

# Tairua Harbour and Catchment Management Plan

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Numerous individuals have given up time and information to contribute to the Tairua Harbour and Catchment Management Plan. It is hoped that the stories and experiences shared have been captured in this overarching strategy to ensure that the wellbeing of the catchment, harbour and its people remains.

It is now our collective responsibility as community, stakeholders, tangata whenua and agencies to bring this document to life.



# Table of contents

<b>Acknowledgements</b>	<b>i</b>
<b>1 Introduction</b>	<b>10</b>
1.1 Background	10
1.2 Integrated catchment management	10
1.3 Regional significance	11
1.4 Intention of the Tairua HCMP	11
1.4.1 Foundation	12
<b>2 Linkages</b>	<b>12</b>
2.1 The Peninsula Project	12
2.2 Coromandel Peninsula Blueprint	13
2.3 Hauraki Gulf Marine Park Act 2000	13
2.4 Proposed Waikato Regional Policy Statement	14
<b>3 Legislative and planning framework</b>	<b>14</b>
<b>4 Tairua HCMP objectives</b>	<b>15</b>
4.1 Objectives and outcomes	15
4.1.1 Vision	15
4.1.2 Objectives	15
4.1.3 Outputs	15
4.2 Outcomes sought by the community	15
<b>5 Catchment description</b>	<b>16</b>
5.1 Location	16
5.2 Catchment communities	19
5.2.1 Tairua	19
5.2.2 Hikuai	20
5.2.3 Pauanui	21
5.2.4 Tangata whenua	22
5.3 Community process	23
5.3.1 Setting the scene for the plan	23
5.3.2 Community engagement and consultation	24
5.3.3 Newsletter	24
5.4 Physical characteristics of the catchment	25
5.4.1 Geology	25
5.4.2 Soils	27
5.4.3 Slope	31
5.4.4 Erosion form and degree of severity (NZLRI)	33
5.4.5 Land cover and land use	35
5.4.6 Land use capability	38
5.5 Terrestrial ecology	41
5.6 Water quality	41
5.6.1 How clean is the water in the river and streams?	42
5.6.2 How clean is the water in the harbour?	42
5.6.3 How clean is the water on the Tairua Harbour beaches?	42
5.6.4 Catchment management issues	42
5.7 Water quantity	42
5.8 Harbour and estuary	44
5.8.1 Ecological values of the Tairua Harbour	45
5.9 Native freshwater fish and invertebrates	47
5.9.1 Fish	47
5.9.2 Invertebrates	48
5.10 Ecosystem services	49
<b>6 Harbour and catchment assessment</b>	<b>49</b>
6.1 Harbour and catchment values	49

6.2	Harbour and catchment key issues	50
6.3	Harbour assessment	51
6.3.1	Coastal vegetation	52
6.3.2	Harbour sedimentation	56
6.3.3	Coastal habitats	59
6.3.4	Beach Care	63
6.3.5	Navigation safety and recreation	67
6.4	Catchment assessment	69
6.4.1	Grahams Stream sub catchment	70
6.4.2	Pepe Stream sub catchment	71
6.4.3	Oturu sub catchment	71
6.4.4	Swampy sub catchment	72
6.4.5	Woody Stream and Hikuai River sub catchments	72
6.4.6	Boom sub catchment	73
6.4.7	Gumdiggers/ Oxley/ Duck Creek sub catchments	74
6.4.8	1st, 2nd, 3rd, 4th branch sub catchments	74
6.4.9	Kitahi sub catchment	74
6.4.10	Stony sub catchment	74
6.5	Biodiversity corridors	75
6.6	Pest plants	76
6.7	Animal pests	78
6.7.1	Landowner support	78
6.7.2	Existing initiatives	78
6.7.3	Future control	79
6.8	Recreation and facilities	79
6.9	Forestry	80
6.9.1	Forestry relationships	81
6.9.2	Forestry activities	81
6.9.3	Community aspirations	82
6.9.4	Looking ahead	82
6.10	Department of Conservation land and activities	83
<b>7</b>	<b>Methods and outcomes</b>	<b>85</b>
7.1	Land and water	85
7.1.1	Land management	85
7.1.2	Riparian enhancement	86
7.1.3	Pest plant control	87
7.1.4	Animal pest control	87
7.2	River and flood management	88
7.3	Coastal land and water	89
7.3.1	Sedimentation management	89
7.3.2	Coastal vegetation management	90
7.3.3	Coastal waters	90
7.4	Recreation and community	91
7.4.1	Methods	91
7.4.2	Benefits and outcomes	91
<b>8</b>	<b>Implementation</b>	<b>92</b>
8.1	Implementation programme	92
8.2	Responsibilities	92
8.3	Community process – implementation	93
8.3.1	Community involvement	94
8.4	Works programme	94
<b>9</b>	<b>Costs</b>	<b>94</b>
<b>10</b>	<b>Monitoring and reporting</b>	<b>95</b>
10.1	Monitoring	95
10.1.1	East coast catchment monitoring objectives	96
10.1.2	Wharekawa catchment monitoring – findings to date	96
10.2	Reporting	96

<b>Bibliography</b>	<b>97</b>
<b>Appendix 1. HCMP boundaries</b>	<b>100</b>
<b>Appendix 2. Legislative and planning framework</b>	<b>101</b>
Soil Conservation and Rivers Control Act (1941)	101
Resource Management Act (1991)	101
Regional Policy Statement	101
Waikato Regional Plan	101
Regional Coastal Plan	102
Department of Conservation	102
Whaia to Mahere Taiao a Hauraki – Hauraki Iwi Environmental Plan	102
Thames Coromandel District Council Community Plan – Tairua Pauanui Hikuai	102
<b>Appendix 3. Ngati Hei O Hauraki</b>	<b>103</b>
<b>Appendix 4. Community representatives for initial working party</b>	<b>105</b>
<b>Appendix 5. Rural landowner consultation summary</b>	<b>106</b>
<b>Appendix 6. Soil classification and description</b>	<b>107</b>
<b>Appendix 7. Soils and agricultural properties</b>	<b>108</b>
<b>Appendix 8. Tairua Harbour and catchment important characteristics</b>	<b>110</b>
<b>Appendix 9. Harbour assessment</b>	<b>112</b>
<b>Appendix 10. Assessment of catchment</b>	<b>116</b>
<b>Appendix 11. Nutrient management and managing soils</b>	<b>125</b>
Nutrient budgets and farm management	125
Managing soils	126
<b>Appendix 12. Draft Local Area Blueprint Actions with HCMP linkages</b>	<b>128</b>

## List of figures

Figure 1: Aerial imagery of catchment with main roads identified.	18
Figure 2: Rural Landowner consultation session. Hikuai Hall, June 2010.	25
Figure 3: Top rock geology of the Tairua Catchment (NZLRI)	27
Figure 4: Soil classification of the Tairua Catchment	30
Figure 5: Tairua catchment slope classes (NZLRI)	32
Figure 6: Tairua catchment erosion type and severity (NZLRI)	34
Figure 7: Showing farm location and type.	36
Figure 8: Tairua catchment Land cover classes from Land Cover Database 2 (LCDB2)	37
Figure 9: Tairua catchment Land Use Capability classes from NZLRI	40
Figure 10: Tairua Catchment Water Shortage Areas.	44
Figure 11: Stream culverts as listed on smartmaps culverts database	48
Figure 12: Streams in brown denote streams identified as “indigenous fishery class”	48
Figure 13: Salt water paspalum near Pauanui Waterways.	53
Figure 14: Estuarine Vegetation Changes in the Tairua Harbour.	54
Figure 15: Coastal vegetation	55
Figure 16: Glass wort and samulous with salt water paspalum beginning to intrude.	60
Figure 17: Pingao growing on foreshore and main beach Tairua. Dune protection works (right) restricting access.	63
Figure 18: Example of dune restoration work by Tairua Beachcare – showing original badly degraded dune dominated by exotics (top), shortly after restoration (excavation and planting)(middle) and just under 2 years later (bottom)	66

Figure 19: Example of dune restoration at Pauanui – showing original badly degraded dune (top), shortly after reshaping and planting (middle) and 18 months later (bottom)	67
Figure 20: Entrance to Pauanui Waterways, local, safety conscious, lads enjoying a spot of fishing.	69
Figure 21: Forest fragment retirement with erosion in foreground. Hikuai Valley.	73
Figure 22: Biodiversity Restoration Corridors Map. Showing Priority classification when compared to whole district.	76
Figure 23: Wilding pine near Oturu Stream.	77

## List of tables

Table 1: Land use and land cover - area	35
Table 2: Percentage of Tairua catchment area in LUC class	38
Table 3: Description of the subclass limitations for the LUC classes	39



# Executive summary

Since the mid seventies when the then area engineer, Roger Harris, reported 'there is an urgent need for a comprehensive catchment scheme aimed....at a plan of land use which will conserve native forest, and will create an appropriate compromise between "production" and "protection" for the purpose of controlling the entry of sediment into the river system', sedimentation and its resulting impact on the harbour and stream systems of the Tairua catchment has been an area of concern.

Rate of infill, a slow decline in water quality and a heightened awareness of the need to preserve community values for social, cultural, economic and environmental outcomes has been a driver of the three communities (Tairua, Hikuai and Pauanui) and associated landowners that make up this catchment.

This plan is essentially a snap shot of the current condition of the harbour and surrounding catchment from which all future works and initiatives can be measured to demonstrate change.

Significant features of this catchment include:

- Coastal wetland systems and intact vegetation sequences
- Generally good water quality meeting contact recreation standards
- Significant landscape and seascape values
- High recreational use area
- Significant cultural and historical sites
- An engaged and proactive community
- Key flora and fauna species including northern rata, kohekohe, north island brown kiwi, hochstetters frog and banded rail.

Key issues, current and potential are:

- Declining aquatic and terrestrial habitat
- Evidence of a general decline in water quality, particularly in peak summer period
- The perceived and actual impact of forestry activities
- Potential for pine to pasture land conversion
- Mangrove expansion impacting on recreational use and other significant habitats
- Salt water paspalum expansion and impact on habitat and hydrology
- Impact of plant and animal pests
- Sedimentation rates in the harbour and surrounding streams
- Decline in fish numbers and species diversity in the harbour.

Key recommended actions for implementation include:

- Retirement of riparian margins, wetlands and forest fragments
- Harbour sedimentation investigation – identify sediment hot spots and opportunities for managing sediment more effectively through trapping, reduction and removal
- River management with focus on willow removal, improving flow and decreasing stream bank erosion
- Pest control – both animal and plant with particular focus on Regional Pest Management Strategy species
- Mangrove management through seedling removal and areas of juvenile to mature mangroves.

Estimated total costs of works is \$1,210,000. Actual costs are dependent on the uptake of work, landowner participation and the level of service provided. The costs do not include major projects such as flood protection, mangrove and saltwater paspalum control and all components of animal pest control. Further work on these areas is planned in the first year following adoption of this plan.

How successful this plan will be in addressing the desired outcomes is dependent on community contribution and participation. It is also reliant on ongoing agency support and financial assistance.

# 1 Introduction

## 1.1 Background

Harbour and catchment management plans (HCMP) provide an integrated approach to the management of natural resources and the protection of community values. They seek to consider the values and uses of a catchment collectively in order to maximise their long term sustainability. The short, sharp nature of the Coromandel catchments provide for ease of connection between people and place, action and effect.

In 2008 the Waikato Regional Council ('the council') completed the Draft Whangamata Harbour and Catchment Management Plan and commenced the Wharekawa HCMP. This led to an ongoing commitment from the Waikato Regional Council to prepare and implement plans for all the Coromandel Peninsula harbours and their surrounding catchments. This commitment was in recognition of the pressures on the coastal environment and the need to address:

- issues catchment-wide
- the increasing demand from communities for services, and
- that collectively the harbour and catchment plans provided an ideal implementation tool to deliver on key strategic and policy directions such as the proposed Waikato Regional Policy Statement (PWRPS) and the Coromandel Peninsula Blueprint.

For the purpose of developing HCMPs 12 management areas were formed within the Coromandel Zone (refer map Appendix 1). These areas were determined by considering:

- geography – water and harbour catchments
- community – settlements and makeup
- topography – of a similar nature and common issues.

Harbours and key water features can connect people to place and encourage active participation in the preservation of 'their patch'. However, consideration of more than just hydrological boundaries is necessary to be able to support the implementation component of the plans.

## 1.2 Integrated catchment management

For the Peninsula Project, catchment management is based on principals of integrated catchment management (ICM) philosophies, namely those developed and encouraged by Landcare Trust, however catchment management for the Peninsula Project is more outcome and works focused rather than research focussed.

The Peninsula Project involves the council, Department of Conservation (DOC), Thames Coromandel District Council (TCDC) and the Hauraki Maori Trust Board (HMTB) in a collaborative effort to:

- 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 goats
- improve diversity of plants and animals
- improve and stabilise catchments
- sustain the mauri of the peninsula from the mountain ranges to the sea.

This project has provided the umbrella under which the HCMPs have been and will continue to be developed.

Integrated management, particularly for water body catchments, riparian areas and the coastal environment is a key policy driver within the proposed Waikato Regional Policy Statement (WRPS). The development of HCMPs is one means of implementing these directions and addressing regionally significant resource management issues. Guiding principles in the development of these plans are:

- Promotion of best practice techniques
- Focus on sustainability – economic, social, cultural and environmental
- The importance of partnership; both between agencies and community
- Collaboration of resources

A well run harbour and catchment process and resulting document will:

- Encourage partnerships between community, key agencies and stakeholders
- Create a proactive community working towards resolving identified issues
- Support sound economic, social, environmental and cultural outcomes.

The key factor behind harbour and catchment management planning is the involvement of communities. Community based management initiatives are encouraged as people who live, work or have a strong connection to an area generally have a greater sense of ownership therefore leading to greater success.

### **1.3 Regional significance**

The Coromandel is often referred to as the playground for the Waikato, Auckland and beyond; the holiday maker's paradise. It is also the jewel in the ecological crown, with key flora and fauna communities, many intact vegetation sequences and the presence of a number of threatened species. These factors, combined with increasing development pressures, mean its management and protection is important for economic, cultural, recreational and environmental values.

The responsibility to ensure appropriate management and protection falls to both the immediate community and those of the wider regional communities. Specific consideration for the development and most importantly the implementation of HCMPs is needed as less than half of the peninsula's population are permanent residents, meaning services and physical contribution often falls to the few rather than the many.

These factors make harbour and catchment management planning a regional priority, this is reflected in the current long term council community plan (LTCCP) and the funding policy for the development of these plans. Funding decisions also need to take account of the effectiveness of HCMPs in delivering on key strategic policy directions in terms of the Coromandel Peninsula Blueprint and the proposed Waikato Regional Policy Statement.

### **1.4 Intention of the Tairua HCMP**

The intention of this plan is to provide an assessment of current pressures and issues in the harbour and catchment and provide a practical strategy to alleviate these. This plan will also action those matters identified in the Coromandel Peninsula Blueprint (both district-wide and local area blueprint (LAB) matters) that fall within its scope. Comparisons will be made over time as a result of recommended works to demonstrate change. More detailed site specific plans will be developed in conjunction with landowners and land managers for specific works and issues on their properties.

This plan is non statutory but it will have the capacity to inform and support statutory documents such as district and regional plans. Its success relies on the uptake and goodwill of landowners and land managers within the catchment as well as the support of key agencies.

Waikato Regional Council staff will work with the Tairua Pauanui Community Board, Iwi, interested landowners, agencies and stakeholders to develop and implement this plan.

### **1.4.1 Foundation**

Sedimentation of Tairua Harbour has long been of concern for this community and agencies. A report by the Hauraki Catchment Board (in 1977) stated that it seemed “fairly certain that the tidal compartment is under attack” from greatly increased sediment flow over the previous 100 years. The report went on to say that “there is an urgent need for a comprehensive catchment scheme aimed...at a plan of land use which will conserve native forest, and will create an appropriate compromise between “production” and “protection” for the purpose of controlling the entry of sediment into the river system”.<sup>1</sup>

In 2008 Waikato Regional Council staff were invited by the Tairua Ratepayers Association to attend a meeting in regards to concerns on the health and wellbeing of the Tairua Harbour. This invitation, combined with interest expressed from landowners in the Hikuai settlement and contact from a number of interest groups, assisted in cementing Tairua as the next plan development area.

## **2 Linkages**

Over the past three years the Waikato Regional Council has been developing harbour and catchment management plans on the Coromandel Peninsula under the Peninsula Project umbrella. It is agreed that this form of planning should continue and in addition that it should provide a key implementation tool to deliver on strategic policy directions set by the Coromandel Peninsula Blueprint and the proposed WRPS. It also provides a mechanism for agencies and the community to give effect to the Hauraki Gulf Marine Park Act 2000 (HGMPA).

The Tairua Harbour and Catchment Management Plan will be implemented predominantly through the Peninsula Project and Coromandel Blueprint with support from Thames-Coromandel District Council (TCDC), the Department of Conservation (DoC), the Tairua Pauanui Community Board, existing care groups and iwi.

Outlined below is an overview of the Peninsula Project, Coromandel Blueprint, HGMPA and the proposed WRPS in relation to this harbour and catchment management planning process.

### **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 address these issues. It is a collaborative project between the Waikato Regional Council, 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.

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<sup>11</sup> EW TR 2008/12 Coastal Sedimentation. Reference to Harris, 1977

The Peninsula Project team is responsible for the development and oversight of the implementation of this plan.

## 2.2 Coromandel Peninsula Blueprint

The Coromandel Peninsula Blueprint is a strategic planning document that identifies the development and protection of the Coromandel Peninsula for the next 20 - 50 years. It is an inter-agency project run by four partners: Waikato Regional Council, Thames Coromandel District Council, the Department of Conservation and Hauraki Whaanui.

The project is made up of two stages: The district-wide strategy "Framework of Our Future", and the "Local Area Blueprints".

The "Framework for Our Future" provides strategic direction via outcomes and goals for the future. It's written in its strategy (volume 1) and furthered in its implementation mechanisms (volume 2). This "Framework for Our Future" is essentially non-spatial, apart from its identification of three growth centres: Thames, Whitianga and Whangamata, which helps focus future development impacts away from the peninsula's surrounding natural and landscape values. The non-spatial focus relates to four topics:

- natural values of biodiversity and landscapes
- diversity and vibrancy of the settlements
- social, economic and cultural requirements for communities
- avoidance of natural hazard impacts and resilience of communities.

The "Framework for Our Future" was adopted in 2010 and will be implemented through statutory plans, operational plans and "Local Area Blueprints".

The local area blueprints are catchment-based<sup>2</sup>. These local scale, 'zoomed in' versions are mainly spatial plans/maps that indicate areas for various development and protection needs as well as more general actions at a harbour or catchment scale. These maps/actions will inform the statutory and non-statutory planning processes and will be implemented through various management tools, including this harbour and catchment plan. The range of actions identified as part of the LAB process that can be implemented through this plan are identified in appendix 11.

## 2.3 Hauraki Gulf Marine Park Act 2000

The Hauraki Gulf Marine Park covers the Hauraki Gulf, Waitemata Harbour, Firth of Thames and the east coast of the Coromandel Peninsula.

The Hauraki Gulf Marine Park was established by special legislation in February 2000. The Hauraki Gulf has a natural richness, environmental quality, biological diversity and landscape that make it outstanding and distinctive within New Zealand.

By establishing some overall objectives for the gulf, its islands and catchments, the act provides integrated management across land and sea, so that the effects of urban and rural land use on the gulf are given proper attention and the life supporting capacity of the gulf is protected. The act provides for integrated management of the gulf across 21 statutes including the Resource Management Act, Conservation Act and Fisheries Act.

The HCMP processes, with their integrated mountain to sea focus, quadruple bottom-line approach and community engagement emphasis are ideal tools to assist in the achievement of the broader aims of the HGMPA at an operational level.

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<sup>2</sup> Each LAB is based on a number of water-based catchments so from a pure hydrological perspective they are actually groups of catchments.

## 2.4 Proposed Waikato Regional Policy Statement

The purpose of a regional policy statement is to achieve the purpose of the Resource Management Act 1991 by providing an overview of the resource management issues of the region, and policies and methods to achieve integrated management across the region.

Integrated management requires the adoption of an approach that recognises and accounts for:

- the natural processes and basic principles that support life;
- the complex interactions between air, water, land and all living things;
- the needs of current and future generations;
- environmental, social, economic and cultural outcomes; and
- the need to work with agencies, landowners, resource users and communities.

The HCMP processes, with their integrated mountain to sea focus, quadruple bottom-line approach and community engagement emphasis are ideal tools to assist in the achievement of proposed WRPS policy directions<sup>3</sup> and to address those regionally significant issues of relevance to the Thames-Coromandel District.

## 3 Legislative and planning framework

A number of legislative frameworks exist that guide and direct Waikato Regional Council 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)
- Hauraki Gulf Marine Park Act (2000)
- Wild Animal Control Act (19
- Conservation Act (1987)
- Reserves Act (1977)
- Operational and Proposed Waikato Regional Policy Statement
- Waikato Regional Plan and Regional Coastal Plan
- Coromandel Peninsula Blueprint
- Waikato Conservation Management Strategy
- Protected Natural Areas Programme
- Whaia to Mahere Taiao a Hauraki – Hauraki Iwi Environmental Plan
- Thames Coromandel District Council Community Plan.

Information on these documents and the components that relate to this plan can be found in appendix 2.

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<sup>3</sup> The Tairua HCMP directly or partially addresses a substantial portion of the PWRPS objectives including: Objective 3.1 Integrated Management; Objective 3.5 Adapting to Climate Change; Objective 3.6 Coastal Environment; Objective 3.7 Ecosystem Services; Objective 3.8 Relationship of Tangata Whenua with the environment; Objective 3.12 Mauri and health of marine waters; Objective 3.13 Mauri and health of fresh water bodies; Objective 3.15 Riparian areas and wetlands; Objective 3.18 Ecological integrity and indigenous biodiversity; Objective 3.19 Outstanding natural features and landscapes; Objective 3.20 Amenity; Objective 3.21 Natural character; Objective 3.22 Public access; Objective 3.23 Natural hazards; and Objective 3.24 Values of soil.

## 4 Tairua HCMP objectives

### 4.1 Objectives and outcomes

A number of key objectives came from the community through hui, meetings and one on one discussions. These, in conjunction with the vision and objectives form the basis of the harbour and catchment management plan.

The community's aspirations and concerns have been collated into a collective vision. Their dedication to protecting the catchment as well as Waikato Regional Council's commitment through the Peninsula Project for integrated catchment and harbour protection are the driving force for this document.

#### 4.1.1 Vision

*To ensure the preservation of the community's values, the harbour, surrounding lands, water and biodiversity for future generations to enjoy.*

#### 4.1.2 Objectives

An integrated approach to the protection and enhancement of the Tairua 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.

#### 4.1.3 Outputs

Two core documents will be prepared as part of the HCMP and will drive the implementation and progress reporting for the plan. They are:

- Tairua Harbour and Catchment Management Plan (Technical series)
- Implementation strategy – based on objectives and outcomes

## 4.2 Outcomes sought by the community

Key outcomes sought as a result of the development and implementation of the HCMP as identified by the community include:

- An engaged and proactive community
  - Coordination of efforts, information and communication
  - Engagement of the great volunteer networks that already exist
  - Education opportunities identified and implemented
- Commercial forests well managed
  - Activities to be carried out in a best practice manner
  - Forestry companies to be 'good neighbours' (refer to section 6.10 - Forestry)
- Management of coastal vegetation
  - Consent gained for management of mangrove seedlings and a hold the line approach taken
  - Removal, where appropriate, of mature mangroves where expansion threatens recreational activities and key ecological habitats
  - Control of saltwater paspalum
- Recreational opportunities enhanced and managed
  - Water quality suitable for swimming/fishing/shellfish gathering
  - Access to walkways, streams and harbour for all users
  - Facilities for visitors provided so visitors are welcomed
- Sedimentation minimised
  - Opportunities for dredging identified, explored and implemented

- Reduction of sediment entering the system through land management practices
- Harbour access and depth maintained
- Ecological health and biodiversity values enhanced
  - Appropriate animal pest control with variety of methods carried out
  - Biodiversity preserved and enhanced
  - Wildlife protected
  - Plentiful shellfish and fish stocks maintained
  - Pest plant control and education
- Water quality improved and maintained
  - Aim of superb water quality achieved
  - Streams to be at drinking standard
  - Cattle access to stream beds, wetlands and harbour margin removed
  - Management of nutrients through development and implementation of nutrient management plans
- Stable catchments
  - Appropriate shore line, stream bank and hillside erosion protection
  - Flooding potential and impact minimised
- Lifestyle, values and opportunities maintained
  - Reduced ribbon development
  - High quality soil areas preserved
  - Continued ability to earn and live locally
  - Be able to farm trans-generational.

While many of the above aspirations can be addressed through the implementation of the HCMP a number will not be and would not be appropriate to do so. The plan will assist in informing other methods of implementation such as the district Plan, regional plan or regional pest management strategy to ensure these are actioned. These actions will be identified in the implementation strategy.

## 5 Catchment description

Whether travelling to the Tairua catchment from the north or south you know you have arrived as Paku (Paaku) Mountain, standing like a guardian over the Tairua catchment comes into view. For generations Paku has been a protector and guardian of Tairua, be it from nature's force or as a vantage point for Maori tribes to spot approaching enemies. One Maori legend dubs it as the home of Turehu – forest dwelling fairies. Local kuia Moana Jones' view is that Paku is the fairy guardian of Tairua.

A story that goes back generations tells that anyone who climbs the mountain will always return back there.<sup>4</sup> Perhaps this is why the communities wish to preserve this place is strong.

### 5.1 Location

The Tairua catchment sits between the Whitianga catchment to the north and the Wharekawa (Opoutere) catchment to the south in the central east coast of the Coromandel Peninsula.

The catchment comprises three settlement areas; Tairua, Hikuai and Pauanui. Though these communities are linked by road, stream, and harbour they are diverse and are generally treated as three separate settlements with differing needs and views. We have received a clear message from all three communities through the development of this plan; to provide opportunities for better linkages between the settlements through joint projects and initiatives. In theory this sounds positive, in practice the meetings and attempts at engagement have been most successful when treated as three separate

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<sup>4</sup> Information sourced from Paaku views magazine and in consultation with Moana Jones.

communities. This is also reflected in the three separate community plans<sup>5</sup> for this area.

The catchment is still home to a strong pastoral community with the Hikuai settlement at its centre. Its catchment area contains some of the highest quality soils of the Coromandel; the challenge will be ensuring that the high quality soil areas are preserved.

Main centres Pauanui and Tairua are influenced by their proximity to the sea and the ease of interaction between people and the coastal environment. Basic services are provided in shopping centres as well as award winning café's and restaurants.

For the purpose of this plan the catchment area is based on zoning as identified through the Peninsula Project. This area extends beyond the true hydrological catchment area to take in the river systems that feed into the Tairua harbour, along with consideration of settlements that connect with this coastal and land environment. As such the area of the catchment is 29,381 hectares. Refer to figure 1 for more detailed information.

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<sup>5</sup> Tairua; Your Future, Your Choice, Your Community – Tairua Community Plan 2006 : Hikuai Community Plan 2006 : Pauanui Community Plan 2005



Figure 1: Aerial imagery of catchment with main roads identified.

## 5.2 Catchment communities

### 5.2.1 Tairua

#### 5.2.1.1 A brief history

Throughout its long history Tairua's river, harbour and surrounding waters have been central to its development. As early as the 1300s the area provided a rich bounty of food and other resources to a growing Maori population. Ngati Hei, an early settler, came under extreme pressure by other tribes notably Ngapuhi and Ngati Tamatera, losing much of their tribal lands and by the 1820s few people remained.

Tairua was not significantly resettled until the kauri timber industry brought Europeans in the 1830s and by 1864 a large mill employing 100 men marked the real beginning of Tairua as a European settlement.

Forestry, gum and later gold continued to sustain Tairua's economy. By late 1800s farming had commenced on a semi commercial basis and by the mid 1920s had taken over as the dominant economic activity.

Despite many ups and downs and dramatic population changes, Tairua has survived. This is due to its natural scenic beauty and the development of the Kopu-Hikua road, improving access and enhancing its popularity both for permanent residents and holiday makers.<sup>6</sup>

#### 5.2.1.2 Tairua today

Tairua's population continues to grow as do the pressures on land, water and zoning for industrial and residential areas. Projections suggest there will be 1900 dwellings in Tairua by 2016, an increase of over 500 dwellings on the 2001 total of 1370 dwellings. Current permanent population is around 1296 residents<sup>7</sup>.

The Tairua school is well supported and a cornerstone of this community.

This community wishes to maintain the natural back drop, enhance land and seascapes and preserve environmental values whilst ensuring economic growth and prosperity.

Access to the coastal environment and consideration for the natural environment and its creatures is paramount for this community. The community is skilled at rallying its residents for events such as the successful Tairua Food and Wine Festival and for causes like the preservation of the harbour and environment.

#### 5.2.1.3 Aspirations

The ease of interaction between people and the coastal environment of both the harbour and estuarine system through to the open coast and surf beach provide an enticing draw card that has shaped this community.

The Tairua community is passionate about its harbour, providing access for a variety of users, whilst ensuring that natural integrity remains and the environment is always considered.

Key aspirations held by this community in relation to this plan are:

- flood pressures and impact alleviated in Grahams Creek area.
- Manaia road causeway upgraded to alleviate flood hazards.
- flood issues around Redbridge road remedied.

<sup>6</sup> Tairua; Your Future, Your Choice, Your Community – Tairua Community Plan 2006.

<sup>7</sup> Based on usual resident population from census figures.

- mangrove expansion halted and active removal of mangroves undertaken to provide for other habitats and recreational use
- coastal wetland areas preserved and enhanced to provide habitat for threatened bird species such as banded rail and fern bird
- Saltwater paspalum controlled
- water quality enhanced particularly around Pepe Stream area and harbour
- all tide navigation access in harbour
- reduction in amount of sediment entering harbour.

## 5.2.2 Hikuai

### 5.2.2.1 A brief history

Hikuai means literally the ‘tail of the water’ in reference to the upper limit of the tide. Pa sites denote the early settlement here by Maori, but in the 1820s warfare saw hundreds of inhabitants killed and the area not re-settled.

Hikuai’s history was strongly influenced from about 1862 by the logging of kauri and the search for gum and gold. Gold was discovered in the Neavesville in 1875 and later at Puketui where another settlement was established.

1897 was an important year with the opening of the post office and the school which until 1915 was known as the Tairua Block School. Gold mining ceased in 1911 and the outbreak of war in 1914 brought an end to the gum digging. At this time 2181 hectares was made available to be divided into 15 farms for returned soldiers. Years of road access issues to either Thames or Waihi were resolved when in 1928 the road to Waihi was opened followed by the forming of the Kopu Hikuai Road in 1967. This provided much greater ease of access and ever increasing visitor numbers to the Coromandel.<sup>8</sup>

### 5.2.2.2 Hikuai today

The Hikuai community today remains a strong pastoral community and is the hub for such activities in the Tairua Catchment. The fertile soils, some of the most fertile on the Coromandel, along with good access to water lends itself to these activities. In recent years there has been an increase in the number of lifestyle blocks as people seek their slice of rural paradise.

The well maintained Hikuai hall is a pivotal meeting place for the community to come together and maintain the sense of community and connection with neighbours.

The resilience and community feel of this place supports an ever popular school with students travelling from Tairua and Pauanui to attend and experience the benefits of a rural school environment.

The community here wish to maintain the rural open landscape, support farming as a practice with a future while encouraging visitors to experience the natural surroundings thus providing other economic opportunities. The current usual population is around 260 residents.

### 5.2.2.3 Aspirations

The backbone to this community is the river network that dissects the valleys, providing water and recreation opportunities as well as the mountain ranges cross hatched with walking tracks and opportunities to experience nature. However, the same rivers that provide so much are not easily accessed and are often in poor condition, leading to erosion and flood hazards.

Key aspirations held by this community in relation to this plan are:

- well maintained river networks free of blockages and inappropriate vegetation

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<sup>8</sup> Hikuai Community Plan 2006

- facilities such as rubbish and waste water disposal enhanced to encourage visitors to the area
- access to the Tairua River via TCDC reserve lands south of Bailey Bridge at Hikuai and this site to be developed as a recreation area
- enhanced walkway and cycle way facilities to link from Prescott's Garage to the Puketui Valley and potentially to Pauanui and Tairua
- water quality enhanced and maintained so rivers can still be swum in and drunk from
- restoration of the cabbage tree forest wetland system located on main stem Tairua River – true left bank
- reduction of possums and goats through an inclusive process linking to the Hikuai Wharekawa Community Possum Control Scheme as well as involving local hunters
- strong sense of community maintained, local hall used for events
- greater controls on forestry activities around harvesting to reduce the amount of sediment leaving forests, threatening pasture, blocking river systems and entering the harbour.

## 5.2.3 Pauanui

### 5.2.3.1 A brief history

Due to the predominantly flat nature of the majority of Pauanui, Maori occupation of the area was focused on temporary habitation as the lack of easily defended naturally occurring land features did not encourage permanent settlement. Evidence of this is apparent in a number of recorded archaeological sites including Te Karaka Pa at Tangitarori Lane.

Pauanui was developed for farming in the early 1950s with limited access. In the late 1960s construction of the Kopu Hikuai Road brought Pauanui within reasonable driving distance of the Waikato and Auckland regions.

In the 1960s the Hopper brothers purchased a significant undeveloped land parcel from the Needham family. This provided an ideal opportunity to 'master plan' a new township.

The results of this comprehensive planning now characterises the Pauanui community. Many of the design components of the original development of Pauanui were deemed as innovative and the first of their kind in New Zealand and are now incorporated into many other modern developments.

Pauanui's attractive coastal environment and improved accessibility make it look set for continued popularity as a destination.<sup>9</sup>

### 5.2.3.2 Pauanui today

In recent times, Pauanui has undergone continued development, with further subdivision proposed and pressure on the district council to re-zone areas. This raises the challenge of protecting and enhancing the character of Pauanui while still drawing people to the area.

Pauanui is a mix of both permanent residents and holiday makers resulting in significant population fluxes particularly over the summer months. The median age of permanent residents is higher than that of the New Zealand average with 4 in 10 people living in Pauanui aged 65 years and older. The current usually-resident population is around 730 residents.<sup>7</sup>

The community here is well organised and very involved in local issues and ensuring the values held by the Pauanui community are preserved.

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<sup>9</sup> Pauanui Community Plan 2005

The proximity to both the harbour and surf beach makes this a fishermen and boaties paradise.

### 5.2.3.3 Aspirations

Key issues for this community relate to the recreational use of the coastal marine area, access and the overall well being of the harbour.

Key aspirations held by this community in relation to this plan are:

- increased dredging of harbour to provide all tide access
- preservation of dotterel breeding sites
- catchment works to dramatically reduce sediment entering the harbour
- saltwater paspalum control
- management of mangroves in high recreational use areas and preservation of mature mangrove communities for habitat values.

### 5.2.4 Tangata whenua

Nature holds its own stories in Tairua as symbolic trees, now referred to as heritage trees, firmly rooted to the earth stand tall and remind us of time gone by and the need to acknowledge our history as we move forward. These trees symbolise and mark places such as food sharing areas to a mourning spot to farewell loved ones. The trees reveal an insight in to the lives and customs of Maori tribes. Seventeen heritage trees have been identified around Tairua. The tree Tutuaki (to stand guard) for example is said to be standing guard over the place where an ancient mother of pearl fishing lure was found during an archaeological excavation in 1958. The lure was dated to the late 13<sup>th</sup> century.<sup>10</sup>

Input has been sought from Ngati Rautao (on behalf of Ngati Maru) and Ngati Hei with considerable interest from both as well as a strong desire to see the values of the harbour, the surrounding land and waterways preserved for future generations.

Representatives from Ngati Rautao have contributed time and information to this process and a willingness to support the plan and its implementation where possible.

Ngati Hei, while having expressed an interest and their support for this type of planning and associated works, currently are heavily involved in the treaty settlement process for Hauraki settlement and as a result have not been able to contribute in the same way. A brief history of Ngati Hei and their relationship to the Hauraki rohe has been included in appendix 3.

It will be an important part of this plans implementation to continue to work with and to support the desires of all those with ancestral links to this place and a desire to preserve and enhance the mauri of the Tairua catchment and associated waterways.

#### 5.2.4.1 Concerns and outcomes

##### 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, Tairua community and agencies not as strong as it could be.
- Greater recognition for role as kaitiaki of taonga such as kaimoana and waahi tapu sites.
- Decline in kaimoana, both abundance (ie, lack of flounder) and diversity (lack of kingfish, stargazers etc).

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<sup>10</sup> Extracts from Paaku View Summer edition 2010 with permission from Moana Jones.

- Change in sea bed structure: mud more slimy and increased sea lettuce blooms.
- Preservation of kaimoana areas. Greater efforts in the protection of the harbour environment.
- Decline in water quality and historical impacts such as the mill and the old sewage plant.
- Perceived and actual impact of forestry post harvest.

#### **Outcomes sought**

- Outcomes to accommodate cultural and spiritual values held by tangata whenua, such as recognition of significant sites and features such as heritage trees.
- Tangata whenua satisfied that their concerns in regards to the mauri of water are being recognised and appropriately addressed.
- The relationship of tangata whenua with water and the coastal environment is better understood.
- Significant ancestral sites protected and value recognised.
- Management of customary fishing areas.
- Partnerships in the implementation of iwi management plans.
- Meaningful co-governance roles and opportunities sought.

## **5.3 Community process**

### **5.3.1 Setting the scene for the plan**

In 2007 the Peninsula Project team were contacted by Hikuai residents concerned about increased river bank erosion, decreasing channel capacity and problem vegetation such as poorly maintained willow and silver poplar. At this time the area engineer and land management officer completed a sub catchment inspection and developed a works programme

Then in 2008 Waikato Regional Council was contacted by the Tairua Ratepayers Association out of growing concern around sedimentation of the harbour and water quality issues. A meeting was held at labour weekend and a facilitated session was run to identify the issues and concerns of those present. An outcome of this meeting was the collation of desired actions and outcomes for the harbour and catchment. These along with feedback received through the consultation process have been used to form the foundations of the HCMP.

At the end of the meeting people were encouraged to come forward to be part of a core working group to look at the potential for action on the ground and to begin to form the foundations for the development of a harbour and catchment plan.

Community members who put forward their names to be a part of this core working group are identified in appendix 4.

Several meetings were held with the majority of those listed in appendix 4 present. These meetings were called and facilitated by group members. In late 2009 it was decided in conjunction with this group that a group with a wider focus (catchment wide not just harbour) and representation of the wider catchment and its community was needed. It was suggested that the primary contact group be the Tairua-Pauanui Community Board.

This was approved by the Tairua Pauanui Community Board in early 2010 and re endorsed by the newly elected community board in November 2010. Waikato Regional Council staff have worked with the community board since this time to develop this plan.

### 5.3.2 Community engagement and consultation

The number of interested stakeholders in the catchment made this an attractive option for a HCMP. Efforts have been made to make contact with a wide range of organisations and stakeholders to ensure a representative view was obtained.

Organisations and groups that have been contacted and consulted or given the opportunity to contribute are:

- Iwi
  - Ngati Hei
  - Ngati Rautao
- Local community interest groups
  - Hikuai Wharekawa Community Possum Control Scheme
  - Guardians of Paku
  - Tairua Game Sports Fishing Club
  - Tairua Harbour Committee
  - Coastguard
  - Pauanui Boating Club
  - Ratepayers associations
  - Tairua Pauanui Community Board
  - Rural landowners (>5ha)
  - Coastal Walkways Society
  - Pauanui Waterways
  - Harbour Care
- Department of Conservation
- Thames-Coromandel District Council
- Landowners and residents
- Forestry – Rayonier via the Coromandel Liaison Subcommittee and direct contact

A visual summary of the issues raised in the rural landowner's sessions can be found in appendix 5.

### 5.3.3 Newsletter

To ensure as wide an audience as possible was included in the process a newsletter was sent to every ratepayer in December 2010. This included a summary of the draft issues, proposed actions and desired outcomes as identified in the HCMP. Advertisements were also placed in local papers and were circulated to a range of stakeholder groups to ensure as many people as possible responded. Ratepayers were invited to complete a feedback form and provide comment on the draft content.

Around 250 feedback responses were received. A summary of feedback results are as follows:

- Respondents Age:
  - 40-60 – 31 per cent
  - 61 – 70 – 36 percent
  - 70+ - 25 per cent
- 52 per cent were not permanent residents
- 83 per cent agreed with outcomes identified
- 35 per cent felt there were additional issues to cover (most of which were already included in the draft HCMP, just not in the newsletter)
- 73 per cent were either satisfied or very satisfied with the draft HCMP
- 84 per cent wanted to see mangroves managed
- 85 per cent wanted to see saltwater paspalum control.

Overall the response was very positive and confirmed the direction of the harbour and catchment plan.

As implementation of the plan is carried out it will be important to ensure that regular contact is maintained with the wider community including; opportunities for involvement and communication of progress. It is proposed that this will be done through:

- regular updates to the Tairua Pauanui Community Board and/or the Harbour Committee
- newsletter to all ratepayers on an annual basis
- media releases, particularly around peak summer season using local media such as the Tairua Advertiser and Paku View Magazine
- Waikato Regional Council's website ([www.waikatoregion.govt.nz](http://www.waikatoregion.govt.nz)).



Figure 2: Rural landowner consultation session. Hikuai Hall, June 2010.

## 5.4 Physical characteristics of the catchment

The Tairua catchment is situated on the eastern coast of the Coromandel Peninsula and drains an area of 29,381 hectares via a network of streams that flow into the Tairua Harbour before exiting to the Pacific Ocean.

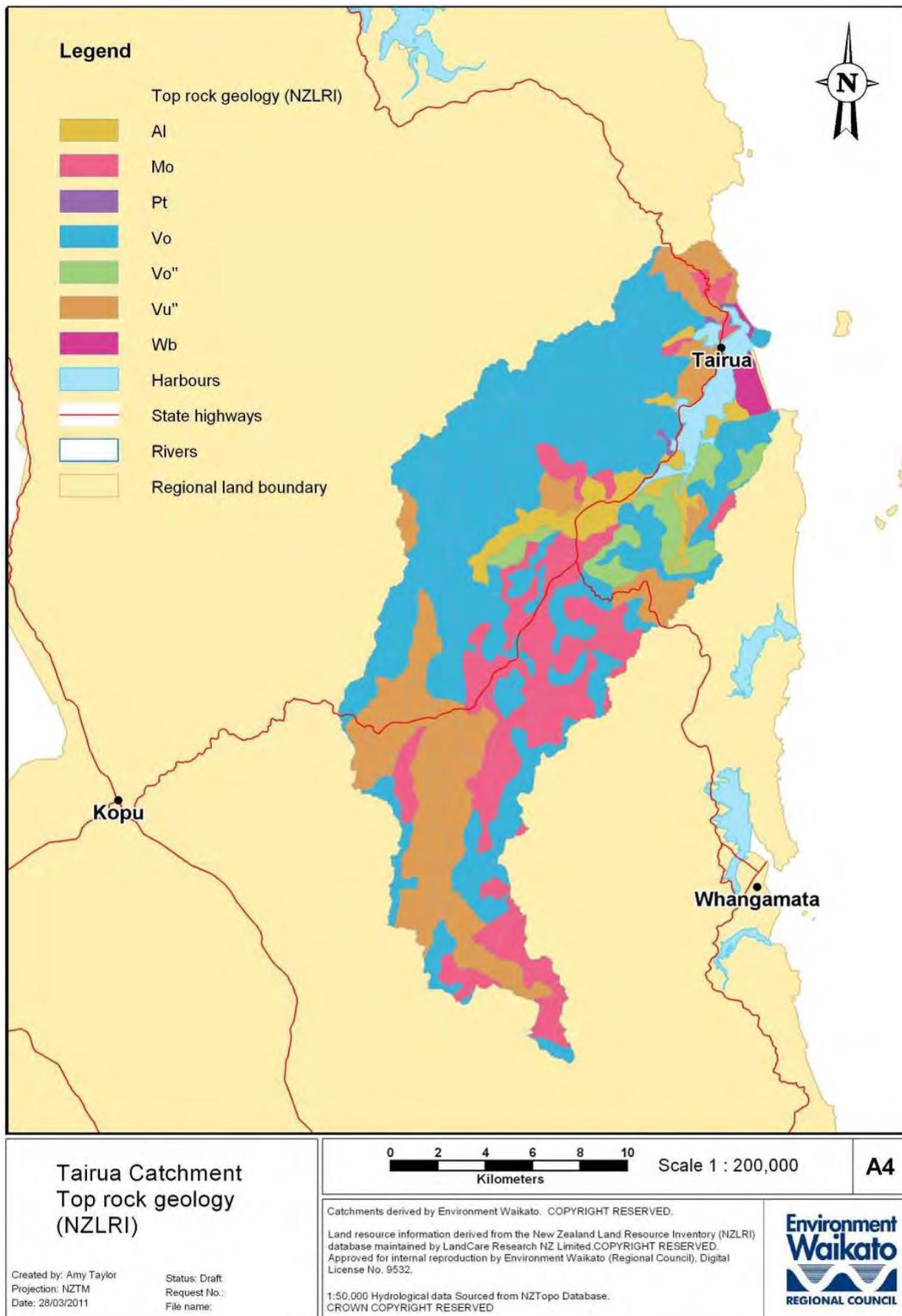
The catchment is a rugged landscape made up of predominantly volcanic geology. Rainfall is high, as is the potential for soil erosion. Key features include:

- Average annual rainfall is 2384mm with falls between 1,600-2,400mm/year.
- Dominant base rock: hard volcanic rock (54 per cent), weathered soft volcanic rock (27 per cent).
- Dominant soil type: yellow brown earth (56 per cent), yellow brown loam (22 per cent).
- Erosion potential: moderate/high.

### 5.4.1 Geology

A variety of geology types are present in the Tairua catchment as mapped in the New Zealand Land Resource Inventory (figure 3).

Volcanic activity has resulted in eruptive rocks and ashes covering older base rock. Rhyolitic pumice breccias, ignimbrite, volcanic lavas, rhyolitic domes, andesitic flows, dikes and outcrops (Rijkse and McLeod, 1995), make up just over 54 per cent of the catchment. Soft volcanic rocks and ashes (Holocene to Pliocene era) have mantled the area with thickness varying from 0 to 2-3m (Rijkse and McLeod, 1995) and are present in approximately 40 per cent of the catchment. The remainder of the catchment is a mix of alluvial material derived from tephra which cover the narrow terraces, pockets of peat and windblown sands along the shore.



**Figure 3: Top rock geology of the Tairua catchment (NZLRI)**

### 5.4.2 Soils

There are a wide variety of mapped soils in the Tairua catchment. These soils were mapped as part of the New Zealand General Survey of the Soils of the North Island

<sup>11</sup>and reinterpreted at 1: 63 360 scale for the New Zealand Land Resource Inventory (NZLRI) maps. The NZLRI maps were updated and the information is taken from the 2<sup>nd</sup> edition maps.

The soils of the Tairua catchment are developed predominantly in old volcanic material and are predominately brown soils (72 per cent of catchment) as shown in figure 4. Two brown soil groups are recognised, orthic brown and sandy brown. Brown soils have well developed subsoil horizons and are found where soil moisture is adequate.<sup>12</sup> The top soils are reasonably stable and they have good soil structure.

- The acidic orthic brown soil (Tangatara, Puketui and Te Kie series) is the dominant subgroup making up 60 per cent of catchment and is found on rolling to steep land on midslope and footslopes on the McBeth, Hikuai and Motutapere land systems. The soils are predominantly well drained and deep, formed from weathered rhyolite, ignimbrite or andesite and have an acidic B horizon (pH less than 5.5). The rolling areas will support high quality pastures with support through top-dressing and have low erosion potential. Some of the hilly land and steeper areas (greater than 26 degrees) have been planted in *Pinus radiata* and phosphate and potassium are the probable deficiencies for that land use and for pasture<sup>13</sup> Soils on steep slopes (greater than 26 degrees) are subject to severe erosion if the covering vegetation is removed.
- Typic orthic brown soils have subsoils with pH greater than 5.5 and are found on the same land systems as the acidic orthic brown soils. They are also predominantly well drained (there are some imperfectly drained soils - mottled orthic brown three per cent of area) and deep soils. These soils (Pukenamu, Waitakere and Aroha) make up eight per cent of the catchment.
- Sandy brown soils (Tangitiki series, one per cent of catchment) are found on the Pauanui land system on inland dunes. These soils are deep but prone to drought and can have a mottled profile form in places indicating some drainage impediment.

The allophanic soils (Whangamata series) derived from volcanic ash, are strongly weathered, well drained, uniform soils<sup>14</sup> and make up approximately 11 per cent of the catchment. The soils are found on the McBeth, Hikuai and Motutapere land systems (rolling to steep land) on crests, plateaus, mid and footslopes. Topsoils are stable and resist the impact of machinery or grazing animals in wet weather. Erosion rates are generally low except on steep slopes or exposed sites which do occur in the Tairua catchment.

Mapped in the NZLRI as pumice soils the podzolic orthic pumice soil make up nine per cent of the catchment. These soils are found on the McBeth, Hikuai and Motutapere land systems (rolling to steeper land). Pumice soils are sandy or gravelly soils dominated by pumice, or pumice sand. They have low soil strengths, high macroporosity, and deep rooting depth. Soils have low strength when disturbed, but are generally resistant to livestock treading damage<sup>15</sup>).

These podzolic orthic pumice soils may occur in areas of higher rainfall and are usually associated with forest trees with an acid litter. There may have a bleached horizon immediately beneath the topsoil and an underlying dark or reddish coloured horizon.

There are small areas (four per cent of catchment) of gley soils (Ohinemuri series) on the low terraces, floodplains and estuarine flats that make up the Tairua land system.

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<sup>11</sup> New Zealand Soil Bureau 1954

<sup>12</sup> Rijkse and McLeod, 1995.

<sup>13</sup> Rijkse and McLeod, 1995.

<sup>14</sup> Rijkse and McLeod, 1995

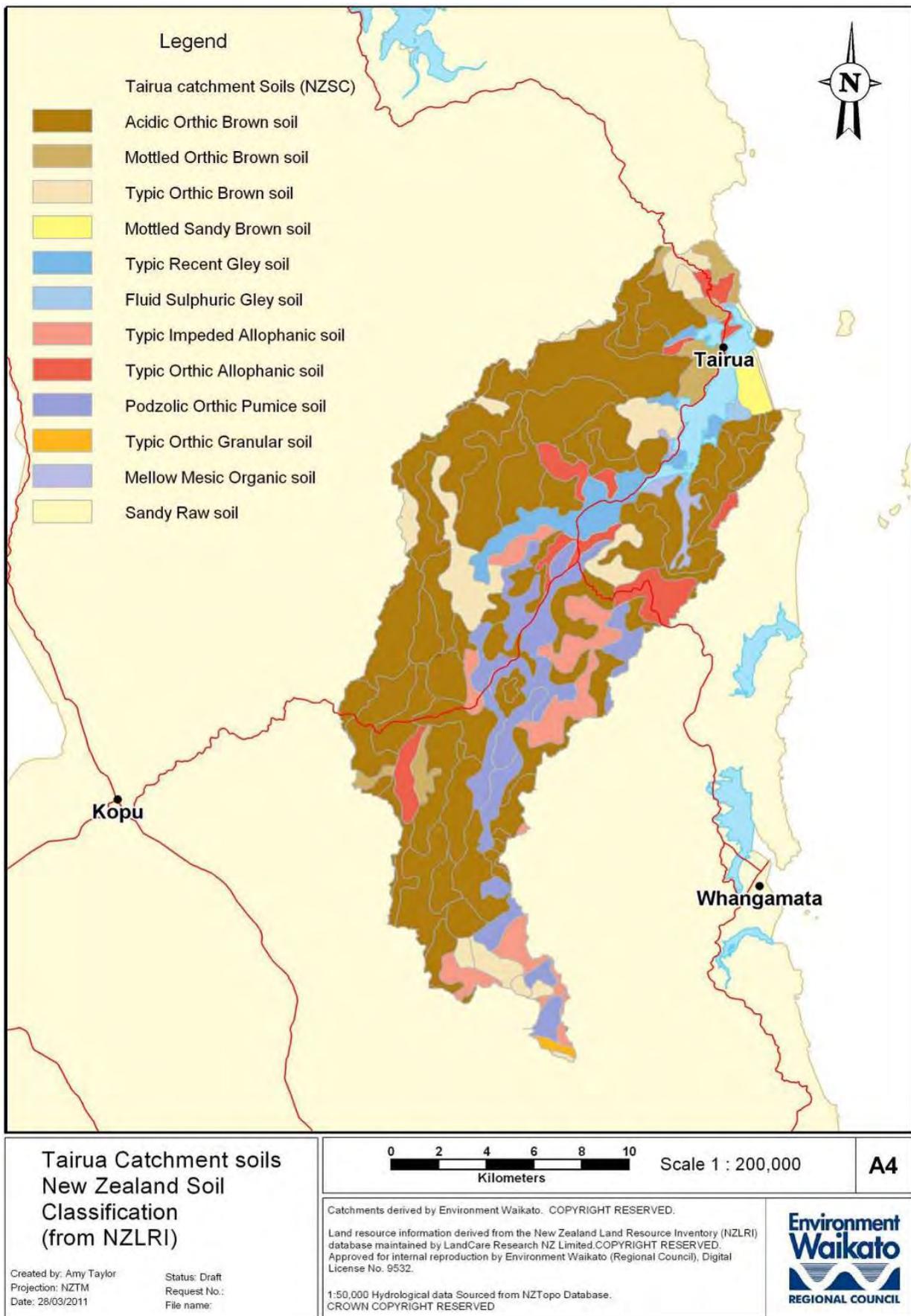
<sup>15</sup> ([http://soils.landcareresearch.co.nz/contents/SoilNames\\_NZSoilClassification\\_SoilOrders](http://soils.landcareresearch.co.nz/contents/SoilNames_NZSoilClassification_SoilOrders))

The soils are deep, poorly or very poorly drained soils. They are derived from alluvial and colluvial silts eroded from the slopes of the catchment and estuarine silts and sands (Rijkse and McLeod, 1995). The dominant group is the recent gley soils which have had recent deposits of alluvium as indicated by buried top soils. These soils are used for grazing but may be acidic in places and have a sandy texture.

The remainder of the catchment is made up of small areas of organic soils and raw soils. Organic soils are found in swamps in the Tairua land system and in hollows on the plateaus of the McBeth land system. They are unsuitable for pasture development though may have been drained.

Raw soils of the dune system have no topsoil development, structure and colour. They are sandy in texture and the parent material is aeolian coastal sand. The fore dunes are fragile and prone to erosion where there is no vegetation.

Refer to appendix 6 and appendix 7 for soil classifications, descriptions and agricultural properties.

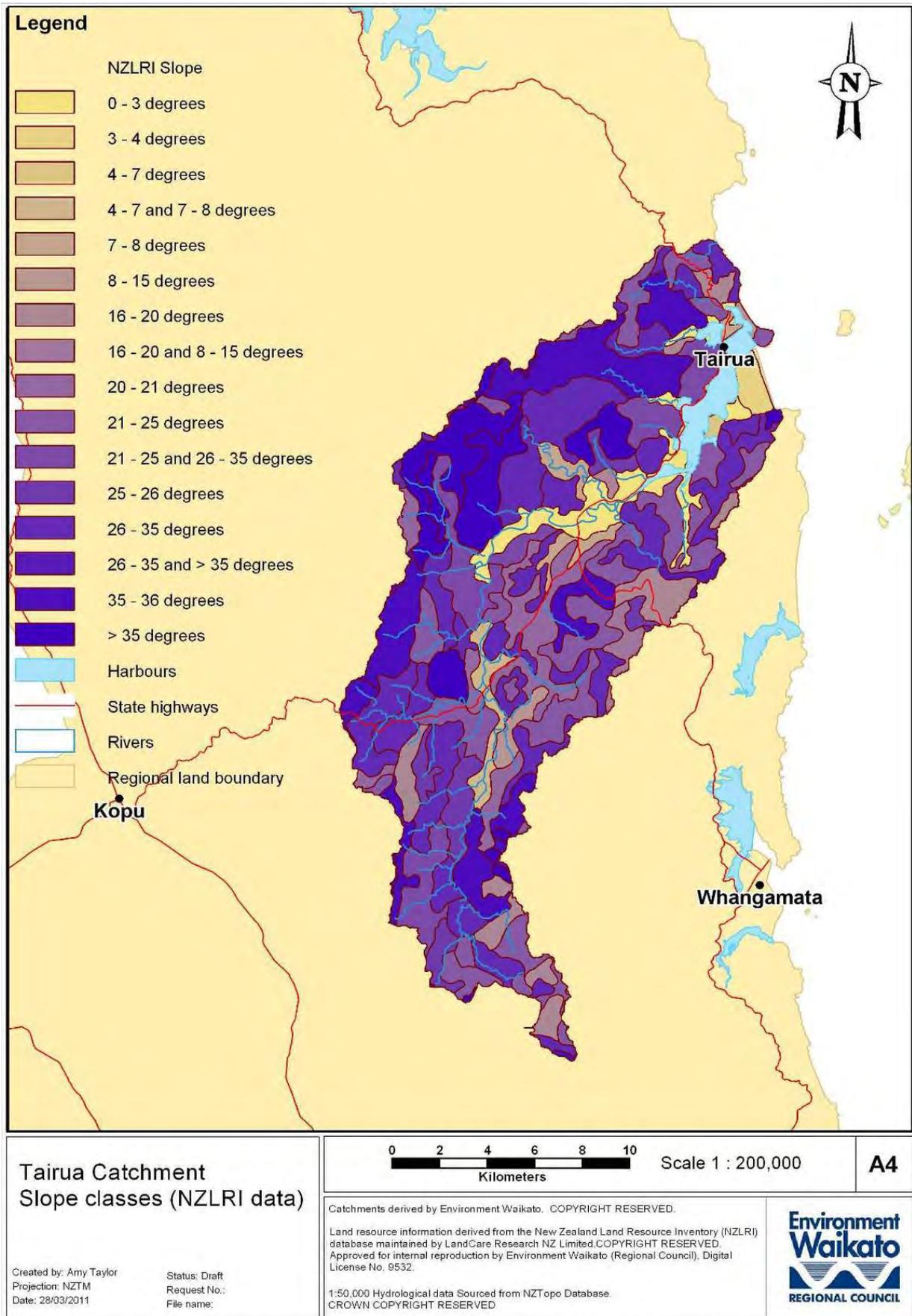


**Figure 4: Soil classification of the Tairua catchment**

### **5.4.3 Slope**

The catchment is dominated by steep land and hill country with 83 per cent of the catchment having slopes greater than 20 degrees shown in figure 5 as mid to dark purple. The area to the north of the Tairua River has the steepest slopes and may be most prone to erosion if vegetation is removed.

There are limited areas (10 per cent of catchment) of undulating to flat land. There are some plateaus in the hilly land but predominantly the flat land is on the terraces and floodplains surrounding the Tairua River.



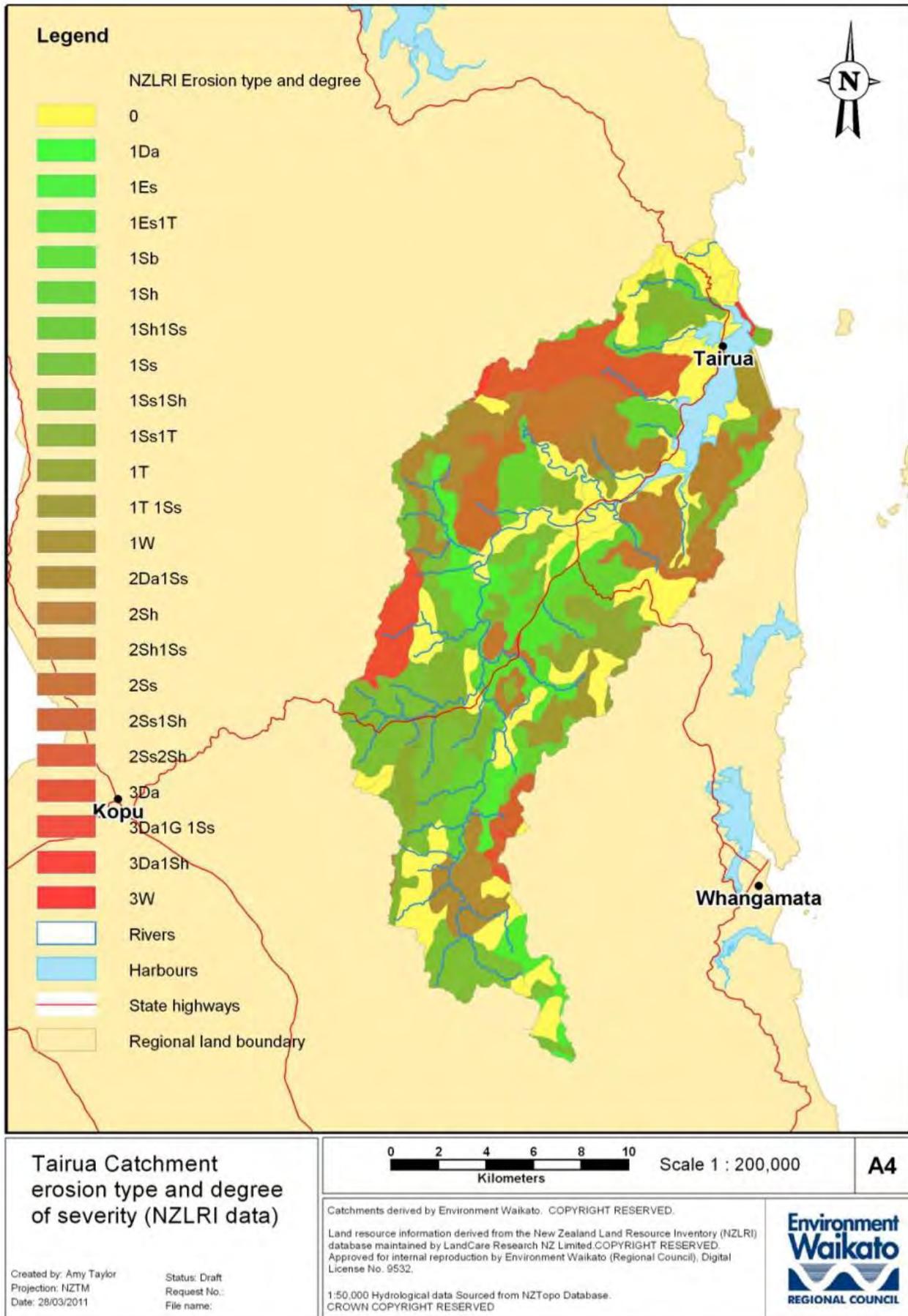
**Figure 5: Tairua catchment slope classes (NZLRI)**

#### **5.4.4 Erosion form and degree of severity (NZLRI)**

The Coromandel peninsula is generally steep and rugged with a mild climate. The Tairua catchment has an average rainfall of just above 1600mm per year (Rijkse and McLeod, 1995) but the Coromandel Peninsula does have a high frequency of intense rainfall events that can lead to severe erosion, which eventually results in discharges of sediment to the coastal marine area.

Approximately 21 per cent of the catchment area (displayed as yellow in figure 6) has no erosion with the remainder of the catchment area having some type of erosion. The predominant erosion types are soil slip and sheet erosion on the lower slopes and debris avalanche on the steeper more erosion prone slopes.

Forty-seven percent of the catchment area has slight erosion (green colours – figure 6), 28 per cent has moderate erosion (brown colours) and 3 per cent has severe erosion as indicated by the red colour in map below. The areas in red are the areas that are dominated by steep slopes. The erosion potential is moderate to high.



**Figure 6: Tairua catchment erosion type and severity (NZLRI)**

## 5.4.5 Land cover and land use

Land cover has been mapped using satellite imagery and is available as the Land Cover Database 2 (LCDB2, MfE, 2004). The 2002 land cover data are the most recent available for the Tairua catchment. Table 1 shows that in total, indigenous forest is the most extensive type of land cover (44.8 percent) followed by scrub (21.2 per cent). Planted forest and pastoral land both cover approximately 14 per cent each of the catchment area. Figure 7 shows the location of farms and farm type in the catchment as well as production forestry areas.

**Table 1: Land use and land cover - area**

<b>LCDB2 categories</b>	<b>Area - hectares</b>	<b>Percentage</b>
Bare Ground	10.84	0.04
Coastal Sand	22.34	0.08
Coastal Wetland	135.15	0.46
Indigenous Forest	13173.36	44.84
Inland Water	608.77	2.07
Inland Wetland	75.56	0.26
Major Shelterbelts	14.82	0.05
Mines and Dumps	37.30	0.13
Planted Forest	4327.73	14.73
Primarily Horticulture	81.45	0.28
Primarily Pastoral	4158.49	14.15
Scrub	6237.35	21.23
Urban Area	378.51	1.29
Urban Open Space	117.78	0.40
Willows and Poplars	1.02	0.00

Figure 8 shows that the indigenous forest covers the outer area of the catchment that is dominated by steep slopes and brown soils. Scrub is intermingled within these areas, whereas the planted forest is on the steeper slope closer to the harbour where the Tairua River enters the harbour. The pastoral land is predominantly found on the undulating to rolling land either side of the Tairua River.

Of the 6500 hectares is under either primarily pastoral land or plantation forest, 1925 hectares are currently under dairy farm management with 1600 hectares being managed as sheep or beef farms. A portion of the 2953 hectares of plantation forest has the potential to be converted to pasture. This has the potential, if not managed well, to have a downstream impact by way of additional sediment and nutrient inputs.

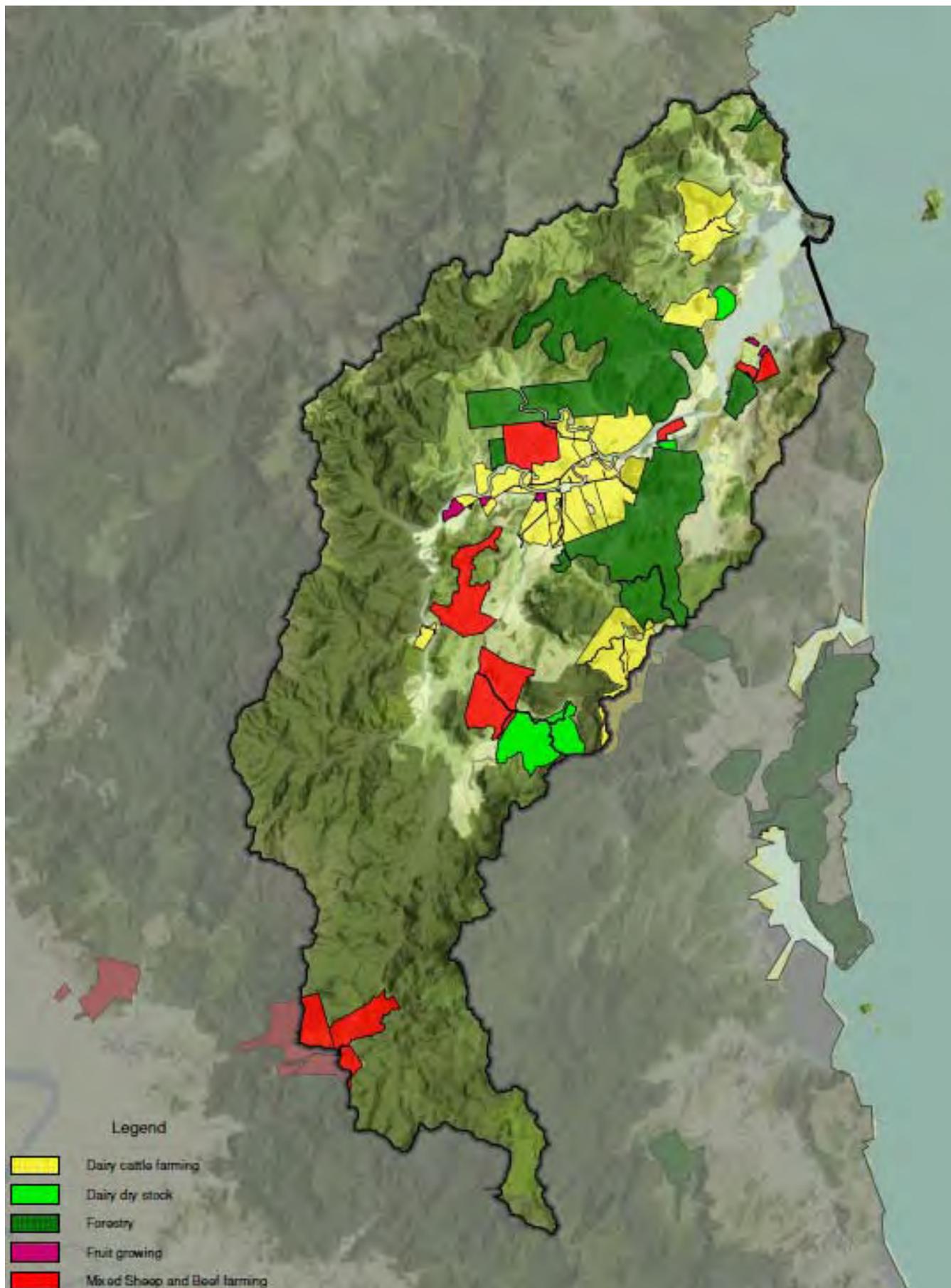
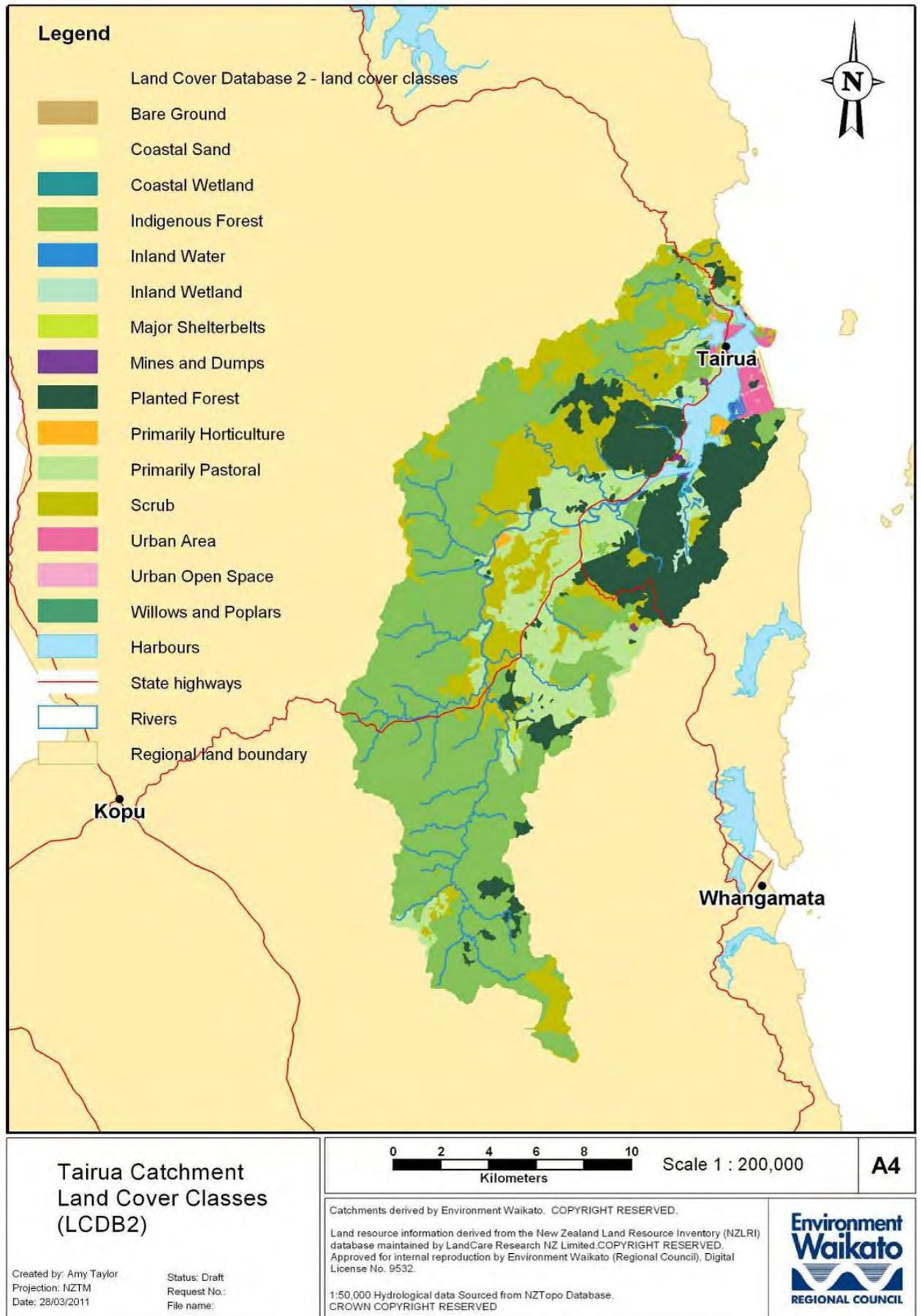


Figure 7: Showing farm location and type.



**Figure 8: Tairua catchment land cover classes from Land Cover Database 2 (LCDB2)**

## 5.4.6 Land use capability

Land use capability (LUC) is an area's capacity for sustained productive use, taking into account physical limitations, management requirements and soil conservation needs. The information contained in the New Zealand Land Resource Inventory (NZLRI) is assessed to determine the LUC of a parcel of land. Figure 9 displays the land use capability for the Tairua catchment.

Most of the catchment is mapped as land use capability class 6, 7 and 8, with only 11.7 per cent being classed as suitable for arable cropping (classes 1-4) and 4.1 per cent as being highly versatile (classes 1 and 2) as shown in table 2.

**Table 2: Percentage of Tairua catchment area in LUC class**

LUC class	Percentage
2	4.1
3	4.7
4	2.9
6	38.2
7	43.5
8	6.5

The darkest red areas (Class 8) in Figure 9 represent land that has very severe to extreme limitations that make it unsuitable for arable, pastoral, or production forestry use (Newsome et al. 2008). Class 8 land in the Tairua catchment consists of steep land areas that include very steep slopes and also highly erodible areas on the northern edge of the catchment. It is suitable for conservation use.

The mid red areas (Class 7) represent land that is non-arable land with severe limitations to use under perennial vegetation such as pasture or forest. These areas (43.5 percent of the catchment) have severe actual or potential erosion, or topographical constraints. Land areas of the LUC class are currently under indigenous forest or plantation forest. Great care will be needed at forest harvest on these LUC class 7 areas.

The brown areas of class 6 land (38.2 percent) are non-arable with moderate limitations for use under perennial vegetation such as pasture or forest (Newsome et al. 2008). There is still an erosion risk with the class of land and care will be required if vegetation is removed. Class 6 – 8 land have subclass limitations of erosion as described in table 3.

The green areas (Figure 9) represent more versatile land, with the darkest green (Class 4) land having moderate limitations for arable use, but suitable for occasional cropping, pasture or forestry. This land can be found on some of the rolling land that has undulating plateaus and crest. Class 3 and 4 have subclass limitations of soil, wetness and erosion.

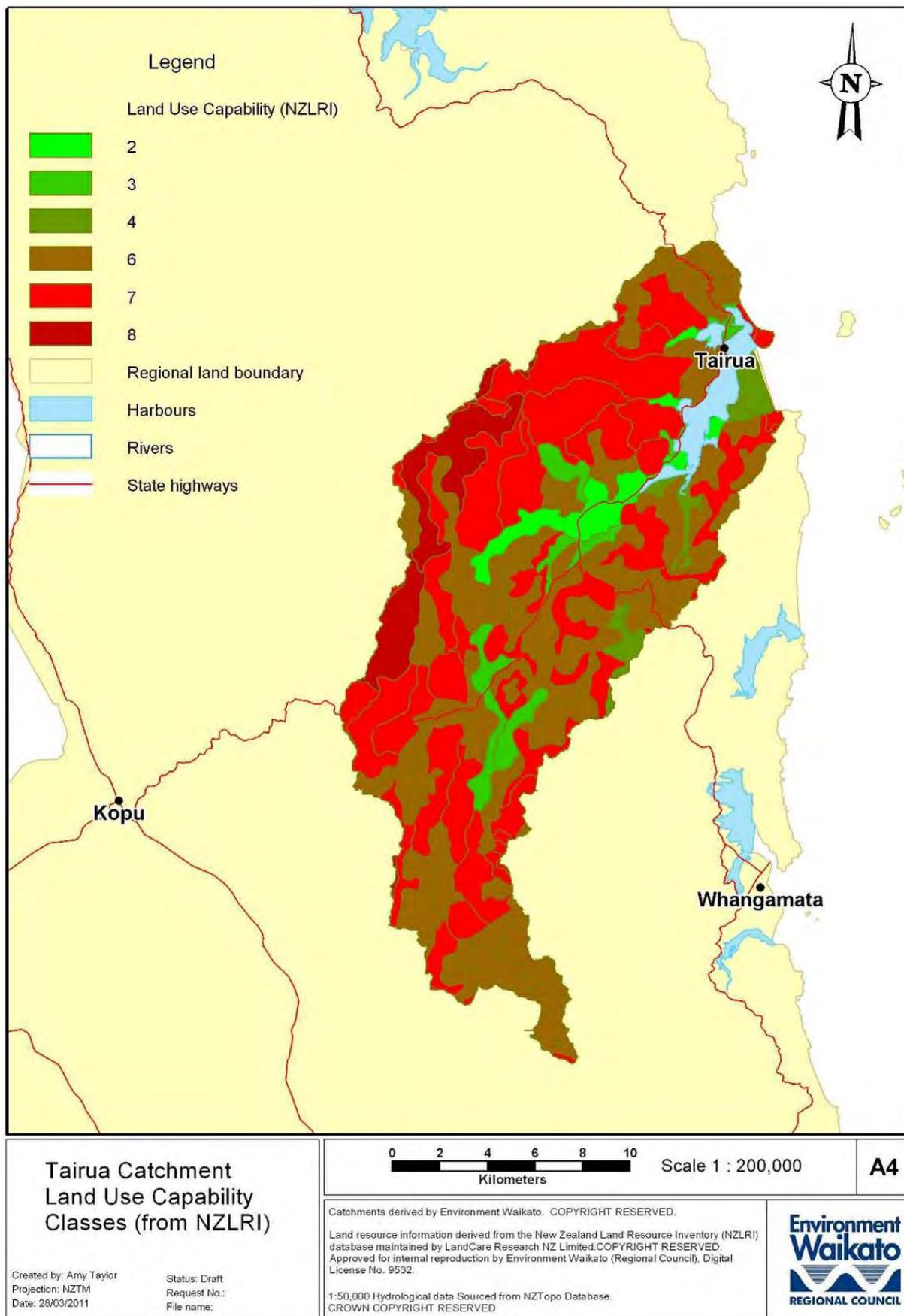
Class 3 land (mid green) equates to almost 5 percent of the catchment, with moderate limitations for arable use, but suitable for cultivated crops, pasture or forestry. This land is found in and around the rolling hills of the Tairua River.

Class 2 land represents higher versatility and productivity, with land having slight limitations for arable use and suitable for cultivated crops, pasture or forestry (Newsome et al. 2008). It is found surrounding the flat to undulating terraces and floodplains deposited with alluvium. Class 2 represents highly productive land with versatile soils, which is best suited to productive activities, rather than residential growth and development. Class 2 land has a soil and wetness limitation as represented by the dominant soils found within.

There is no Class I land in the Tairua catchment. Class I land represents the most versatile multiple-use land with virtually no limitations to arable use.

**Table 3: Description of the subclass limitations for the LUC classes**

<b>LUC subclass modifier</b>	<b>Description</b>
e	erosion susceptibility, deposition or the effects of past erosion damage first limits production
w	soil wetness resulting from poor drainage or a high water table, or from frequent overflow from streams or coastal waters first limits production
s	soil physical or chemical properties in the rooting zone such as shallowness, stoniness, low moisture holding capacity, low fertility (which is difficult to correct), salinity, or toxicity first limits production
c	climatic limitations such as coldness, frost frequency, and salt-laden onshore winds first limits production



**Figure 9: Tairua catchment land use capability classes from NZLRI**

## 5.5 Terrestrial ecology

The Tairua Harbour catchment sits within one of the most altered ecological districts on the Coromandel Peninsula. Although the steep upper parts of the catchment to the west and south of Tairua Harbour still retain much of their native forest cover, diminished species diversity and a paucity of large emergent trees such as kauri, rata and podocarps (which were once characteristic of this forest type), speak of a long history of modification through logging, burning and presence of pest animals and plants. Modification throughout the low-lying and coastal parts of the catchment has been even more severe with most of the original vegetation cleared or drained to make way for settlements, farmland and exotic forestry, leaving only small remnants of native forest and wetlands on the lower hill slopes, gullies, alluvial terraces and coastal margins.

Natural native habitats are however still prominent and ecologically important across the catchment landscape with around 19 000 hectares (about 67 per cent of the catchment by area) identified by Waikato Regional Council as significant for biodiversity values. The bush-covered hills in the upper catchment form part of an almost continuous corridor of native vegetation that covers the spine of the Coromandel Peninsula, and forms in its entirety one of the most diverse and intact areas of forest in the upper North Island. This forest provides significant habitat for a wide variety of rare and threatened plants and wildlife including the North Island brown kiwi, kaka, native frogs geckos and long-tailed bat. Other significant habitat in the catchment is much more fragmented and includes small remnants of privately owned native forest, scrub or wetlands; two-thirds of which are smaller than 20 hectares in size. Many are patches of native scrub within which coastal and lowland forest species are regenerating; signalling a slow but eventual return to the original vegetation types of the area.

Wetlands are no longer common within the catchment; their cover accounting for less than four percent of the land area. However, those that remain include some of the best examples of their type not only within the catchment but also the wider ecological region. Examples include the iconic cabbage tree and flax wetland alongside the Tairua River which is one of the largest examples of an alluvial river plain wetland in the district and an important spawning habitat for freshwater fish. The Duck Creek wetland near Pauanui provides one of the best and most intact sequences of freshwater to estuarine wetland vegetation.

Wetlands, scrub and forest throughout the catchment provide important habitat for a variety of wildlife. However, survival of these species is increasingly threatened by feral and domestic predators and the quality of their habitat is compromised by plant pests and browsing animals such as possum, goats and deer. Some of these problems are being addressed where natural areas are formally protected and are subject to active management by private owners, government agencies, trusts or community groups. However many are still in need of management if the biodiversity values and ecological integrity of natural areas within the catchment are to be maintained.

## 5.6 Water quality

The Waikato Regional Council operates one routine river water quality monitoring site in the Tairua catchment. This site is located on the Tairua River near the settlement of Hikuai. The catchment upstream of this monitoring site has an area of about 150 km<sup>2</sup> (or about 54 percent of the estuary's catchment). Some 88 per cent of this catchment is covered with forest or scrub, and just 14 per cent is in pasture. River flows are monitored nearby at Broken Hills (mean flow about 6 m<sup>3</sup>/s, maximum recorded c. 950 m<sup>3</sup>/s).

### **5.6.1 How clean is the water in the river and streams?**

The water quality of the Tairua River is generally good for swimming and fishing. It also supports a healthy aquatic life, particularly native fish. The river has clear water (except during floods when it becomes murky), is well-oxygenated and contains low levels of toxic ammonia, low levels of plant nutrients such as nitrogen and phosphorus and moderate levels of faecal bacteria (e.g. *E. coli*).

However, as with many other rivers in the region, the Tairua River is slowly degrading. There has been a steady increase in concentrations of nitrogen, with concentrations of total nitrogen having increased at an average rate of about two per cent per year. This is likely to come from farming activities as there are no other obvious point sources in the area.

### **5.6.2 How clean is the water in the harbour?**

The water quality of the estuarine Tairua Harbour is generally good. The water present in the estuary is mostly “clean” seawater which typically contains low levels of contaminants. It is not as clear as the sea because sediments from the bottom of the estuary are disturbed by tidal currents and wind waves. Overall, the water in the estuary is well-oxygenated, has low levels of toxic ammonia, low levels of plant nutrients and algal growth and low levels of faecal bacteria.

However, faecal bacteria can reach high levels after heavy rain which washes dung into the estuary. These bacteria are likely to come from birds and feral animals rather than farm animals, given the relatively-minor amount of pasture in the catchment.

### **5.6.3 How clean is the water on the Tairua harbour beaches?**

The water quality of the estuarine Tairua Harbour is generally good for swimming especially in fine weather when the freshwater input is low. Unfortunately there are local “hotspots” where conditions are poor. For example, from time-to-time it is not safe to swim in the Pepe Stream bathing beach site because of bacterial contamination which can happen when the tide is ebbing and water at the site contains more freshwater than sea water. It is unclear whether the faecal bacteria in the freshwaters come from people, farm animals or wild animals (e.g. birds, possums, pigs).

### **5.6.4 Catchment management issues**

Several matters of potential concern were identified in the 2006 ‘Tairua Harbour & Catchment Important Characteristics’ report (see Appendix 8). Overall, there is currently little sign that river and estuarine water quality in the Tairua catchment is likely to deteriorate markedly in the next 10–20 years: water quality is currently good, pressures are only modest and the estuary is regularly well-flushed with clean seawater.

However, we cannot be complacent if we want to enjoy clean water in the future. Pressures from human activities are increasing. The Tairua area is being intensively developed. There are more settlements and structures being built along the coastline, which is associated with more boat mooring and boating activities on the harbour. Forestry activities and timber processing are also increasing. All these can have negative effects on water quality including damage to natural aquatic habitats (e.g. Whitebait spawning habitat), enhanced erosion and therefore sedimentation of the estuary and bringing sources of chemical and microbial contamination.

## **5.7 Water quantity**

Water is a finite resource. Consequently, the efficient allocation and use of water is an important resource management issue. Over allocation can lead to potential conflicts in use of water resource between users, and exhaustion of the water resource. Water shortage alters the type or amount of development or type and scale of land use that

can occur. It also impacts on stream biodiversity, ecosystem functions and processes, cultural and recreational values.

Figure 10 identifies areas of settlement water supply from streams or groundwater within the catchment that are not sufficient for current water use or are nearly fully allocated. This is based on Waikato Regional Council data on the water take of water bodies and the amount of water allocated for use. Water short areas are identified when there is 75% or more of the water allocated. The two locations of concern in this regard are the upper end of the Graham's Creek catchment and the upper end of the Tairua River catchment.

To ensure that the water resource in the catchment is maintained for use in the long-term and provides for ongoing ecosystem functions, biodiversity, and other values, any increase in the type and scale of land use or development within these two highlighted areas needs to be carefully considered. Appropriate controls, planning mechanisms and guidelines are required, including looking at alternative water supply and water conservation measures such as water tanks and reuse of grey water. While not an action for this plan, this will be addressed through district council water take consents and through the district plan review.

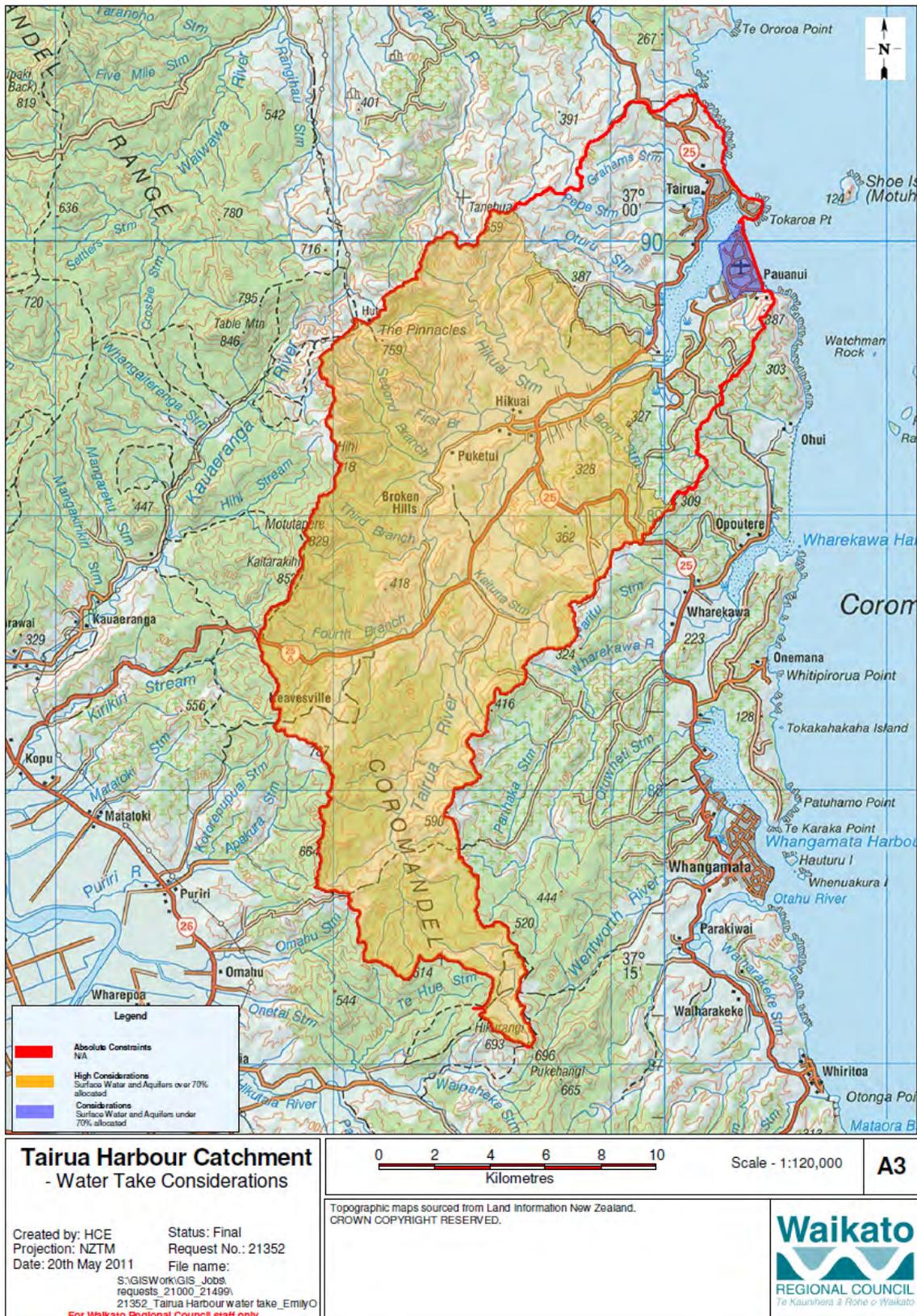


Figure 10: Tairua Catchment Water Shortage Areas.

## 5.8 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.

Tairua Harbour is a barrier enclosed river estuary, 6 km<sup>2</sup> in area, 51 per cent of which is intertidal. It is sheltered from the sea by the Pauanui sand spit and Paku Mountain.

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 matter and bacteria. This in turn has negative impacts on the harbour area by:

- Smothering shell fish beds
- Increased weed growth i.e. saltwater 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 seagrass 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
- Increased bacteria levels and muddying water making it unsafe for swimming.

### **5.8.1 Ecological values of the Tairua Harbour**

Vegetated habitats occupy around 39 per cent of the entire area of Tairua Harbour. The patterns and extent of these are heavily influenced by the Tairua River channel and the overall form of the harbour. Seagrass beds make up more than half the total vegetation cover, dominating the intertidal flats throughout the middle reaches. Of the remaining vegetation types, coastal wetlands (saltmarsh rushes, sedges and herbs) represent about one third of the total cover, and mangroves approximately one-sixth. Saltmarsh ribbonwood scrub and low-growing coastal herbs (sea meadow) are the most uncommon types, representing less than 2 percent of the total vegetated area. Other than seagrass, the vegetation is mainly restricted to sheltered embayments where small streams enter the estuary (Graeme 2008).

The extensive seagrass beds and intertidal sand flats of Tairua Harbour provide habitat for a healthy diversity of marine invertebrates, fish and shellfish (Bridgewater & Foster, 1984). Fish assemblages in the waters of Tairua are similar to those in other Coromandel harbours and include species such as the yellow-bellied flounder, sand flounder, yellow-eyed snapper, kahawai, trevally and parore (Lundquist et al 2004). Of the more commonly sought after shellfish, cockles are perhaps the most plentiful, with dense beds present in the lower and middle areas of the harbour. Pipi are abundant near the entrance and upper reaches, and wedge shells are most common in the lower parts of the harbour (Singleton and Giles 2010).

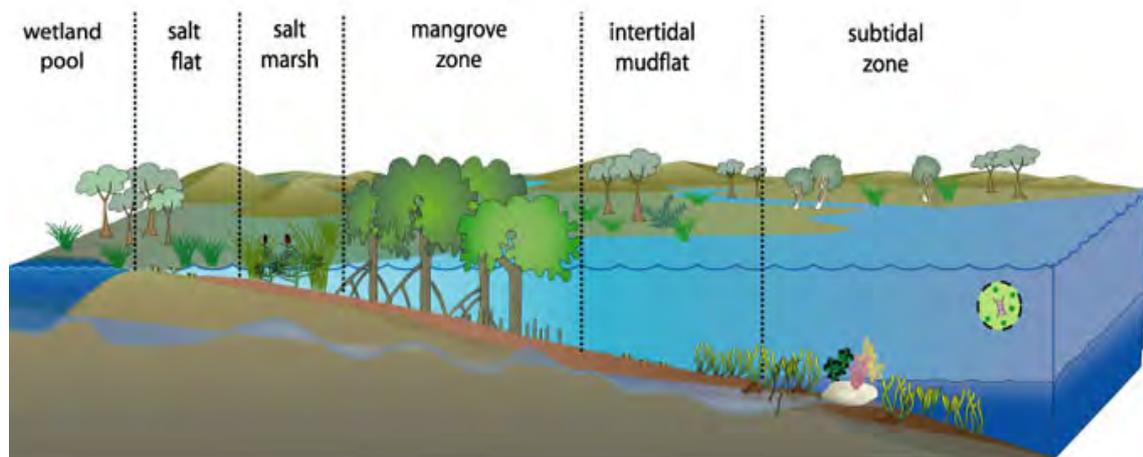
The diversity of coastal, wading and wetland bird species in Tairua Harbour is very high, with some 42 different species recorded as regular inhabitants, and at least ten which are known to be threatened or at risk in New Zealand (Pierce & Owen, 2004). The seagrass beds and bare intertidal flats provide important feeding grounds for many, including the New Zealand dotterel, banded dotterel and reef heron. The Pauanui sand spit, sandy roosts near Paku, and some of the short grass areas alongside the Pauanui waterways provide regular roosting places for these and other wading birds including oystercatcher and pied stilt. Further landward of the intertidal flats, the mangrove, salt marsh and scrub habitats provide various feeding, roosting

and breeding opportunities for a range of land, wetland and coastal birds, including some rarely seen such as banded rail, fernbird and Australasian bittern.

The coastal wetlands around the harbour are important not only for birds, but also for many other native fauna such as reptiles, snails, insects, and other invertebrates. They also provide vital services for the environment; capturing sediments and contaminants coming in from the wider catchment, thereby improving the quality of water entering the harbour, and also protecting the shoreline from erosion. Around Tairua there are still places where these wetlands form part of ecologically significant and intact vegetation sequences (e.g., Duck Creek). Here, the direct linkages have been preserved between the estuary (with its sand flats, seagrass, mangrove and salt marsh), and freshwater/terrestrial habitats (wetland and forest) further upstream. It is important that these types of linkages, and the biodiversity they support, be protected as they have largely disappeared from the landscape as a result of drainage, development and land-use changes.

The sand dunes of the Pauanui sand spit and further north on the open coast, and the rocky shorelines around Paku support different assemblages of plants and animals than those found in and around the soft sediments and vegetated shorelines of the estuary. Some of the coastal cliffs still possess some of their original vegetation, with pohutukawa, karo, taupata and flax present. Herbaceous plants including New Zealand iceplant, and sea primrose often occur on steep rocky cliffs and platforms close to sea level.

Invasive weeds in and around Tairua Harbour threaten the ecological integrity of many habitats. Coastal paspalum (*Paspalum vaginatum*) in particular, is widespread and problematic; taking over large areas of salt marsh wetlands at the mouth of Graham's creek, establishing islands within the estuary around Paku, and filling in many of the back-swamps landward of mangroves around the harbour – areas which would have once been occupied by healthy native salt marsh communities. Wattle and pines are also becoming well established in some areas of salt marsh.



**Diagram 1: Typical 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.

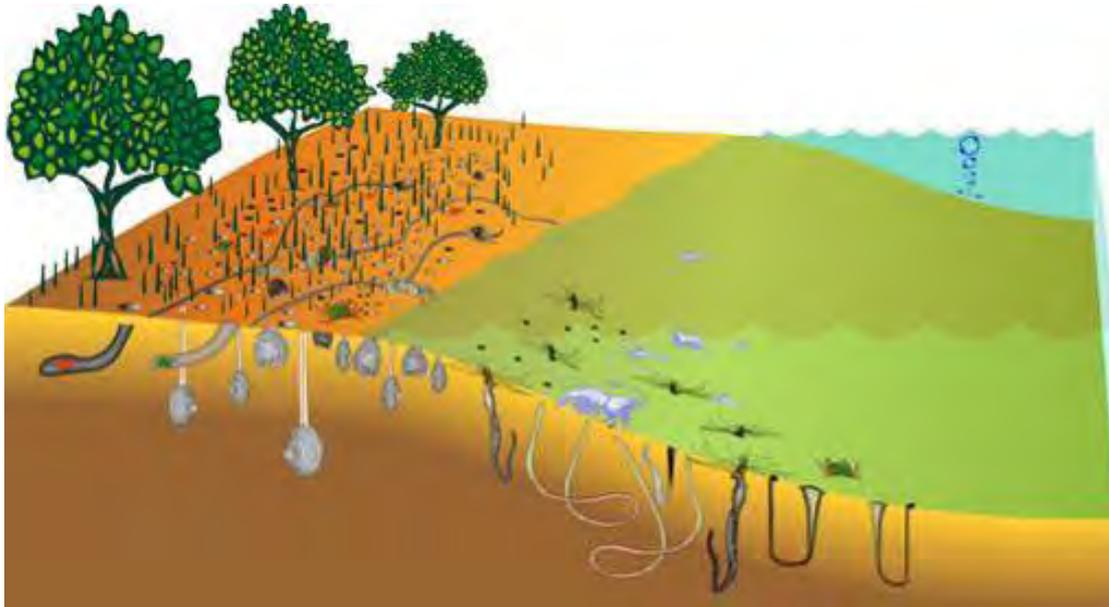


Diagram 2: Estuarine mud animal examples. Graphic by NIWA

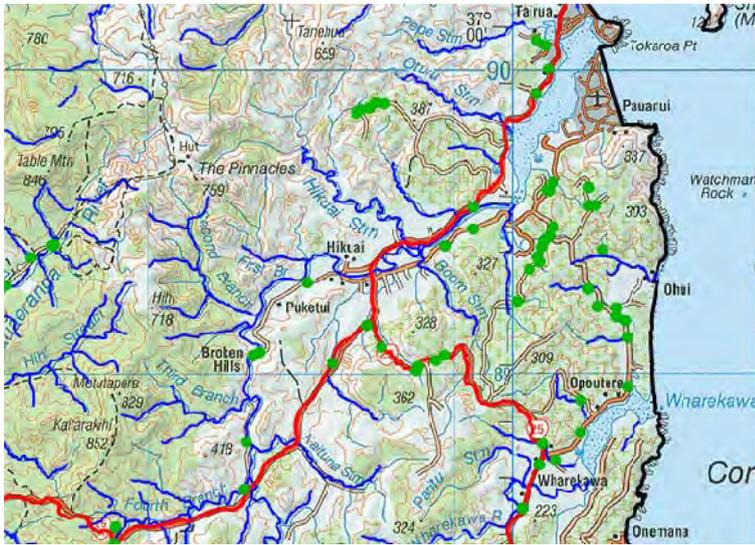
## 5.9 Native freshwater fish and invertebrates

### 5.9.1 Fish

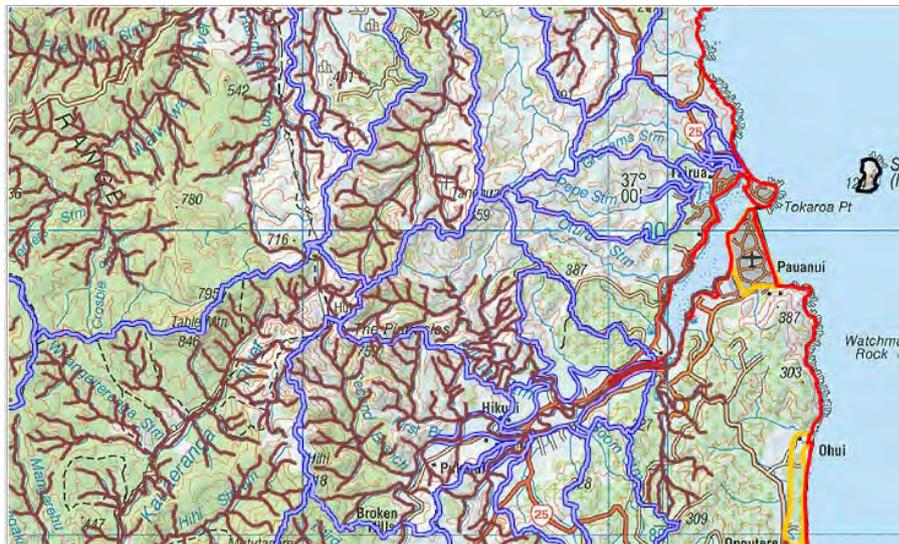
A rich diversity of native fish species have been found in this area as listed on the New Zealand Freshwater Fish Database. These species include but are not limited to longfin and shortfin eels, common bully, redfin bully, giant bully, torrentfish, banded kokopu, inanga and smelt. The high diversity reflects the proximity of streams in this area to the coast (most species require the ocean as part of their lifecycle) and the extent of indigenous riparian vegetation in some catchments. Recognition of the known importance of these streams and the conditions they provide is evident in the large number of streams listed in the Waikato Regional Plan as “indigenous fishery class” (Figure 12)

Nevertheless some issues likely to impact on native fish fauna in this area are apparent and include:

- Disruption of river connectivity (the ‘fish roading network’) by artificial barriers such as dams and culverts (see fig 11 for known culvert locations in this area)
- Forestry harvest practices which can cause initial reductions in stream shade following harvest and increased sediment loads to rivers which can cause infilling of spaces on the streambed reducing habitat availability for some fish species.
- Stock grazing and or poor stopbank management in lower tidally-influenced reaches can greatly affect local spawning of the inanga (a main component of the whitebait) which require bank side vegetation in which to spawn on high tides in autumn.
- Water allocation and various discharge permits. In association with other pressures listed above can cause cumulative effects that reduce water quality e.g. increase in temperature and lower instream dissolved oxygen conditions which may negatively influence the natural presence and distribution of fish communities in some parts of these catchments.



**Figure 11: Stream culverts as listed on council’s Smartmaps culverts database**



**Figure 12: Streams in brown denote streams identified as “indigenous fishery class”**

## 5.9.2 Invertebrates

Waikato Regional Council has collected 27 invertebrate samples from 8 streams in the Tairua catchment over 1997 to 2010 the locations of these samples are identified on the map below. These samples have been collected as part of Waikato Regional Council’s state of the environment monitoring required under the RMA and as part of the Clean Streams programme to evaluate the effects of riparian retirement on stream health. In addition, several targeted studies that have included sites in the Tairua catchment have addressed species issues such as forest harvesting and water abstraction, using invertebrates as ecological indicators; these studies have been conducted by external agencies or under contract to the council. The council’s monitoring has shown that streams draining catchments predominantly in native forest have invertebrate communities dominated by sensitive species of mayfly, stonefly and caddisfly which make up over half the numbers in samples, whereas those sites draining developed catchments have fewer numbers of sensitive species.

Overall, Tairua sites in developed catchments had higher diversity and numbers of sensitive species and better habitat quality than stream sites typical of the Waikato region generally. This is likely to be because of forested headwater catchments maintaining good downstream water quality and the moderate to steep gradient of many streams helping to maintain oxygen levels and prevent sediment deposition.

However, low gradient lowland sections of coastal streams are at risk from these and other pressures. Agricultural development and associated loss of riparian shade and demand for water can lead to loss of suitable habitat, elevated water temperatures and abundant plant growths which can affect aquatic invertebrate communities.

## 5.10 Ecosystem services

Ecosystem services are the benefits people obtain from ecosystems. These include provisioning services such as food and water; regulating services such as flood and disease control; cultural services such as spiritual, recreational and cultural benefits; and supporting services such as nutrient cycling that maintains the conditions for life on earth.

This harbour and catchment plan aims to deliver programmes and services that protect and enhance the catchment and harbour. For example fencing and planting of erosion-prone land and/or riparian margins improves soil stability, reduces sedimentation of waterways, reduces downstream flood hazards and improves water quality and habitat for freshwater and marine ecosystems. The multiple benefits that result from these actions provide for the long-term stewardship of the catchment and harbour resources and assist in moving towards a resource-efficient economy.

The catchment's natural resources such as forests, estuaries, streams, harbours and soils provide a range of values that directly impact on human wellbeing. However, this value delivered to society is not well recognised nor is it factored into current economic models.

For example, estuarine ecosystems provide a range of services<sup>16</sup> that have been estimated to deliver benefits valued at \$46,400/ha/yr<sup>17</sup>. Any land use development that changes ecosystem types or alters ecosystem functions will also change (reduce) the level of ecosystem services supplied to society.

Therefore, works programmes that provide for the maintenance and enhancement of ecosystems can be seen as a sound investment in ecological infrastructure that will provide returns into the future, in addition to responding to community concerns and long-term aspirations.

## 6 Harbour and catchment assessment

Outlined below is the process carried out for both the harbour and catchment assessments and their respective findings. A number of overlaps exist between the harbour and catchment as often one can not be considered without the other. This section also identifies the key issues and recommended course of action to address these issues through mitigation, remediation or enhancement.

The information in this report is intended to act as a snapshot of the harbour and catchment so changes can be recorded and compared to demonstrate change over time and for the development of the works programme component of the HCMP process. Works costs are indicative only and are likely to vary greatly depending on the scale and extent the associated landowner wishes to go to once a property based programme is developed. Based on this the works and associated costs are fairly conservative particularly in relation to planting programmes.

### 6.1 Harbour and catchment values

A number of key themes reoccurred throughout the plan development process. These were identified through discussions with landowners, community groups, stakeholders,

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<sup>16</sup> Services such as spawning and nursery grounds for many species, habitat, waste treatment and nutrient cycling.

<sup>17</sup> Patterson, M and Cole, A. 1998: *The Economic Value of Ecosystem Services in the Waikato Region*. Report prepared for Waikato Regional Council. Massey University, Palmerston North.

iwi, and agencies within the Tairua catchment area. The summarised key values are as follows:

- Biodiversity protection
  - Rare and threatened avian fauna
    - NZ dotterel
    - Banded rail
    - Australasian bittern
  - Rata forest remnants
  - Significant wetland systems.
- Community engagement
  - High level of community interest
  - Strong community support for HCMP
  - High level of interaction with natural environment
  - Cultural and historical sites preserved.
- Coastal enhancement
  - Kaimoana gathering
  - Recreational use and access to coast.
- Water quality preserved
  - To be able to drink from and swim in streams and harbour
  - Ensure water quality standard maintained.

## 6.2 Harbour and catchment key issues

As with the key values there are reoccurring themes with the issues identified. These have a strong correlation to the things that are most valued by the community. In particular the role sedimentation plays on impacting on values such as recreation use, biodiversity and water quality.

The summarised key issues are:

- Sedimentation:
  - Perceived and actual impact of forestry
  - Rate of sedimentation of harbour
  - Tairua River main channel depth, capacity and navigability
  - Impact of sedimentation on access
  - Impact of sedimentation in relation to mangrove and saltwater paspalum
  - River bank and hill slope erosion.
- Water quality:
  - Bathing beach standards breached at Pepe Stream and Grahams Creek
  - General water quality decline
  - Nutrient management and perceived or actual impact down stream
  - Algal bloom and shell fish gathering restrictions.
- Biodiversity:
  - Decline in wetland area and health
  - Decline in forest health
  - Impact of cattle access on significant habitats
  - Decline in health and area of significant habitats i.e. streams, wetlands, forest fragments.
- Pests:
  - Wilding pine
  - Privet
  - Possum and feral goats
  - Impact of pests on biodiversity and water quality

- Canada geese.
- Coastal vegetation:
  - Mangrove expansion in past decade and impact on harbour users and coastal habitat
  - Rapid expansion of saltwater paspalum and its impact on hydrology and significant coastal habitats.
- Recreation:
  - Access to harbour; and traditional flounder gathering sites can no longer be accessed
  - Decline in fish numbers caught in harbour
  - Opportunities for walkway/cycleway need to be investigated
  - Facilities for visitors ie Puketui Valley and Hikuai area areas for rubbish collection.
- Flooding:
  - School Road culverts
  - Redbridge Road area culverts
  - Grahams Creek
    - encroachment of dwellings
    - causeway
  - Frequency of road closures; height of road
  - Hikuai Settlement Road.
- Community:
  - Fragmented community; 3 distinct communities but one harbour
  - Ability to engage and involve non resident ratepayers
  - Opportunities for community engagement.

## 6.3 Harbour assessment

Tairua Harbour is a barrier enclosed river estuary, 6 km<sup>2</sup> in area, 51 per cent of which is intertidal. It provides habitat for a wide variety of plant and animal species. The small estuary area compared with large catchment areas and small tidal prism (5 million m<sup>3</sup>) are likely to predispose this estuary to infilling.

The harbour and coastal margin assessment was carried out by Waikato Regional Council's Coastal Ecologist, Harbourmaster and Harbour and Catchment Co-ordinator. Phase one was land based and phase two was carried out by boat to gain a different perspective and to examine marine issues more thoroughly, while phase three was a desk top assessment of existing information.

Areas of interest were identified on the map included in appendix 9 - Harbour assessment. This appendix also provides additional information on findings, recommendations and specific work sites.

While the focus was predominantly on opportunities for enhancement of the natural environment, consideration has also been given to the current area occupied by mangroves and saltwater paspalum.

Detailed below are the issues identified in relation to the harbour and coastal environment. The majority of the recommendations relate to land based management and activities that would benefit the harbour.

Infrastructure and resources that relate to navigation or boating have been included though the majority of these works are included in Thames-Coromandel District Council's capital works programme.

Issues have been broken into the following categories:

- Coastal vegetation
- Sedimentation
- Coastal habitats
- Recreation.

### 6.3.1 Coastal vegetation

The Tairua Harbour still contains intact vegetation sequences from coastal forest fragments through to sea grass beds. Preservation of these sequences is important in maintaining ecological corridors and for biodiversity. They also provide high landscape values from both sea to land and land seaward. Changes in coastal vegetation communities can be viewed in figure 14, *Estuarine Vegetation Changes in the Tairua Harbour*, and current vegetation cover in figure 15.

In recent years the expansion of saltwater paspalum (*Paspalum vaginatum*) and encroachment of mangroves have become areas of concern for this community. In some instances this has led to illegal removal of mangrove seedlings and mature mangroves.

Saltwater paspalum is identified in the operational Waikato Regional Pest Management Strategy as a potential pest plant which means that it is not currently controlled. This is not deemed appropriate by the greater Tairua community. More active control is needed to ensure significant coastal vegetation; wading bird feeding grounds and hydrology of harbour and stream mouths is maintained.

Mangroves - *Avicennia marina* subsp. *australasica* (-Manawa) are an opportunistic species that have a natural role as a pioneer on accreting estuarine sediments (Hutchings & Saenger 1987). By its very nature, its growth triggers change in the structure and function of the habitats that it colonises. The “threat” to other ecological values arises when the factors driving the ability of the species to colonise allow those changes to occur at a rate (or to a point where) other valued habitats such as seagrass, mud- and sand-flats are lost.

However, it is important to emphasise that as elsewhere, while mangroves do contribute to habitat modification, they are not the primary threat to ecological values in the harbour. Mangroves have a well-recognised role to play in harbour ecology; contributing to primary productivity, providing habitat for a range of species, and forming buffers and corridors with adjoining habitats (Morrisey et al. 2007).

Primary threats to other ecological values are instead the factors that shift the system out of balance; namely increased sediment and nutrient loadings into the harbour, which, in driving mangrove progradation, ultimately compromise other habitat types (Turner & Riddle 2001, Morrisey et al 2007). If the undesirable effects arising from mangrove growth are to be successfully controlled, management of the harbour catchment, and management of habitats in the receiving environment must both be considered as equally important.

#### Issues

- Mangrove expansion leading to displacement of sea grass and decline in recreational use and access
- Saltwater paspalum expansion resulting in habitat loss and changes to hydrology
- Pampas in coastal marine area
- Wilding pine, eucalyptus and wattle in coastal fringe.
- Nuisance or inappropriate vegetation in wetland areas



**Figure 13: Saltwater paspalum near Pauanui Waterways.**

### **Proposed Actions**

- Mangroves:
  - Seedling removal consent sought
  - Areas for mangrove preservation identified
  - Juvenile to mature mangrove removal areas identified and consent granted.
  
- Saltwater paspalum:
  - Ideally a regional control consent sought
  - If not a regional consent then a catchment consent possibly in conjunction with Whangamata and Wharekawa harbours
  - Consents to include control of pampas.
  
- Vegetation management:
  - Removal of willows from wetland areas (i.e. Gallagher Drive and Rewarewa Valley Road)
  - Active weed/pest plant control in coastal wetland areas. Works carried out in conjunction with TCDC and LTNZ.

Mangrove management needs to be future proofed and any resource consent application should reflect this along with careful environmental considerations. The area for seedling management should extend to the natural extent of the harbour. Mature mangrove removal needs to be staged to allow for flushing of sediment and minimal disturbance.

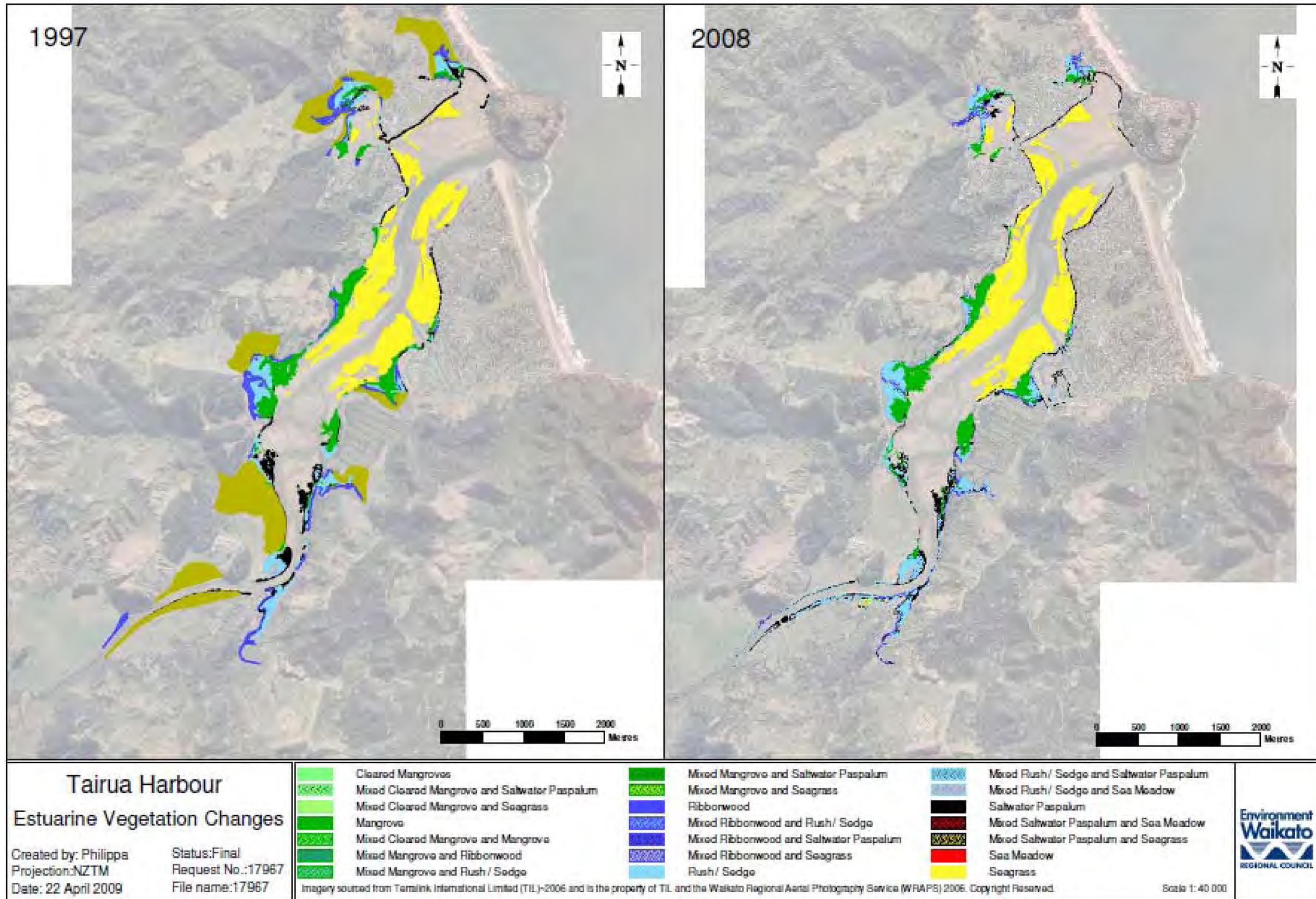
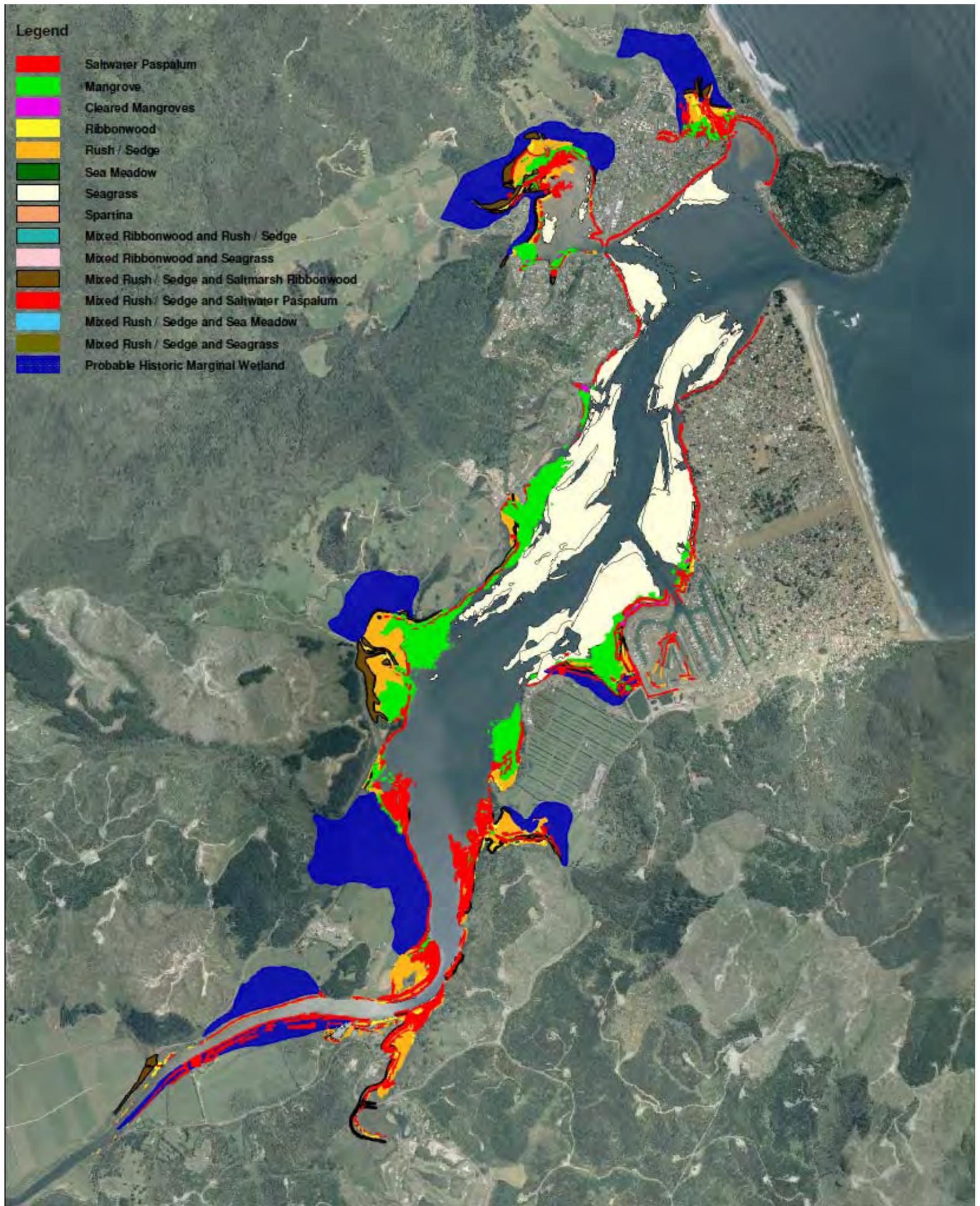


Figure 14: Estuarine vegetation changes in the Tairua Harbour.



<p style="text-align: center;"><b>Coromandel Management Area 9 Estuarine Vegetation</b></p> <p>Created by: A. Richmond    Status: Projection: NZTM            Request No.: 18820 Date: 19 November 2009    File name: Harbour_Coastal_Vegetation.gws</p>	<p style="text-align: center;">0    2    4    6    8    10 Kilometers</p> <p><small>Crown Copyright. Department of Conservation Te Papa Atawhai. The LCDB2 data set is a "Public Good" data set owned by the Ministry for the Environment and supplied by Terralink International Limited. Land resource information derived from the New Zealand Land Resource Inventory (NZLRI) database maintained by Landcare Research NZ Limited. Copyright Reserved. Approved for internal reproduction by Environment Waikato (Regional Council), Digital License No. 9532 Covenant polygons and associated information derived from QEII National Trust. Copyright Reserved. Textured Landsat image derived from DEM data supplied by Landcare and the LCDB2 owned by the Ministry for the Environment and supplied by Terralink International Limited. NZEEM sediment yield model supplied by Landcare Research. Copyright Reserved.</small></p>	<p style="text-align: right;"><b>A3</b></p> <p style="text-align: center;"><b>Environment Waikato</b> REGIONAL COUNCIL</p>
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**Figure 15: Coastal vegetation**

## 6.3.2 Harbour sedimentation

Estuaries on the Coromandel Peninsula are highly valued for cultural, recreational and economic reasons. Catchments on the Coromandel Peninsula are typically of very steep topography and covered by soils that are highly susceptible to erosion. High intensity, localised rainfall events occur relatively frequently, mobilising exposed soil and triggering landslides. In addition to the high risk of erosion, estuaries on the Coromandel Peninsula east coast are susceptible to infilling by sediments because they often have sandbars or barriers (forming barrier-enclosed lagoons) that narrow the harbour entrance. These estuaries have high ecological value, are highly valued for recreation and are under increasing pressure from development.

Major land use changes have occurred on the Coromandel Peninsula following European settlement. Polynesian settlement was most likely concentrated close to the coast, with only small scale land clearance, although large accidental fires also occurred. Sediment cores taken from Whangapoua, Wharekawa and Whangamata estuaries show a small increase in sedimentation following Polynesian settlement and a much larger increase following European settlement.<sup>18</sup>

Large scale land cover changes began in the mid 19<sup>th</sup> century. Major deforestation and soil erosion occurred as a result of gold mining, gum digging and kauri logging. In the 20<sup>th</sup> century pastoral farming became the major land use. Large scale planting began during the 1930s and exotic production forestry became established from the 1950s to the present day.<sup>19</sup>

For the Tairua catchment the construction of the Kopu-Hikua road has also had a considerable influence on the quantity of sediment entering the system as roading practices and sediment trapping of the time would not be deemed acceptable today.

Forestry companies are often blamed for sedimentation. It is important to note that while a contributor, the time frame of real influence is generally a seven year window post harvest. Measures can and should be taken to minimise sediment contribution from forestry practice during and post harvest. These steps need to be identified in the resource consent process and supported by appropriate rules in the Waikato Regional Plan in regards to area logged at any given time, roading, riparian setbacks and timeframes for re planting.

A marker bed study has estimated the sedimentation rate in the lower estuary, between 1933 and 1984, to have ranged between 2 and 22mm/year and to have averaged 6mm/year, much greater than pre-European settlement sedimentation rates. The estimates for sediment yield (SedRate and the Hicks and Shankar model) are 150 and 80.7 tonnes/km<sup>2</sup>/year, respectively.

Sedimentation of Tairua Harbour has long been of concern. A report by the Hauraki Catchment Board (in 1977) stated that it seemed “fairly certain that the tidal compartment is under attack” from greatly increased sediment flow over the previous 100 years. The report went on to say that “there is an urgent need for a comprehensive catchment scheme aimed...at a plan of land use which will conserve native forest, and will create an appropriate compromise between “production” and “protection” for the purpose of controlling the entry of sediment into the river system”.<sup>20</sup>

The influence of increased sedimentation rates is also noted in:

- The increase in mangrove coverage from 12ha in 1983 to 31ha in 1995 suggests sedimentation may have had an effect on the estuary

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<sup>18</sup> Hume and Dahm, 1992.

<sup>19</sup> Turner and Riddle, 2001.

<sup>20</sup> Harris, 1977

- Biological communities: though there has been little monitoring in the estuary it has been reported that shellfish beds have declined in size and abundance.

### 6.3.2.1 Why is sedimentation an issue?

- High levels of suspended sediment within the water column increase the turbidity and decrease the light available to plants, such as seagrass and plankton. This can decrease the food available to benthic animals and clog their feeding structures
- Deposition of sediments can smother seagrass beds, encourage mangrove growth and bury benthic animals
- Contaminants attached to sediment affect benthic behaviour, mortality and community structure
- Changes in the plant and animal communities can reduce feeding ground and habitat for bird and fish species and can impact on kaimoana species
- Sedimentation is not the only pressure on coastal plant and animal communities, and the impacts of sedimentation should be considered in conjunction with other pressures.

### 6.3.2.2 Sediment generation

Steep slopes, weathered volcanic soils and frequent storms predispose slopes on the Coromandel Peninsula to erosion.

There are three main erosion processes responsible for sediment generation:

- Slopewash: During and after rainfall, sediment can be eroded from bare non-vegetated areas and carried down the slope. This can be exacerbated by gullying, which is the process of erosion by ephemeral streams, (streams formed during and immediately after rain fall)
- Streambank erosion: Streambank erosion is the erosion and/or remobilisation of sediment from the banks of streams
- Landsliding: A slope experiences two sets of stresses. One stress acts to hold the slope together (shear strength) and the other acts to move material down the slope (shear stress). When shear strength becomes less than shear stress, the slope fails and a landslide occurs. Slopes can be gradually weakened by a range of processes, including deforestation, weathering, erosion, undercutting by a stream and construction activities. The trigger can be an earthquake or volcanic activity but is more often prolonged or intense rainfall.<sup>21</sup> On the Coromandel Peninsula landslides usually occur when unstable rock and soil on steep slopes are saturated by heavy rain. Landslides occur in all land use types, including native forest, mature pine forest, harvested pine forest and pasture.

Extreme rainfall is well documented in the Coromandel Peninsula and can trigger and/or worsen all three processes of erosion described above. Each of the above processes occurs naturally, but can also be accelerated by human activity.

#### Other forms of erosion

##### *Scalping*

(*Soil scraping*) Deep soil disturbance caused by trees dragging along the ground during logging has been found to be a significant contributor of sediment to streams.<sup>22</sup>

##### *Roading*

Historically, construction of roading has been regarded as a persistent and widespread source of surface erosion.<sup>23</sup> Current forestry practices are believed to minimise the amount of sediment generated from forestry roads to an acceptable level. However, there have been few studies

<sup>21</sup> Saunders and Glassey, 2007

<sup>22</sup> Fransen *et al*, 2001.

<sup>23</sup> Fahey and Coker, 1992.

carried out on the effects of roads on sediment generation and those were in situations different from what is generally practised in modern forestry.<sup>24</sup>

*Other earthworks* Clearance of vegetation for development (for example, subdivision) can leave bare ground exposed to erosion for extended periods of time.

*Pastoral farming* Removal of vegetation to produce grassland for pastoral farming on steep slopes increases erosion. This is caused by the lack of a canopy intercepting rainfall and the fact that root systems of grasses are less effective at binding the soil than the roots of trees.

*Agriculture/horticulture* These activities can also expose bare soil, especially if the land is ploughed.

### 6.3.2.3 Issues and proposed actions

#### Issues

- Rate of infilling and amount of sediment entering the harbour - No one source of sediment (collective of land uses contribute to the results)
- Lack of funds to carry out enough dredging and beach renourishment for erosion benefits
- Impact of navigation access, particularly outside of two hours either side of high tide
- Impact on recreational access and users
- Impact on biological communities such as seagrass and shellfish beds
- Changes in water quality through increased turbidity, changes to water clarity and mobilisation of nutrients
- Increased mangrove expansion by providing appropriate habitat.

#### Proposed actions

There is much debate around the cost and practice of dredging in the Tairua harbour particularly in relation to the moving of sediment from one place to another, rather than its removal from the harbour system all together. Many see this practice as futile and a waste of money. However coastal scientists believe that the coastal sediment in the Tairua system is a finite resource and therefore should remain within the harbour tidal movement area.

The benefit of dredging and moving is that material can be used for beach renourishment and erosion protection in areas where it is needed. Areas such as reserves along the Pauanui side of the harbour and the Manaia Road area could benefit from this work. In order for this to be done well a suction dredge is required. The sediment size and quality is perfect for such practices.

The current dredging consent held by TCDC is more than sufficient to maintain navigation access with 12,000 cubic metres permitted for dredging on an annual basis. The issue is cost to carry out the dredging on a more frequent basis. Currently the bulk of the dredging occurs every four years with intermittent works as required (particularly in a 150m stretch of channel opposite Pleasant Point between the mooring zone and the waterways entrance). Additional funding of 10 to 20 thousand dollars annually would allow for a suction dredge to be set up and used biannually and for more extensive dredging to occur, allowing for more all tide access for larger vessels and potential deep hulled yachts.

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<sup>24</sup> Phillips, 2005 (Environment court evidence).

It is proposed that the first stage for sediment management is to carry out an investigation into management options. To look outside the norm and current practices to explore opportunities to capture, reduce and manage sediment in a cost effective and environmentally sound way. Consideration will include but not be limited to:

- Opportunity to capture sediment outside of coastal marine area
- Sediment trapping: wetlands and within the harbour system
- In harbour dredging: opportunities for efficiency and for use of dredging
- Economic uses for sediment gathered
- Cost sharing opportunities for multiple outcomes
- Navigation access and benefits
- Environmental implications: benefits and potential issues
- Sediment and dredging practices: what's happening in other parts of New Zealand?

**Additional Actions:**

- Land management practices implemented to reduce sediment loading
- Encourage forestry companies to reduce erosion and run off post harvest and for a seven year period post harvest
- Active participation in resource consent application for earthworks and logging to ensure all appropriate erosion mitigation is carried out
- Contribute to Waikato Regional Council submission on national environmental standard for forestry
- Review of TCDC dredging consent when it expires in 2013
- Funding review and amendment for dredging of harbour and for methodology to use a suction dredge to allow for ease of placement for beach renourishment
- Implement recommendations from investigation in partnership with community.

### 6.3.3 Coastal Habitats

The land sea interface is perhaps one the most degraded single systems in the Tairua harbour area. It is however, one area where significant gains can be made with multiple benefits achieved by providing opportunity for; biodiversity gains, recreational use, promotion and education, silt trapping and water quality improvements.

Though there are a number of opportunities that exist, only four key project areas have been identified and discussed below as these have the greatest potential to combine a range of outcome areas. These observations need to then be matched with landowner and community willingness to participate and also the ecological corridors work to ensure maximum gains for efforts.

Additional information can be found in Tairua Harbour inspection document – Appendix 8. A location map showing sites (Areas 1 – 20) is also included in this appendix.

**Grahams Creek** (area 1 and 2)

The lower reach of the Grahams Creek area contains a variety of herbaceous plants (including samulous and glass wort) as well as intact saltmarsh. The area is prone to flooding so works should aim to enhance flood capacity rather than impede it. Also recent water quality analysis has shown increased bacteria levels.

- Suggested works
  - Mustelid and rodent control
  - Salt water paspalum and pampas control
  - Catchment works: stream bank erosion control and riparian retirement
  - Edge planting to ensure vegetation variety, vegetation sequence and mitigation of edge effects
  - Mangrove management in central area where sediment trapping is occurring.

- Potential benefits
  - Improved water quality
  - Significant habitats and avian fauna such as banded rail, fern bird and Australasian Bittern
  - Accessible and highly visible. Potential to link in with, and not impede on flood works.



**Figure 16: Glass wort and samulous with salt water paspalum beginning to intrude.**

#### **Oturu (area 8)**

The harbour end of the Oturu has existing good vegetation sequence with opportunities for future enhancement through land based planting and weed control. Extensive salt marsh areas have come under pressure from vehicle access and recent burning of an area of salt marsh (electrical fire).

The site is highly visible with the state highway dissecting the site and poses a good opportunity for land to sea connection by including the riparian area in a restoration strategy.

- Suggested works
  - Riparian protection and planting of appropriate vegetation
  - Weed control including wattle, wilding pine and pampas (also salt water paspalum as part of a long term plan)
  - Re vegetating of vehicle tracked areas and burn site
  - Mangrove removal where mangroves are encroaching into sea grass beds and where recreational use has been recently altered.
- Potential benefits
  - Catchment connections and diverse habitat
  - Highly visible with good educational and promotional opportunities
  - Coastal vegetation sequence opportunities
  - Improvements to water quality and sediment reduction.

### **Woody Stream** (area19)

The Woody Stream confluence is at the upper salt water limits of the Tairua River/Harbour. The stream area is bound on the true left by forestry and the right by farm land. An area of fairly intact wetland system exists at the confluence end and is dissected by the state highway.

Efforts have been made to retire this area, but additional works would significantly benefit this site as well as aid in reducing sediment inputs into the harbour.

- Suggested works
  - Inclusion of forestry company in works and activities to reduce sediment contribution to stream system
  - Weed control (wattle, wilding pine and pampas)
  - Increased riparian margins
  - Set back areas in forestry
  - Silt trapping initiatives investigated and implemented.
  
- Potential Benefits
  - Improved water quality and a reduction in sediment entering harbour
  - Connection to and proximity of cabbage tree forest (significant natural area on main Tairua River)
  - Improved wetland function and area as well as potential water quality improvements.

### **Pauanui** (areas 9 and 10)

The landward portion of this area (above the main road) is currently fine. There is a concern that should the surrounding land use change it may result in increased pressure on this wetland system, and on the already degraded wetland system downstream. Future management of both sections of wetland would benefit from vegetated buffers to ensure minimal impact from any future development or land use change. The down-stream wetland would benefit from enhancement in the short term. The site as a whole, provides good community engagement opportunities as well as linkages to other community initiatives such as the board walk.

- Suggested works
  - Animal pest control – focus on rats, feral cats and mustelids
  - Weed control including wattle and pampas (also salt water paspalum as part of a long term plan)
  - Planting of appropriate native species
- Potential benefits
  - Improved water quality by providing a filter for any run off
  - Improved wildlife habitat
  - Improved recreational opportunities
  - Opportunity for promotional and educational signage.

#### **6.3.3.1 Toxic algal bloom**

A health warning, first issued back in December 2009, advising against the collection and consumption of shellfish along part of the Coromandel and Bay of Plenty coastline remained in place into early 2011.

The affected area included the entire coastline from Tairua (including Tairua Harbour) south, including Opoutere, Onemana, Whangamata, and Whiritoa, east along the Bay of Plenty coastline from Waihi Beach, including Tauranga Harbour to the mouth of the Whakatane River in the eastern Bay of Plenty.

The health warning applied to all bi-valve shellfish including mussels, pipi, tuatua, cockles, oysters, scallops as well as catseyes and kina (sea urchin). Paua, crayfish and crabs could still be taken but as always, with the gut should be removed before cooking.

Consumption of shellfish affected by the paralytic shellfish toxin can cause numbness and tingling around the mouth, face or extremities; difficulty swallowing or breathing; dizziness; double vision; and in severe cases, paralysis and respiratory failure. These symptoms usually occur within 12 hours of a person consuming affected shellfish.

Anyone suffering illness after eating shellfish should seek medical attention immediately.<sup>25</sup>

The algae is a plant of the sea that makes up phytoplankton. There are literally thousands of species though only thirty lead to toxicity in shellfish. There seems to be no one specific factor that leads to these blooms and it is thought that a combination of factors need to occur. Contributing factors include:

- Decrease in salinity
- Change in water temperature
- Weather patterns such as El Nina and La Nino or special weather patterns such as a prevailing easterly
- Sunlight: as daylight increases so does light intensity
- Level of nutrient entering the system such as nitrate and phosphate
- A stable water column – calm sea conditions for extended periods.

The milder than normal winter of 2010 may have been a significant contributing factor to the bloom continuing longer than anticipated in the Tairua area.

### **6.3.3.2 Benthic communities**

Large intertidal seagrass beds are found in the Tairua estuary. These are predominately in the middle harbour, with little seagrass found in the estuary south of Oturu Stream and the Pauanui waterways. The biggest seagrass beds are on the tidal flat west of the channel level with and just south of Red Bridge Road, with a smaller bed present on the eastern side of the channel in the same area. More large seagrass beds are found on both sides of the channel just out from Tairua and Pauanui townships, south of Pepe inlet.

Extensive cockle beds are also present in the Harbour. The highest concentrations of cockles are found on the intertidal flats either side of the main channel due east of Tairua township, extending from just south of Paku Bay to just north of Cemetery Point. The high density cockle beds are often not large and interspersed with areas where cockles are present in lower densities. Cockles are often found in medium to high densities in seagrass beds within the estuary. Other intertidal shellfish such as the wedgeshell (*Macomona liliana*), an important food resource for birds, are found in similar areas to cockles.

Pipi beds are confined to the bottom and sides of fast-flowing channels and in a recent Waikato Regional Council survey a number of pipi beds were mapped just inside the Tairua Harbour entrance. The same survey found more pipi beds in the upper estuary, approximately level with Tangitarori Lane on the Pauanui side of the estuary.

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<sup>25</sup> Sourced from Waikato District Health Board

### 6.3.4 Beach Care



**Figure 17:** Pingao growing on foreshore and main beach Tairua. Dune protection works (right) restricting access.

Tairua and Pauanui Beachcare groups are community based coastal dune restoration partnerships involving the local community, Waikato Regional Council and the Thames Coromandel District Council.

The dune restoration is undertaken by local community volunteers. The councils provide plants and materials as well as experienced coastal scientists and reserve management staff to assist the communities in design and implementation.

#### 6.3.4.1 Purpose of Work

The dune restoration work has a number of important management objectives, including:

- **Improved coastal hazard management** through restoration of natural self-sustaining dunes to provide protection from coastal erosion, wind erosion, coastal flooding and tsunami
- **Restoration of indigenous dune biodiversity and ecology** through planting and control of plant and animal pests. Coastal dunes are one of the most modified and degraded of New Zealand's ecosystems and have suffered extensive loss of native plant and animal biodiversity
- **Improved management of public access** – to enhance public access to and along the dunes, and to protect native dune vegetation and ecosystems from damage
- **Restoration and enhancement of the natural character and landscape values of the beaches**
- **Promote increased resilience to climate change.**

#### **6.3.4.2 Formation and Issues**

The Tairua and Pauanui Beachcare groups were formed in 1995 to address significant dune degradation at both sites.

At Tairua, there were serious issues with wind erosion in places, including major blow-outs. Beach access was also poorly managed leading to ongoing vegetation disturbance. In addition, the dunes at the northern and southern ends were badly degraded. These latter areas were particularly important as public infrastructure and private property is located close to the sea in these areas. The beach also includes significant remnants of native backdune vegetation which were being increasingly invaded by exotic species (particularly agapanthus) and also degraded by a variety of human activities.

At Pauanui, the natural frontal dune had been leveled and capped with clay at the time of the original development, with the seaward dune face often steeply scarped and lacking the native dune vegetation critical to natural dune function and repair. The steep dune face also made beach access difficult in many areas. In addition, poor access management resulted in damage of dune vegetation and localised problems with wind erosion and windblown sand.

#### **6.3.4.3 Activities**

Over the past 15 years, the primary focus at both Tairua and Pauanui has been the restoration of spinifex and pingao along the seaward face of the frontal dune. These native species are critical to natural dune function as they trap windblown sand, thereby naturally repairing the dune following periods of erosion as well as preventing wind erosion. The general aim at both sites is to restore sufficient width of spinifex and pingao for the dunes to be naturally self-sustaining.

The two groups have also worked extensively with councils to improve beach access ways - to prevent damage to stabilising dune vegetation and to improve public access. The groups are also now giving increased attention to restoration of native dune biodiversity with a range of native plantings in more landward areas of the frontal dune.

In addition, both groups have played a significant role in the development of a dune care ethic in their local communities. This is important as improved community awareness and understanding is critical to maintenance of the restoration gains in the longer term.

The work at Tairua has now restored a good width of spinifex and pingao along most of the beach and repaired the more serious wind erosion problems. By way of example, Figure 18 shows before and after photos of successful restoration at the southern end of the beach. At present (2011), work is focused on restoring the remaining degraded dunes at the very southern end of the beach. It is anticipated this work will be completed in 2012. The focus of the group over the next few years will be on maintenance of the restored spinifex and pingao cover (i.e. repair of human damage), increasing attention to restoration of native dune biodiversity, ongoing weed (especially agapanthus) control, ongoing management of public access and a continuing emphasis on community education.

At Pauanui, the group has progressively worked along the beach over the last decade to restore a natural dune shape and a good cover of spinifex and pingao on the dune face. An example of the extensive restoration work successfully completed to date is shown in the before and after photos of Figure 19. At present (2011), the beach is in a natural erosion phase and the restored dune is being eroded in places. This is a natural cycle and the restored dune vegetation will naturally repair this damage once the erosion ceases. The Beachcare group is monitoring the situation to ensure the restored native vegetation is of sufficient width to absorb the erosion, critical to restoration of a natural self-sustaining dune. If necessary, the native vegetation will be extended further landward.

The group has also worked extensively with the councils to install and maintain improved public access ways to and from the beach. This has markedly improved public access and also reduced problems with vegetation damage and wind erosion. Since 2010, the Beachcare group has also commenced restoration of greater dune biodiversity – with planting of a range of native species on more landward areas of the frontal dune.

Although only operating for less than 16 years, the groups have already significantly improved both dune condition and community understanding at both Tairua and Pauanui.



**Figure 18:** Example of dune restoration work by Tairua Beachcare – showing original badly degraded dune dominated by exotics (top), shortly after restoration (excavation and planting)(middle) and just under two years later (bottom)



**Figure 19:** Example of dune restoration at Pauanui – showing original badly degraded dune (top), shortly after reshaping and planting (middle) and 18 months later (bottom)

### 6.3.5 Navigation safety and recreation

In July 2001 Waikato Regional Council became responsible for the control and management of harbours and navigation safety around the Coromandel Peninsula. The Five harbourmasters, who previously reported to TCDC, who are responsible for the

day to day management of the harbours are now employed by Waikato Regional Council.

The change was a result of the amendment to the Local Government Act (LGA) that resulted in navigation safety becoming a clear function of regional councils with limited responsibilities of territorial authorities. The table below briefly outlines the responsibilities.

Regional council responsibilities	Territorial authority responsibilities
<ul style="list-style-type: none"> <li>• Regulation and control of navigation safety</li> <li>• Erect and maintain navigational aids</li> <li>• Remove obstructions to navigation</li> <li>• Execute and maintain works to improve navigation</li> <li>• Appoint harbourmasters, enforcement officers, honorary enforcement officers</li> </ul>	<ul style="list-style-type: none"> <li>• Erect and maintain quays, docks, piers, wharves, jetties, launching ramps, and any other works for the improvement, protection, management , or utilisation of waters within its district</li> <li>• Erect and maintain protective works (other than works undertaken under the Soil Conservation and Rivers Control Act 1941) to prevent the encroachment of waters within its district</li> </ul>

The Tairua harbour is overseen by a harbourmaster and his deputy. These roles are supported by honorary enforcement officers who as volunteers educate and enforce where necessary the key navigation safety rules as identified in the bylaws as well as the various areas zoned specifically in the Tairua harbour for different users.

Below are the issues raised and identified throughout the investigation and consultation for the Tairua HCMP.

### 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 Waikato Regional Council harbourmasters informed if an issue arises
- Navigational safety – appropriate signage and education of harbour users by the harbourmasters
- Level of involvement needed by locals to monitor harbour activities
- All tide access needed up main channels currently limited to 2 hours either side of high tide for medium to large vessels
- Sand spit near Pauanui wharf hazardous
- Channel needs to be clearly marked especially in lower channel
- Visitor moorings need to be clearly identified and made more visible
- Boat ramp – better facilities needed with increasing demand (at Tairua side)
- Regular dredging around Pauanui boat ramp needed
- Trailer boat parking areas currently no land secured at Tairua for parking
- Decline in fish and shellfish numbers
- Mooring zone is currently full – will there be pressure for more in the future?
- Vehicle usage (unauthorised) in coastal marine area and driving over shell fish beds
- Conflict over proposed/planned marina development at Paku Bay and resulting impact on the environment, access and parking pressures.



**Figure 20: Entrance to Pauanui Waterways, local, safety conscious lads enjoying a spot of fishing.**

### **Proposed actions**

- Boat ramp upgrade; Plan exists with TCDC and funding is currently identified for 2015 to design and gain consents for works. Work needs to include trailer parking facilities
- Upgrade Tangitarori boat ramp at Pauanui
- More regular or extensive dredging of main navigation channel and boat ramp access points
- Improved channel and visitor mooring marking
- Reinstatement of the Tairua Harbour Committee
- Sedimentation investigation into how harbour sediment issues can be better managed
- Reduce number of moorings in navigation channel once marina developed (if development goes ahead). Or review mooring areas under navigation bylaw review process
- Enforcement and raised awareness through education of navigation bylaws and regulations surrounding vehicle access within the CMA
- Appropriate navigation signage installed at main access points around harbour and beaches
- Base line monitoring for shellfish (Waikato Regional Council, benthic survey).

## **6.4 Catchment assessment**

A ground-based assessment was carried out on the physical characteristics of the Tairua catchment in early 2010. This information was collated with a previous inspection carried out by the area engineer in 2008.

A more detailed account of inspection findings can be found in Appendix 10.

For the purpose of the inspections the catchment was split into sub catchment areas, they are:

- Grahams Creek
- Pepe Stream
- Oturu
- Swampy Stream
- Woody and Hikuai Streams

- Boom Stream
- Gumdiggers / Oxley / Duck Creek
- 1<sup>st</sup> 2<sup>nd</sup> 3<sup>rd</sup> 4<sup>th</sup> Branch Tairua River
- Kaituna Stream
- Stony Stream.

River and stream systems are a core component of catchment assessment along with surrounding land, its condition and use. While forestry and its practices have been considered in the overall plan, no formal assessment has occurred on these blocks. This is primarily as these plantation forests are managed in accordance with existing resource consents or under the Waikato Regional Plan permitted activity rules.

#### **6.4.1 Grahams Stream sub catchment**

High in the catchment are two separate QE2 covenants. These protect what is now low lying regenerating native forest. Much of this stream catchment is owned by one landowner. Most of the upper land area is clad in regenerating forest where wilding pines are an issue. Pasture dominates the lower valley where fencing of streams and native forest is less than adequate.

The stream appears to have been highly modified with straightening in the past. The threat of flooding still exists as a major issue here, particularly as the lower reaches are a populated urban area. It is a diverse catchment with farming, mixed exotic and native forest, modified channels, urban encroachment as well as being a high use recreational area.

Significant flood investigation has been carried out in this catchment area<sup>26</sup> and continues to be an area concern. Issues that relate to flooding include:

- Manaia Road causeway – causing constriction
- Encroachment of buildings and infrastructure on main channel and flood plain
- Historical infilling of flood plain
- Historical stop banking
- Ability to carry out routine maintenance on the stream channel.

The willingness and ability of this small community to pay for the large scale flood protection works is the subject of on going debate. Waikato Regional Council is currently committed to carrying out routine channel maintenance to ensure maximum carrying capacity of the stream is maintained. This work is funded via a target rate and is also contributed to through the wider Peninsula Project rate.

#### **Issues**

- Cattle access to stream channel causing bank erosion
- Un fenced and poorly vegetated stream banks
- Minor pest plant issues in lower reach – predominantly pampas
- Wilding pines in upper catchment
- Poor vegetation structure in upper catchment
- Flooding down stream of state highway bridge in heavy rainfall events
- Potential water-take catchment for town water supply and has been identified as a water shortage area.

#### **Proposed actions**

- Fencing to cattle class standard along Grahams Creek and tributaries

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<sup>26</sup> Wood, Megan Grahams Creek Flood Risk Investigation Status Report November 2008, Waikato Regional Council Internal Series

- Appropriate planting of river banks to provide for bank stability, shading of water way and habitat
- Regular maintenance of the stream channel and removal/lowering of obstructions on the floodplain
- Link in with TCDC plans to upgrade spans in Manaia Road causeway bridge to increase capacity – identified in 2017/18 and 2018/19 years of their current LTP
- Weed control
- Undertake sports field development and feasibility study (TCDC) to determine what options exist for future use of the flood plain.

#### **6.4.2 Pepe Stream sub catchment**

The Pepe is much like Grahams Stream. With the exception that DOC administers nearly all the steep ground and most of the catchment. Lower reaches are covered by one major landowner. This dairy farm has adequate riparian fencing and is regularly monitored by Waikato Regional Council. The majority of tributaries are also fenced, however there is little if any vegetation cover on the stream banks and erosion continues to be an issue. Just past the farm the urban area begins before the stream enters the harbour. It is a high use recreation area.

Bathing beach monitoring has shown a continual breach of standards during peak summer periods this is largely due to high faecal coli form levels. The exact cause of these levels is unknown and further investigation is required. Possible sources include:

- Bovine effluent
- Run off from land after rain event with contamination from bovine and animal pest faecal matter
- Leaching from old septic tanks.

#### **Issues**

- Cattle crossing points causing sedimentation and water quality issues
- Cattle access to forest fragments and poor stability land areas
- Plant pests in lower reach
- Poor water quality monitoring results
- Stream bank and hill slope erosion
- Poorly vegetated riparian margins
- Nutrient management
- Animal and plant pests.

#### **Proposed actions**

- Gravel management to alleviate erosion and to increase channel capacity
- Planting of both native and exotic (suitable willow and poplar varieties) species to shading and bank stability
- Fencing forest fragments
- Animal pest control in upper catchment and pest plant control in lower reaches
- Water quality monitoring to determine source of faecal contaminants
- Nutrient management plan developed and implemented on farm and golf course
- Enhancement of reserve areas and promotion of recreational access.

#### **6.4.3 Oturu sub catchment**

The upper reaches of this stream catchment are under DOC and plantation forest management. Within the mid to lower reaches the steep sided valley has native regenerating riparian margins. Mid to lower areas of this sub catchment are production land currently under dairying. The Oturu Stream, before entering the harbour is contributed to by a network of channelised farm drains.

## **Proposed actions**

- Stream bank erosion control
- Removal of nuisance vegetation from stream banks
- Complete stream fencing
- Work with landowner to look at nutrient use and practices
- Riparian planting.

### **6.4.4 Swampy sub catchment**

The Swampy Stream sub catchment is predominantly a pine plantation catchment. The stream has well vegetated margins within farm land before meeting the harbour. The land looks to be used predominantly for beef cattle grazing.

The area would benefit from some weed control as well as riparian enhancement. The wetland system here was assessed (identified as area 14 and 15) as part of the harbour inspection.

### **6.4.5 Woody Stream and Hikuai River sub catchments**

In the area bounding the true left hand side of the Tairua River from Woody Stream to the Hikuai River a regionally significant wetland exists. The lower reaches of both streams finish at this significant site. The wetland itself is protected from grazing animals by SH25 and the Tairua River, however in some parts the opposite bank is open to stock and riparian vegetation is minimal or non-existent.

On the Hikuai River, further up from this wetland dairy farms exist on the lower flats and give way to steep hill country mixed grazing. Forestry exists in pockets further up the Hikuai River catchment while Woody Stream has a large boundary with forestry on its mid slopes and in steeper areas before reaching native clad DOC land.

#### **Issues – Woody**

- Pest plants – pampas, privet
- Nutrient use and application – potential issue
- Proximity of fence to stream bank – some erosion issues.

#### **Proposed actions**

- Pest plant control
- Nutrient management plan designed and implemented with neighbouring farmer
- Re locate fence to allow space for planting to alleviate erosion risk
- Planting for erosion and biodiversity purposes. With long term aim to create ecological corridors linking wetland system.

The Woody Stream is generally in good condition though improvements for biodiversity and water quality could be made through planting. The drainage network would benefit from fencing and planting to minimise nutrient input into the stream system.

#### **Issues – Hikuai**

- Mature native vegetation that is currently unfenced
- Poorly vegetated riparian margins
- Opportunity for better nutrient management systems
- Minor weed issues though lower reach dominated by privet
- Minor stream bank erosion – currently no active erosion but will need to be monitored
- Flooding – lower reach and state highway

- Sections of stream unfenced.

Generally the main channel is in good condition and is adequately fenced along the stream length. There are opportunities for planting for enhancement, water quality and biodiversity values along this stretch.

#### **Proposed actions - Hikuai**

- Retirement fencing of stream channel and forest fragments
- Planting of willow and poplar poles as well as appropriate native species that will not exacerbate flood hazard
- Monitoring erosion points (currently no active erosion)
- Active weed management
- Continue channel management to maximise channel capacity and to alleviate flood pressures. Engage with Land Transport NZ through the Coromandel Peninsula Blueprint process to investigate options to alleviate regular road closure due to flooding.



**Figure 21:** Forest fragment retirement with erosion in foreground. Location; Hikuai Valley.

#### **6.4.6 Boom sub catchment**

The Boom Stream sub catchment is predominantly plantation forestry in the upper catchment. The major issue on the farm land is the Boom Stream's proximity to the Tairua River. There is a chance in the future that this stream will change course and enter the Tairua River at a different location, leaving an island of pasture without overland access.

#### **Proposed actions**

- Enhance riparian margins through additional fencing and planting
- Erosion protection works
- Nutrient management plan designed and implemented with neighbouring farmer

- Weed control.

#### **6.4.7 Gumdiggers/ Oxley/ Duck Creek sub catchments**

Gumdiggers, Oxley and Duck Creek sub catchments are dominated by pine plantation in the upper to mid part of the catchment with lowland wetland systems at the downstream end. The wetland systems require additional protection and enhancement and have the potential to provide sediment trapping and water filtering opportunities.

Duck Creek, so named because of the large duck population is a particularly significant wetland. Fortunately most of it is protected by a QE2 covenant, with local pest control and restoration underway.

Additional commentary is included in the harbour assessment (Refer to appendix 8) as well as the catchment assessment (appendix 9).

Works need to focus on preserving and enhancing the wetland systems as well as weed and animal pest control.

#### **6.4.8 1st, 2nd, 3rd, 4th branch sub catchments**

1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup> and 4<sup>th</sup> branch sub catchments are very similar in structure. With dominant native forest cover in the upper part of the catchments and small amounts of pasture in the lower reaches near the confluence to the Tairua River. They currently appear to be in good health, but gravel deposition will need to be monitored to ensure this does not further obstruct flow or cause stream bank erosion.

#### **6.4.9 Kitahi sub catchment**

The Kitahi catchment is a short steep catchment, with the head waters of its tributaries in native or plantation forest cover and the upper section of the main channel under DOC management. The mid and lower slopes are pastoral land with a mix of sheep and beef farming. Numerous opportunities exist for erosion control works as well as the considering alternative land use and land management practices.

##### **Proposed actions**

- Stream bank erosion control works
- Hill slope erosion control planting
- Forest fragment retirement
- Riparian fencing and planting
- Animal pest control (linkages to community possum control scheme)
- Weed control.

#### **6.4.10 Stony sub catchment**

Much of the main channel of this stream is administered by DOC and numerous opportunities for riparian fencing and remnant forest protection exist. High in the catchment is a QE2 covenant which retired a block of native bush. These types of remnants appear to be more common within this catchment than neighbouring areas. There are only three major landowners in the Stony Stream catchment and a good opportunity exists for catchment improvement.

##### **Proposed actions**

- Riparian fencing and planting
- Plant and animal pest control
- Work with DOC to implement works.

## 6.5 Biodiversity corridors

Waikato Regional Council is identifying areas in the landscape where high biodiversity values exist and using this information to create an inventory of indigenous biodiversity values. This work includes the identification of significant natural areas (the protection of which is a matter of national importance under section 6(c) of the Resource Management Act).

Identification of significant natural areas (SNA) is an important step towards the maintenance and protection of biodiversity across a full range of ecosystem types in the region. Although SNA are the best of the remaining native biodiversity resource, research clearly shows that protecting them as isolated (disconnected and often distant) habitat fragments does little to ensure the long term maintenance of their health and integrity and the services that they provide.

Establishing habitat connections, linkages and buffers is necessary to strengthen the resilience of native ecosystems to:

- stress
- enhance their essential structure, processes and functioning
- improve interactions between organisms and their environment.

Additional works of habitat reconstruction, restoration or enhancement will also be required to maintain ecosystem services where biodiversity values are in serious decline; where habitats have been depleted and fragmented to the point where they are now below a sustainable threshold (e.g., under-represented habitats such as wetlands, where less than 10 per cent of the original extent remains).

However, given that a much larger pool of resources than is currently available would be required to achieve these outcomes, a method of prioritisation is needed. The biodiversity restoration corridors work has been designed specifically to address this need. It identifies potential habitat linkages across the landscape within a prioritisation framework; helping plan where existing native habitats and possible restoration areas could best be linked or connected to help preserve the unique biodiversity values of waterways, wetlands, forest and scrub habitats, the marine environment and the ecosystem services that they provide.

This information will be used along with mapped data of existing projects and initiatives to further refine the prioritisation.

The Tairua catchment area has been mapped and assessed as the first full catchment trial of this work. This was largely due to the existing level of community interest in preserving ecological function that will in turn benefit the over all health of the Tairua harbour and catchment. At the time of writing, the corridors analysis had only just been completed, as such; more detail on the location and nature of the SNA and potential corridors is not yet available. This work will however be a great foundation on which to build restoration projects and to meet HCMP objectives.

The map below shows the various river corridor connections and their individual ranking when compared to corridor systems across the Thames Coromandel District.

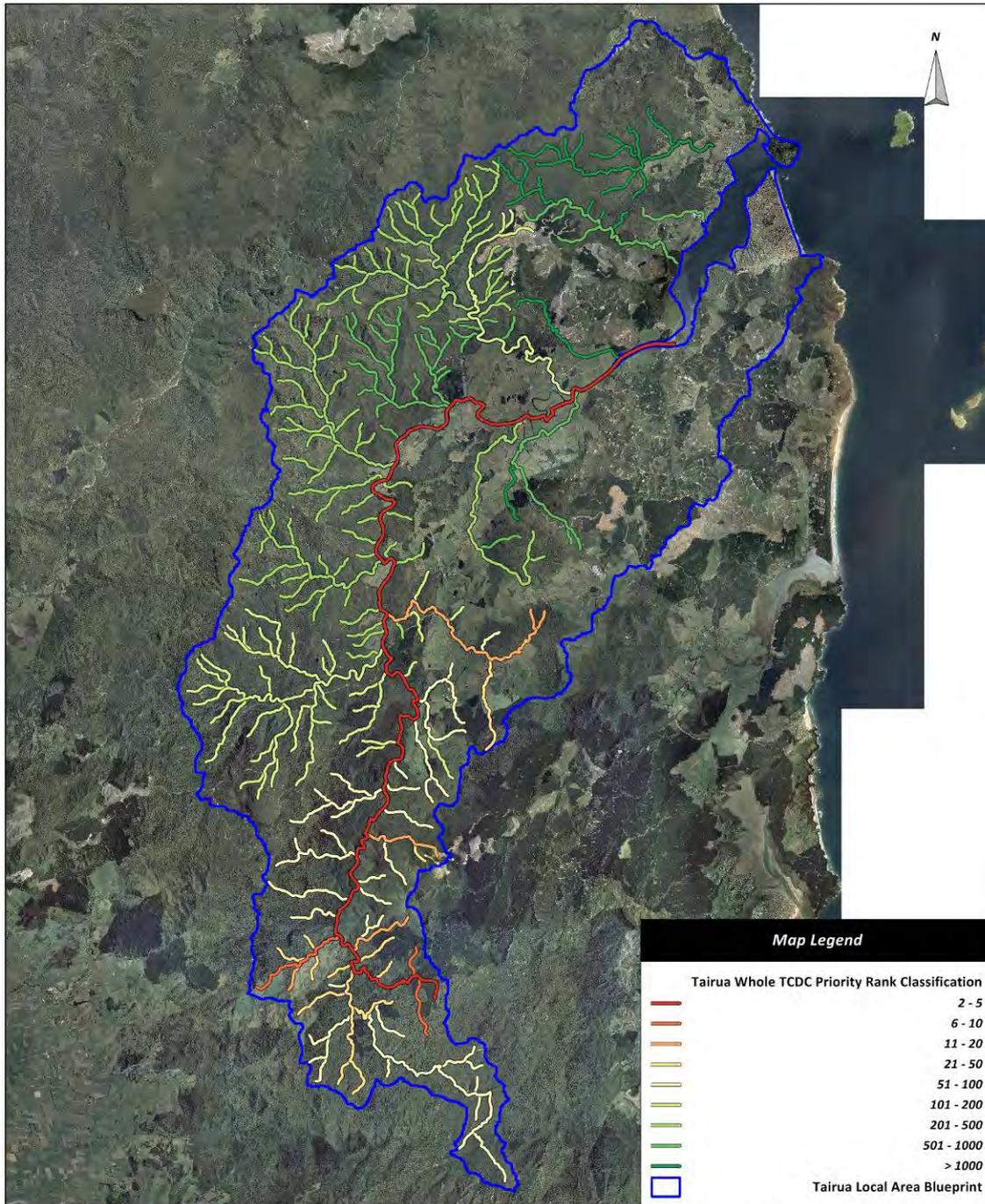


Figure 22: Biodiversity restoration corridors map showing priority classification when compared to whole district.

## 6.6 Pest plants

Like most Coromandel Catchments, Tairua has many varied infestations but unlike other catchments there are no notable pest plant control programmes in place. (i.e. woolly nightshade at Whitianga and Whangapoua or boneseed at Coromandel).

Tairua has the same range of species just not in the size of infestations encountered in other catchments, this makes Tairua fairly unique in the fact that the focus is on trying to limit the spread of and/or eradicate some species as opposed to battling to reduce infestation sizes in one location (eg woolly nightshade on the Whenuakite Landcorp block or wild ginger at Port Charles).

Boneseed and old man's beard have been controlled to zero density from the catchment; these historical sites are visited annually to ensure that if any re-growth is discovered it can then be dealt with swiftly.

Weed issues also include:

- Small incidences of woolly nightshade around Pumpkin Hill that are managed regularly (cut and paste with Vigilant or overall spray with Tordon or similar)
- Climbing spindelberry – Ocean b=Beach Road on private residency
- Gorse is prevalent in waste areas or unmanaged land - usually controlled with overall spray with Tordon brushkiller, Escort or similar
- Tree weeds in this catchment include Chinese privet, wattle, willow, wilding pine (both radiata and pinaster) and silver poplar
- Privet confined mainly to road sides with one heavy infestation occurring at the Hikuai wetland site - may be controlled chemically the same way as woolly nightshade or machine mulched
- Wattle, poplar and wilding pines usually require drilling (injected with Vigilant, Escort or similar) or felling depending on tree size and location. These species are usually found infesting waste or poorly managed land, steep bluffs or riparian strips.



**Figure 23: Wilding pine near Oturu Stream.**

Tairua catchment is not immune to nasty climbers. Honeysuckle is prevalent along the highway especially around the Bailey Bridge and Eeleagnus can be found further towards Hikuai Settlement Road and surrounds. Banana passionfruit is known to infest some parts of Pauanui and is regularly targeted by the council for control. These plants can be found invading disturbed forests and margins and out compete other plants by smothering.

Pampas is common on forestry land, roadsides and riparian areas but is no longer a containment species under the RPMS. Wild ginger on the other hand is ardently targeted for control with TCDC continuing programmed control within reserves including Paku summit. Ginger is also programmed for control if discovered on private property.

Beachcare has restoration projects underway for both Pauanui and Tairua beach dune systems where various weeds (eg agapanthus, iceplant and cotoneaster to name a few) are controlled before being replaced with natives.

There has also been a history of ragwort infesting some upper catchment farms around Kitahi Rd - usually spot or boom sprayed using Tordon, Escort or similar.

## **6.7 Animal pests**

For the purpose of this discussion animal pest control focuses on feral goats and possums. This is due to the impact these species have on catchment stability and the ability of forest health to be maintained. Depending on the control method, target species can also include rats, mustelid (stoats and ferrets) and feral cats.

Success of possum control operations are measured by residual trap catch (RTC) rates. This is measured pre and post operation to determine how successful the operation has been and whether or not additional treatment of the site is required. This also determines at what stage a re treatment of the area is needed.

RTC rates vary depending on the outcome sought. Possum control for example requires a RTC ideally of below 5 per cent in an area where the outcome is catchment stability. In comparison a target RTC of 0-1 per cent maybe required where the focus is on biodiversity gains and supporting threatened species breeding and recovery, for example for the native mistletoe.

Successful animal pest control for the Tairua catchment area requires considerable input from the community, stakeholders and agencies. It is dependent on funding availability and priority setting by the Department of Conservation and the Waikato Regional Council.

Targeted, species specific, success is possible and is demonstrated in areas such as the Southern control area for the Whenuakite Kiwi Care programme as well as the Hikuai Wharekawa Community Possum Control Scheme where the focus has been the northern rata.

### **6.7.1 Landowner support**

The Waikato Regional Council via its Coromandel Pest Control Contractor offers a range of technical support and financial assistance for private landowners to contribute to the ongoing battle against animal pests.

In significant conservation areas and where private land is adjacent to DOC land, the Department of Conservation will also look at how they can support private landowners in their efforts to preserve significant species.

### **6.7.2 Existing initiatives**

#### **Tairua**

A number of new smaller schemes exist in the Tairua area. The focus is on rat and possum control. Residents in Rewa Rewa Valley, Pepe Valley and Paku Hill area work together on pest control through a bait and trapping network.

The Pepe Valley residents reported hearing kiwi calling in June 2010 which they had not heard for over three years.

There are also a number of holiday homes with rat control programmes as well as the TCDC transfer station control for rats/mice, possums and feral cats and TCDC Tairua community hall for rats/mice.

Volunteers and community members led by local, Derek Boyd continue to target mustelid, possum and in some instances feral cats in an effort to create a southern

boundary linking to the Whenuakite Kiwi Zone. Successes here include the continued involvement of landowners and a raised awareness of the issues that these introduced pests have on our native flora and fauna.

### **Pauanui**

Multiple residents are involved in possum and rat control around the Pauanui village as well as a small bait station network at the southern end of the beach protecting the ancient pohutukawa grove. The land owners who neighbour the pohutukawa reserve have pest control equipment over their lands, along the boundaries and service the equipment in the reserve land. Also, there are lifestyle blocks and farm properties along the state highway into Pauanui and along the Tairua River edge out to Hikuai who carry out control for possums, rats and rabbits.

The town streets, parks, reserves and beach dune system have had regular night spot light shooting carried out by a licensed contractor for rabbit control purposes.

Pauanui Lakes Resort continues to implement pest control. This work focuses on preserving bird species such as pateke and allowing them to breed in the Duck Creek wetland system.

### **Hikuai-Wharekawa Community Possum Control Scheme**

The Hikuai Wharekawa Community Possum Control Scheme focuses on keeping the possum population to a low level for the protection of the southern rata.

The possum control area is divided into five blocks with a pest control contractor rotated around them on a performance based contract. The group also has a farm-bush boundary control operation serviced four times per year by contractor. The group hopes to head towards a kiwi recovery programme, including rat control and setting up a kiwi zone with permanent trap lines for mustelids.

The group and its members offer a range of support and advice to new groups and individuals wishing to carry out predator control.

## **6.7.3 Future control**

The success of the Thames Coast goat control as part of the Peninsula Project has lead to an extension of the Thames Coast control area to control re-infestation from the east coast. Control of feral goats in the upper Tairua catchment is scheduled to begin between October 2012 to April 2013, with landowner consultation commencing around June 2012. This work will benefit the upper Tairua by aiding reduction in vegetation loss and sedimentation of rivers in the upper catchment.

Currently there is no planned possum control outside of existing community scheme areas. Through the development and implementation of this harbour and catchment plan as well as the neighbouring Wharekawa Catchment Management Plan it is hoped to secure funding for more extensive integrated animal pest control in the future. The partnering of community and agencies will be crucial to ensuring the success of any pest control works.

The desire for more extensive animal pest control is supported by many of those who have participated in or responded to the consultation process for the development of this plan.

## **6.8 Recreation and facilities**

The Tairua catchment area with its three settlements is a recognised destination for tourists and holiday makers alike. This often places pressure on resources and facilities in the area. During the peak summer period water restrictions are common and the pressure on core infrastructure such as waste treatment plants is at its peak as the population swells.

Thames Coromandel District Council is currently operating under temporary water take consents with the long term consent to be lodged at a later date once landowner consultation is completed. Supply is to be from Pepe Stream plus tributary, as well as the Oturu Stream.

Other investigations also being carried out by TCDC include:

- Upgrading Hikuai Settlement Road
- Boat ramp and wharf facilities as well as opportunities on adjacent land:
  - TCDC LTP identifies the need to establish a boat ramp at Wharf Road to decrease pressure on Paku facilities
  - Design and resource consent to be formalised in 2015
  - Land availability for boat trailer parking.
- Hikuai Reserve – initial concept plan in place
- Paku Coastal Walkway (TCDC) - lower walkway around harbour linking with larger walkway system.

Community concerns and aspirations raised through the plan development process include:

- Puketui Valley facilities – with particular regard to rubbish disposal and services for people in camper vans
- Hikuai/Tairua River reserve development
- More rubbish disposal facilities near play ground area – main beach
- Pepe walkway – from Country Club, round harbour over Pepe Bridge back along council reserve lands and back to town
- Walkway/Cycleway Tairua – Hikuai – Pauanui.

#### **Proposed Actions**

- Contribution to TCDC annual plan reviews
- Feedback of information to DOC and TCDC
- Provide technical support and assistance where necessary
- Lobbying (where appropriate) for funding and support to implement works identified in plan.

This information will be passed on to TCDC to ensure that these aspirations are considered and where appropriate implemented.

## **6.9 Forestry**

Poor soil fertility and steep mountainous terrain lends itself to production forestry in the wider Tairua Catchment. Production forestry is a sustainable land use that for much of its thirty year cycle is appropriate and conducive to this type of environment.

The Tairua Forest is made up of four separate land parcels. These are locally known as the Main, Peninsula, Ohui and Hikuai blocks. Geographically, these blocks are located on the eastern hill slopes of the Coromandel Range between Whangamata and Tairua. Collectively, within the catchment management boundary, these blocks contain 4113 hectares of production forest of *Pinus radiata* trees with some localised areas of other minor species. Matariki Forests holds a Crown Forest Licence lease for the Tairua Forest. Rayonier NZ Ltd is Matariki Forest's plantation forest manager.

Erosion issues arise during and post harvest creating a seven year period of land vulnerability. Severe weather patterns inevitably coincide with this post harvest window, leaving the areas susceptible to sheet, slip and rill erosion.

Forestry activities are carried out in close proximity to other land users, communities and state highways making the activities highly visible. This makes forestry companies an obvious target for their role in sediment contributions to 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 community's best opportunity to influence forestry processes and activities is when the application for harvesting consent is lodged or by liaising with the Waikato Regional Council's Resource Use Group to ensure appropriate conditions relating to managing the effects of run-off and sedimentation during forestry harvesting are implemented and monitored. The Waikato Regional Council relies on communities to be their eyes and ears and to report any activities that raise concerns.

Central government is currently reviewing forestry activities and have begun proceedings for a national environmental standard for forestry<sup>27</sup>. At this time (June 2011) the draft document is out for its second review. If the standard is adopted this will remove much of the Waikato Regional Council's role in forestry consents, however a strong role in monitoring and compliance will be retained.

### **6.9.1 Forestry relationships**

Downstream farmers who often feel the full force of run off from forested blocks generally just want forestry companies to be 'good neighbours'. Meaning, that they too control weeds regularly, and are forthcoming with assistance when debris and silt enter farm lands and streams, often resulting in costly clean up.

It is hoped that through the harbour and catchment management plan process greater interaction between the forestry company and the community will occur. Thus, 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.

Rayonier/Matariki forest managers have been invited on several occasions to participate in the plan development process and have until recently been kept informed via an appointed role on the Coromandel Liaison Subcommittee. Unfortunately the forestry company has declined efforts for involvement in this process.

### **6.9.2 Forestry activities**

Current forest management involves maintenance of the forest road and track infrastructure, harvesting mature trees and re establishment and maintenance of a new tree crop on the harvested land.

Harvesting of the tree crop in the Hikuai and Peninsula blocks has recently been completed. Harvesting is almost completed in the Ohui Block with harvesting increasing in area and production in the Main Block, located behind Whangamata.

Harvesting is primarily carried out with cable logging machines recovering trees off steep hill slopes over distances of up to 600 metres. This method reduces the requirement to construct tracks for ground based harvesting machinery, therefore reducing soil disturbance.

Harvesting and associated earthworks in the Tairua Forest is currently subject to both resource consents and permitted activity rules in the Waikato Regional Plan.

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<sup>27</sup> [www.mfe.govt.nz/laws/standards/forestry/index.html](http://www.mfe.govt.nz/laws/standards/forestry/index.html)

Monitoring of forest management activities is undertaken to measure compliance with the consent and rule conditions.

The current management of the tree crop includes a 25 to 28 year rotation. This means the land will be relatively undisturbed during that establishment to harvest time frame. With the planting of a new tree crop new stand boundaries have also been established. These include not planting plantation trees in riparian zones and on land where the trees will be difficult to harvest.

### **6.9.3 Community aspirations**

Concerns around forestry practices were raised via the various consultation opportunities during the development of this plan. While residents are concerned about the perceived and actual environmental impact forestry has, it is generally accepted that for around 20 years of the forest cycle it is an appropriate land use that has economic benefits to the Coromandel.

In considering what changes they would like to see happen and what opportunities exist, the following were re occurring messages and aspirations.

- Pauanui entrance road: Vegetated strip should remain during harvest along road side
- Permanent vegetated setbacks on streams to trap run off, shade streams and support good water quality
- Roading networks to be established in advance to allow time for settling prior to heavy vehicle use to minimise slumping and run off
- An increase in weed and animal pest control for biodiversity values
- Contribution towards river works when slash enters stream
- To be 'a good neighbour' by carrying out weed and animal pest control as well as contributing to clean up after flood events
- Opportunities for information sharing between forestry companies and community established.

#### **Proposed Actions**

- Feedback to forestry reps through Coromandel Liaison subcommittee
- Contributions to resource consent process
- Opportunities for information sharing and improved relationship with forestry companies identified
- Information to national environmental standard for forestry process.

Through the implementation strategy, opportunities will be explored and identified to assist in addressing these issues. Staff will continue to invite and encourage forest managers to participate and work with this community.

### **6.9.4 Looking ahead**

The Hauraki Treaty Settlement process looks set to see the return of significant amounts of land currently managed as production forest, back to Maori. This has the potential to bring about change in terms of how the land is managed and what level of environmental consideration is placed on the land use and resulting management practices.

Sections of production forest have the potential to be converted from pine to pasture or pine to housing. Consideration will need to be given to land use change both in terms of the opportunities it brings and the potential environmental impact and ensuring that this is well managed. The Thames Coromandel District Council will need to ensure measures are in place for environmental and community safe guarding through the district plan review.

## 6.10 Department of Conservation land and activities

The Department of Conservation is a majority land manager within the Tairua catchment area with more than 49% of the catchment management area under DOC management. DOC 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 as well as other key statutes such as the National Parks Act 1980 and Reserves Act 1977.

The department's key functions as set out in the Conservation Act are to:

- Manage land and other natural and historic resources;
- Preserve as far as practicable all indigenous freshwater fisheries, protect recreational fisheries and freshwater habitats;
- Advocate conservation of natural and historic resources;
- Promote the benefits of conservation (including Antarctica and internationally); to provide conservation information
- Foster recreation and allow tourism, to the extent that use is not inconsistent with the conservation of any natural or historic resource.

The department has particular responsibility under section 4 of the Conservation Act to interpret and administer the act and to give effect to the principles of the Treaty of Waitangi. This involves building and supporting effective conservation partnerships with tangata whenua at a local level.

The Department also contributes to the conservation and sustainable management of natural and historic heritage in areas for which it is not directly responsible.

Conservation management and the work of the department are heavily reliant on a high level of public input and participation. Conservation is based on societal support, and on the concept that conservation land is the common heritage of all New Zealanders. As such, conservation land is public land.<sup>28</sup>

The department's interest in the greater Tairua catchment area includes:

- Management of Canada Geese and black swans to reduce impact on harbour and sea grass beds
- Increased sediment entering the harbour and impacting of coastal environment.
- Controlling pest plant *Spartina* in harbour and would like to see Salt Water *Paspalum* also controlled
- Goat control in upper Tairua catchment area. Currently some contract hunting of goats to minimise reinvasion into Kauaeranga and West coast areas. It is envisaged that this work will increase with active goat control in the Tairua catchment as scheduled for the 2012/13 year (as an extension of the Peninsula Project Thames Coast work)
- Preservation of rare and threatened species such as north island brown kiwi, dotterel, fern bird and banded rail.

Planned works and interests also include:

- A new hut is proposed to be built between 2012-2014 along the main range. This is as part of the multi day tramping track network from the Thames Coast via Crosbie's Hut into camps/accommodation in Kauaeranga Valley. This would continue around to a new Moss Creek/Xmas Creek Hut and onto Pinnacles Hut then onto the new main range hut towards Hihi Motutapere Saddle with options back down Hihi Stream to Kauaeranga Visitor Centre or out to Kopu Hikuai road via Kaitarakahi.

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<sup>28</sup> Source Department of Conservation Website

- Some minor upgrading in Puketui Valley at Broken Hills to the Gem of Boom walk is planned for 2012 with about \$35,000 programmed to be spent to bring it and the battery walks to service standard.
- Longer term, the Collins Drive walk needs upgrading. This will be determined depending on national priorities.
- A capital works bid has been put in to secure funding to put tapped water into Broken Hills campsite in 2012.

Though DOC has statutory obligations to manage their lands, funding restrictions often lead to both regional and national prioritisation. Not all areas of DOC administered land are under pest and threatened species management. This has the potential to impact on the ability to carry out some aspects of works identified in this plan and on the achievement of certain outcome areas.

# 7 Methods and outcomes

This section groups the works areas under four main headings and provides an overview of what would be involved in each component of work, the benefits and the expected outcomes. The groupings are:

- Land and water
- River and flood management
- Coastal land and water
- Recreation and community.

Priorities and targets will be set and identified in the implementation strategy for each of the sections below. These will be informed by the catchment assessment survey as completed in late 2011.

## 7.1 Land and water

Land and water is a diverse section that relates to the way in which land is managed and how this impacts on the surrounding environment. It is this work area that has the greatest benefits to water quality, biodiversity and the resulting down stream benefits through sediment and nutrient management on the harbour.

### 7.1.1 Land management

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

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 and nutrient management. In order for there to be significant benefits, changes to land use practices need to be made.

The Waikato Regional Plan provides direction that supports this by ruling that, 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. The application of more fertiliser does not necessarily equate to more dry matter.

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

Whilst preparing a nutrient management plan it is a good opportunity to also 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.

Appropriate land management can lead to significant reduction in sediment loss. Tonnes of sediment and silt can enter waterways through poor management when carrying out earth works. Best practice guidelines (available from Waikato Regional Council) should be followed to ensure runoff is contained.

#### 7.1.1.1 Methods

- Work with landowners to retire bush areas from stock access and encourage further forest fragment and riparian retirement

- Carry out pest control operations in pine and native bush on both public and private land
- Carry out goat control in upper catchment on DOC and private land in 2012/13
- Target animal pests in key project locations for biodiversity enhancement
- Use corridor work to inform priorities for work
- Develop and implement nutrient management plans
- Run on farm field day focusing on nutrient management
- Work with land owners to consider land use alternatives e.g. steep, highly erodible areas converted to production forest
- Establish appropriate buffers 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.
- Additional, detailed information can be found in Appendix 11.

### 7.1.1.2 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 in the upper catchment resulting in the ability of forests to provide greater stability during rain events and consequently less erosion, downstream sedimentation and harbour infilling.

Well managed soils and the application of best practice techniques when working with soil have far reaching benefits that include economic to environmental.

### 7.1.1.3 Outcomes

- Improved biodiversity
- Improved forest health and structure
- Reduced erosion and canopy collapse
- Reduced runoff
- Improved soil health
- Improved water quality
- Reduced expenditure on fertilisers
- Improved production.

## 7.1.2 Riparian enhancement

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

### 7.1.2.1 Methods

- Native planting – planting of eco-sourced, site specific natives at 1.5 metre spacing
- Pole planting – poplar and Matsudana willow pole planting used for their quick growing 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.

### 7.1.2.2 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.

### 7.1.2.3 Outcomes

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

## 7.1.3 Pest plant control

Pest plant control continues to be an ongoing battle within the Tairua catchment and the wider Coromandel Zone. Council staff regularly undertake surveillance and monitoring but rely on community members to notify them of new pest plant infestations.

### 7.1.3.1 Methods

- Biological control – Currently only for ragwort (plume moth) with the possibility of using biocontrol for other species if infestations increase i.e. woolly nightshade
- Develop weed control programmes with individual landowners
- Enforcement action where education and assistance is not enough, for Regional Pest Management Strategy (RPMS) weeds
- Assist with herbicide supply to community groups and proactive landowners
- Direct control assistance available
- Liaison with DOC and TCDC to coordinate control of pest plants
- Assist with weed control for non RPMS weeds particularly in regards to Beachcare situations, such as controlling agapanthus
- Funding assistance available from the council for key projects.

### 7.1.3.2 Benefits and Outcomes

- To assist in maintaining healthy ecosystems through increasing native biodiversity
- Aid in production and productivity (i.e. ragwort control needed due to its impact on pasture growth)
- Support biodiversity and habitat restoration efforts within the catchment
- Decrease seed source and minimise opportunities for new infestations.

## 7.1.4 Animal pest control

Animal pests such as possums, coats and rats pose a threat to the forest canopy and structure. They reduce foliage cover and the forest's ability to slow down and trap water during peak rainfall 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.

#### **7.1.4.1 Methods**

Methods used are determined by:

- Desired outcomes (i.e. biodiversity or foliar density)
- Community wants and views
- Landowner requirements and preference
- Accessibility of land
- Cost/budget.

Once the operation is completed, post operation monitoring is carried out to ensure the targeted RTC is achieved.

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.

There is also a need to control Canada geese in the Tairua Harbour. Canada geese feed on the production grass lands as well as sea grass beds posing a significant threat to grass production and harbour health. The status of these birds has recently been changed after extensive lobbying by Federated Farmers allowing them to be culled outside of duck shooting season.

#### **7.1.4.2 Benefits**

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 runoff and erosion
- Decrease in faecal coliform levels in waterways 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.

Baseline 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 resources required to get on top of the problem and also to provide information for those tendering to carry out the works so an accurate price can be determined.

#### **7.1.4.3 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
- Improved harbour health by protecting sea grass beds.

## **7.2 River and flood management**

For the purpose of the development of this plan, the more routine river and flood issues are identified and included in cost estimates. Larger scale complex flood management for areas such as Grahams Creek have been noted but need to be addressed as stand alone projects.

### 7.2.1.1 Methods

- Removal of gravel and silt build up and vegetation causing obstruction, blockage or increasing erosion - removal to be carried out by mechanical excavation
- Repair eroding areas through site specific works and soil conservation planting and fencing
- Removal of nuisance and inappropriate vegetation from stream banks
- 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 of inappropriate vegetation
- Work with NZTA to identify opportunities for securing route security
- Work with TCDC to ensure works that relate to flood management are carried out.

### 7.2.1.2 Benefits

- Increased channel capacity
- Reduced risk of stream bank erosion
- Adequate flow path during peak rain events
- Reduced sediment entering the system
- Improved access during flood events and decreased risk to infrastructure.

### 7.2.1.3 Outcomes

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

## 7.3 Coastal land and water

### 7.3.1 Sedimentation management

The rate of sedimentation in the Tairua Harbour and its associated effects is possibly one of the greatest issues for the Tairua and Pauanui communities.

To address this issue most of the benefits will come from land management works and land management practice changes. No one single sediment source is apparent, therefore work activities must involve all land users and not focus solely on one source.

#### 7.3.1.1 Methods

- Carry out sedimentation investigation. Investigation will involve:
  - Data and information gathering. What information already exists that we can learn from?
  - Local contributions through information sharing
  - Technical experts, views, experiences and opportunities to address.
- Prioritise findings and implement in conjunction with community
- Dredging in the short term will need to continue and may need additional funding.
- Opportunities for sediment trapping identified and implemented
- Alternative dredging opportunities explored. For example, the accumulation points in the Tairua River channel.

#### 7.3.1.2 Benefits and outcomes

Benefits and outcomes will include:

- An improved understanding of sediment sources and rates of sedimentation
- Over time, decreased need for channel dredging resulting in cost savings
- Improved recreational access and use

- Preservation of habitats by maintaining variety of depths
- Some potential flood benefits by increasing storage capacity.

## 7.3.2 Coastal vegetation management

Coastal vegetation management in this instance refers to vegetation removal within the coastal marine area, where the activity requires a resource consent. It refers, in this case, specifically to mangroves, salt water paspalum and to any recognised (under the Regional Pest Management Strategy) weed species, such as, pampas, that are impacting on natural habitat, recreational use or hydrology.

### 7.3.2.1 Methods

- Identification of mangrove preservation areas as well as potential removal areas
- Mangrove seedling removal consent for the natural extent of the harbour
- Juvenile and mature mangrove removal consent as deemed appropriate by the community, iwi, stakeholders and agencies and as based on the information obtained through the HCMP process
- Salt water paspalum (SWP) control consent and implementation. (The Waikato Regional Council's Biosecurity Group is currently working on obtaining regional control consent for a range of invasive weeds. This consent will include SWP).

Vegetation removal methods and recommended timeframes for are outlined below.

	Method	Timeframe to implement
Mangrove seedlings	Hand removal	Annually
Mangroves – juvenile to mature	Hand and mechanical removal.	Staged removal. Over approximately 3 years.
Salt water paspalum	Spray using Gallant or equivalent.	Ongoing.

### 7.3.2.2 Benefits and outcomes

Mangrove preservation areas:

- Preserve vegetation sequences
- Trap sediment
- Provide a buffer in areas that are susceptible to erosion
- Promote habitat diversity.

Mangrove removal:

- Preservation of sea grass beds
- Vegetation sequences maintained
- Enhanced recreational access
- Improved stream channel flow.

Saltwater paspalum removal:

- Habitat preservation
- Improved hydraulic capacity
- Enhanced intertidal zone for wading bird feeding
- Treatment of pampas in coastal marine area.

## 7.3.3 Coastal waters

Coastal waters issues include navigation safety, recreational access and habitat enhancement and protection. Many of the outcomes rely on catchment based works

and initiatives in order to fully address the issues, ensuring that the source and not just the resulting down stream impact are addressed.

#### **7.3.3.1 Methods**

- Navigation safety bylaws enforced and opportunities for education developed
- Investigation into current commercial fishing activities in harbour area. Look at options for possible re-zoning
- Sedimentation reduced in harbour through sediment works allowing for improved recreational access
- Navigation safety bylaw review process
- Water quality testing.

#### **7.3.3.2 Benefits and outcomes**

- Enough space for all harbour users to carry out recreational activities in a safe manner
- Risk to life and safety minimised through people following water safety and boating rules
- Improved fish numbers benefiting harbour health as well as recreational benefits
- All tide access through main channel
- Focused water quality testing that links to the catchment – Pepe, Grahams Creek and Red Bridge Road.

## **7.4 Recreation and Community**

Typically recreation opportunities and enhancement is not a core outcome area for the Waikato Regional Council. It is highlighted and discussed in this context as it has numerous linkages and connections to social, cultural, economic and environmental outcome areas and also to ensure that the information gained through consultation is captured and passed on to other agencies.

The involvement and engagement of community is crucial to the success of harbour and catchment management. Without the support and involvement of community groups, organisations, stakeholders, iwi, agencies and landowners, the implementation of this and other plans would not be achievable.

#### **7.4.1 Methods**

- Opportunities for new cycle and walk ways explored
- Enhancement of existing track networks and facilities – in particular in the DOC estate
- Annual newsletter to all ratepayers updating on progress of the plan, opportunities for assistance and involvement.
- Linking and extending existing networks (i.e. Pumpkin Hill, Tairua Country Club, Pepe Stream and back to town)
- Rubbish dumping facilities – playgrounds, Puketui/Hikuai for visitors, rubbish collection from Whangamata turnoff reinstated
- Water supply – continuous, high quality water available to Tairua/Pauanui residents
- Wharf development at Tairua and boat ramp and trailer parking facilities improved at Tairua/Pauanui.

#### **7.4.2 Benefits and outcomes**

- Recreational access and opportunities maintained
- More engaged and involved community
- Greater partnerships between agencies
- Opportunities for businesses through promotion and development of walkways and facilities
- Reduction of waste being dumped on road sides

- Water take resource consents sought and granted
- TCDC investigation and development into facilities and structures.

## 8 Implementation

The following section looks at how the plan will be implemented and highlights the existing programmes and completed works for the catchment. It is proposed that the implementation of works be carried out within a short to medium timeframe (10 years). Timeframes will be dependant on the uptake of work from landowners and funding availability.

An implementation programme will be developed to support this HCMP with the focus on works activities to implement it. The final programme will be confirmed through consultation with the Tairua Pauanui Community Board. This will provide detail on the work that needs to be completed and assist in reporting outcomes and achievements back to the community and stakeholders.

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

### 8.1 Implementation programme

A detailed implementation plan will be developed in 2012. This will be a stand alone document consisting of a spreadsheet with associated actions for achieving outcomes as identified in this plan 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 timeframe. The implementation document will be reviewed by the Tairua Pauanui Community Board.

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

### 8.2 Responsibilities

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

#### **River and Catchment Services (Waikato Regional Council – WRC)**

- Oversee the implementation of the Tairua Harbour and Catchment Management Plan
- Overseeing and funding, soil conservation and stream management works
- Flood management investigation and implementation
- Supporting land management change and information on best practice techniques
- Ensuring targets and outcomes set in the plan are achieved
- Investigation into coastal vegetation management resource consent and consent supervision.

#### **Resource Use Group (WRC)**

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

### **Biosecurity (WRC)**

- Education on Regional Pest Management Strategy pest plants
- Enforcement where education has failed on weed control
- Technical support and advice to landowners and community groups for both plant and animal pest control
- Funding assistance for animal pest control schemes (where available) and for significant natural area works.

### **Resource Information Group (WRC)**

- Expert technical advice and support
- Monitoring and data interpretation
- Harbour and coastal ecosystem restoration support
- Provide the science behind issues to support and bring about change.

### **Policy (WRC)**

- Integration with regional policy directions and strategies
- Implementation and monitoring of blueprint-related actions
- Guidance and support where policy change is needed.

### **Navigational safety (WRC)**

- Support to community for honorary navigational safety warden
- Enforcement of navigation bylaws
- 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
- Implementation support
- Recreational assets focus.

### **Thames Coromandel District Council**

- Support to ensure works are in line with the community plan and the Blueprint project
- Support through the community board
- Management and support to Harbour Committee
- Awareness of HCMP raised at council level and appropriate resourcing and funding allocated through LTP and annual plan processes
- Funding assistance where available i.e. rubbish disposal from clean up days
- Inclusion and consideration of outcomes and recommendations (where appropriate) in district plan review.

## **8.3 Community process – implementation**

Waikato Regional Council is fortunate to have had ongoing and continued support from the Tairua Pauanui Community Board as well as the Tairua Harbour Committee. This combined with the numerous community and stakeholder groups will be key to this plans implementation. Council staff are grateful to the community for its patience and continued support throughout the development process.

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 as part of the implementation and to ensure ongoing involvement and communication on the Tairua Harbour and Catchment Management Plan will include:

- Annual mail-outs for all ratepayers outlining works plans and achievements
- Continued attendance and contribution to Harbour Committee and as needed - the community board
- Use of local media to keep the community up to date with progress.

### 8.3.1 Community involvement

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

- Planting days
- Weed busting
- Animal pest control initiatives
- Mangrove management (subject to resource consents and volunteer health and safety agreements)
- Support to care groups
- Involvement in beach care activities
- Tairua - Pauanui Community Board attendance and participation
- Harbour Committee updates and workshops
- Navigational safety promotion through local wardens.

## 8.4 Works programme

An implementation strategy will be developed in conjunction with this plan. As part of this, annual works targets will be identified for key areas such as river work and land management. Progress and achievements will be recorded and reported on.

## 9 Costs

Waikato Regional Council funds River and Catchment Services on the Coromandel Peninsula under the Peninsula Project Funding Policy (Waikato Regional Council document number 924353). This policy provides for a Peninsula, Regional, General Rate and landowner or community contribution to soil conservation, river management, CMA works and services and flood protection works.

At this stage, proposed costs for the catchment management programmes total \$1,210,000. This includes works and services around river maintenance, riparian enhancement, weed control and catchment new works (soil conservation) as implemented through existing funding streams. This figure does not include ongoing annual maintenance costs, labour costs, coastal vegetation (Mangrove and Salt Water Paspalum) management, recreational facilities and sediment management or dredging.

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, such as mangrove management, where the community supported significant works being undertaken in a short-term timeframe. 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 Tairua Harbour and Catchment Management Plan would be carried out over the next 10 years or so. In order to reduce this timeframe, 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.

A detailed breakdown of expected costs is attached as Appendix 8 and 9. All recommended works costs are an estimate only, based on today's costs for materials and works. Actual prices will vary depending on uptake of work, landowner contribution, industry price increases and availability of materials.

#### **Land and Water - \$670,000**

Includes possum control for one to two rounds only, riparian fencing, planting and some weed control. Does not include goat control or all aspects of pest plant works.

#### **River and Flood Management - \$160,000**

Includes vegetation clearance, erosion control and stream bank works as well as removal of in channel blockages. Does not include Grahams Creek flood protection or other capital works.

#### **Coastal Land and Water - \$350,000**

Includes land sea interface works with particular focus on coastal restoration works that will provide benefits to sediment trapping, water quality and habitat restoration. Does not include dredging, mangrove removal or salt water paspalum control and any existing navigation safety expenditure.

#### **Recreation and Community - \$30,000**

This figure is for on-farm field day, planning of community events, newsletters and communication only. This area of works is generally dependent on resourcing and funding from other agencies such as DOC and TCDC. The scale and extent will greatly impact on works costs.

This work can largely be funded through the existing Peninsula Project programme. Coastal vegetation management and animal pest control are the two main areas where further consideration around funding is needed.

## **10 Monitoring and reporting**

Monitoring for the purpose of this HCMP will generally focus on changes over time as and comparisons made. Monitoring of HCMP implementation, success of 'whole catchment planning' and changes that can be achieved is carried out in the Wharekawa Catchment as a demonstration catchment (refer to section 10.1 below).

Reporting of HCMPs needs to be carried out at a variety of levels to ensure ongoing involvement and support to works from a political level through to grass roots implementation.

Any monitoring and reporting of actions or progress for this plan that overlaps with the Coromandel Blueprint (see Appendix 12) will also be utilised to assist with monitoring and reporting of the Coromandel Blueprint actions and effectiveness, in conjunction with other relevant information from the Blueprint partners.

### **10.1 Monitoring**

The Wharekawa River catchment was selected as the monitoring catchment for the Coromandel Zone. River management and soil conservation initiatives are being implemented in the catchment.

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 East coast catchment 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 Wharekawa Catchment Monitoring – Findings to date

Monitoring in the Wharekawa Catchment is in its third year. The data collected here is beginning to demonstrate the outcomes as identified in the HCMP. These changes are as a result of the partnerships between landowners and the regional council through joint effort to improve the overall health of the catchment.

Changes include:

- Increase in fenced riparian margins (both sides)
- Increase in fenced margins with woody vegetation
- Decrease in willow cover on stream banks this reflects willow clearance works.

It is anticipated that similar results will be achieved in Tairua. While no formal monitoring will be carried out, comparisons over time via the catchment assessment programme will be made.

The catchment assessment process is a largely mapped based and records the presence and absence of:

- Structures such as fencing (streams forest fragments) and culverts
- Natural features
- Plant and animal pest issues
- Erosion – hill, gully, stream bank
- In stream blockages.

This information is recorded via a hand held mapping device that is then used to collate the data. This information is then used to determine where works priorities are and to assist in costing of works programmes. The mapped data will assist in demonstrating change and benefits as a result of works and implementation as the inspection can be carried out every three to five years, or as deemed necessary.

## 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.

Both the Tairua Pauanui Community Board and the Harbour Committee meetings will be regularly attended and progress reported to. This will provide a continued link to the community and ensure that decisions around priority setting and works programmes are a combined effort.

Updates will be provided to the community of Tairua/Hikuai/Pauanui via existing community networks, local media and via an annual newsletter.

# Bibliography

- Amoore J, Denyer, K 2006. What to plant in the Coromandel Ecological Region : Colville, Tairua, Thames and Waihi Ecological Districts : planting local native trees to preserve our natural heritage and promote our community identity. Waikato Regional Council local area planting guide series; 2. Hamilton, Waikato Regional Council (Waikato Regional Council)
- Beard C 2008. Coastal Wetland Ecologist, Waikato Regional Council. Personal conversations and documented notes on habitat.
- Beaufill J 2006. Draft Whangamata Catchment Management Plan. Environment Waikato Internal Series 2007/13. Hamilton, Waikato Regional Council (Waikato Regional Council)
- Bridgewater GD, Foster BA 1984. Marine biota of the Whangamata and Tairua estuarine systems, Coromandel Peninsula. A report prepared for the Hauraki Catchment Board by Auckland University, Zoology Department. Te Aroha, Hauraki Catchment Board
- Collier K 2011. Internal correspondence and personal conversations
- Conservation Act, 1987.
- Coromandel Peninsula Blueprint 2008. <http://www.coroblueprint.govt.nz/>.
- David B 2011. Internal correspondence and personal conversations
- Davis J. 2010/2011. Personal conversation in relation to cultural significance and history of Tairua. October/November 2010 and 2011.
- Department of Conservation. Waikato Conservancy. 1997. Waikato conservation management strategy. Hamilton, Department of Conservation
- Furey L 2007. Personal communication on history of Wharekawa
- Gaukrodger J 2008. Coromandel Area Manager, Department of Conservation. Personal conversations
- Graeme M 2008. Estuarine vegetation survey : Tairua Harbour. Environment Waikato Technical Report 2008/52. Hamilton, Waikato Regional Council (Environment Waikato)
- Harris RW 1977. Report on the harbour (estuary) of the Tairua River. Hauraki Catchment Board and Regional Water Board. Te Aroha, Hauraki Catchment Board and Regional Water Board
- Hikuai Community Plan 2006
- Hauraki Maori Trust Board 2004. Hauraki Iwi Environmental Plan = Whai te Mahere taiao a Hauraki. Paeroa, Hauraki Maori Trust Board
- Humphreys EA, Tyler AM 1995. Coromandel Ecological Region : survey report for the Protected Natural Areas Programme. Rev. ed. Hamilton, Department of Conservation

- Jones R 2010/2011. Personal conversation in relation to cultural significance and history of Tairua. October/November 2010 and January 2011.
- Jones H 2008. Coastal sedimentation : what we know and the information gaps. Environment Waikato Technical Report 2008/12. Hamilton, Waikato Regional Council (Waikato Regional Council)
- Landcare Research NZ Ltd. 2000. New Zealand Land Resource Inventory, North Island, Edition 2. Landcare Research NZ Ltd
- Lundquist CJ, Chiaroni L, Halliday J, Williston T 2004. Identifying areas of conservation value in the Waikato coastal marine environment. Prepared for the Department of Conservation by the National Institute of Water and Atmospheric Research (NIWA). Hamilton, National Institute of Water and Atmospheric Research (NIWA)
- Marshall S 2010. Whangamata Area Manager, Thames Coromandel District Council. Personal conversation
- Ministry for the Environment 2004. Land Cover Database 2. Wellington, Ministry for the Environment
- Newsome PFJ, Wilde RH, Willoughby EJ 2008. Land resource information system spatial data layers - data dictionary. Palmerston North, Landcare Research New Zealand Ltd.
- Noiton D 2011. Programme Manager, Resource Information Group, Waikato Regional Council. Internal correspondence and personal conversations
- O'Donnell E 2008. Wharekawa Harbour and Catchment Management Plan. Environment Waikato Technical Report 2009/12. Hamilton, Waikato Regional Council (Waikato Regional Council)
- Paaku Views Summer Issue 2010/11 community magazine, contributing writer Gillian O'Neil
- Pauanui Community Plan 2006
- Pierce RJ, Owen K 2004. Assessment of potential effects on avifauna of the proposed marina in the Tairua Harbour. Wildland Consultants Contract Report No 954. EW court evidence.
- Resource Management Act, 1991.
- Rijkse WC, McLeod M 1995. Soil-landscape models for Tairua Catchment, Coromandel Region, North Island, New Zealand. Technical Record, Hamilton, Landcare Research New Zealand Ltd.
- Singleton N, Giles H 2010. Estuary benthic habitat mapping. Poster presented at the New Zealand Coastal Society Conference, Whitianga 2010. Waikato Regional Council.
- Singleton P 2010. Acting Programme Manager, Regional Integration, Waikato Regional Council. Personal conversation.
- Soil Conservation and Rivers Control Act, 1941.
- Tairua Community Plan 2006

- Thames Coromandel District Council 2001. Whangamata Community Plan : Our Future 2001. Thames, Thames Coromandel District Council.
- Thames Coromandel District Council. [www.tcdc.govt.nz](http://www.tcdc.govt.nz) (2010)
- Thornton J 1995. The Reed field guide to New Zealand geology : an introduction to rocks, minerals and fossils. Auckland, Reed
- Vant B 2011. Internal correspondence and personal conversations
- Waikato District Health Board, David Cummings and DHB website [www.waikatodhb.govt.nz](http://www.waikatodhb.govt.nz)
- Waikato Regional Council (Environment Waikato). 2000: Waikato Regional Policy Statement. Environment Waikato Policy Series 2000/30. Hamilton, Waikato Regional Council (Environment Waikato).
- Waikato Regional Council (Environment Waikato). 2005. The Peninsula Project : working together to protect our people, property and environment. Waikato Regional Council (Environment Waikato), Hamilton
- Waikato Regional Council (Environment Waikato) 2005. Waikato Regional Coastal Plan. Environment Waikato Policy Series 2005/06. Hamilton, Waikato Regional Council (Environment Waikato).
- Waikato Regional Council (Environment Waikato). 2007. Waikato Regional Plan. Environment Waikato Policy Series 2007/21. Hamilton, Waikato Regional Council (Environment Waikato).
- Waikato Regional Council (Environment Waikato). 2009. Waikato Regional Pest Management Strategy 2008-2013. Environment Waikato Policy Series, 2009/02. Hamilton, Waikato Regional Council (Environment Waikato)
- Waikato Regional Council (Environment Waikato). [www.ew.govt.nz](http://www.ew.govt.nz) (2010)
- Wild Animal Control Act, 1977.
- Wood M. Grahams Creek flood risk investigation status report November 2008. Environment Waikato Internal Series 2008/22. Hamilton, Waikato Regional Council (Environment Waikato)

# Appendix 1. HCMP boundaries



<h2>Coromandel Zone</h2> <p>Management Areas</p>		<p>1:315,000 @ A3</p>	<p><b>A3</b></p>
<p>Created by: G Langdon      Status: Draft</p> <p>Projection: NZTM      Request No.: 17919</p> <p>Date: 07-04-2009      File name: 17919_Management_Areas.gws</p>		<p><b>ACKNOWLEDGEMENTS AND DISCLAIMERS</b></p> <p>Topographical maps sourced from Land Information New Zealand. CROWN COPYRIGHT RESERVED.</p> <p>Management Areas Disclaimer: Land Boundaries follow catchment boundaries found in GIS_ALL_REC_CATCHMENT, Coastal Boundary follows GIS_ALL_REGIONAL_BOUNDARY_SIMPLIFIED and includes harbours defined in GIS_ALL_HARBOURS. Catchments merged based on areas provided by Emily O'Donnell</p> <p>River classification derived by NWA/MIE. COPYRIGHT RESERVED.</p>	

## **Appendix 2. 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 SCRC 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) promotion of soil conservation:
- (b) prevention and mitigation of soil erosion:
- (c) prevention of damage by floods:
- (d) 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.

### **Waikato 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, Waikato Regional Council 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 Waikato Regional Policy Statement.

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

- matters of significance to Maori

- water quality
- wetlands
- biodiversity.

## **Waikato Regional Coastal Plan**

Waikato Regional Council 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. Waikato Regional Council 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 – Tairua Pauanui Hikuai**

As referred to in section 5.2 of this document.

# Appendix 3. Ngati Hei O Hauraki

## Ngati Hei O Hauraki

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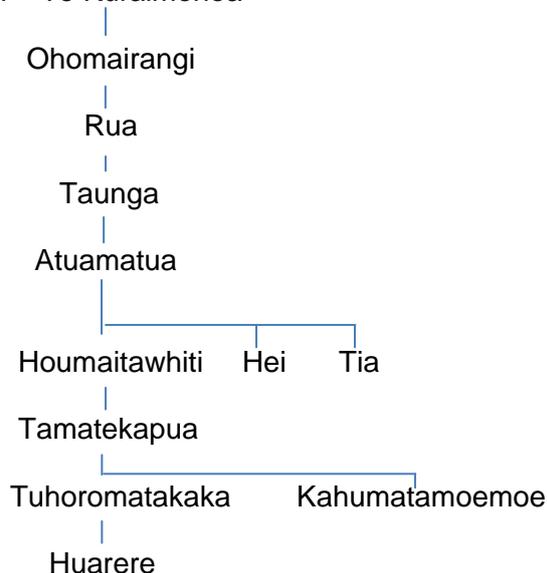
Mai Te Tai Tamahine e  
Ki te Whanganui O Hei  
Ki te maunga teitei Moehau O Tama  
Whiti atu ki Motutere O Hei nui e  
Titiro mai nga kanohi o Ohinau me Ruamaahua ee  
Ki uta ki te rohe kura o Ngati Hei e.

*From the eastern seaboard (Toi Te Huatahi ki te Waitemataa)  
To the Great Bay of Hei (Mercury Bay)  
To the sacred mountain urupa of Tamatekapua (Moehau)  
To Motutere the mountain urupa of Hei nui (Castle Rock Coromandel)  
From the eyes that are the island citadels of Ohinau and Ruamaahua (Alderman Islands)  
That look inland toward the domains of Ngati Hei - Tikaokao (Ngati Hei and Ngati Whanaunga chief)*

Ngati Hei claims its origins from the spiritual ancestor Puharangi who was said to have descended from the heavens in human form to procreate with Te Kuraimonoa. Thus began the beginning of the Te Arawa genealogical lines that form the many tribes in Aotearoa still in existence today. From the legendary Hawaiiiki – the great Ariki Houmaitawhiti bid farewell to his sons, brothers and whanau as the great waka was hauled off the beach and turned to sail to Aotearoa.

Ngati Hei ancient association with the east coast of the north Island stretches from Whangarei to the Bay Of Plenty.

Puharangi = Te Kuraimonoa



Since those ancient times Ngati Hei has survived many feudal inter hapu and tribal conflicts. More recently Ngati Hei were directly associated by the historical arrival of Captain James Cook in 1769.

At Whitianga Captain Cook raised the English flag and claimed “this land for King and Country” This was Ngati Hei’s first encounter with Pakeha. The first official powhiri (welcome) would occur between Pakeha and Maori at Wharekaho. There was also the first recorded wero (challenge) and demonstration of our traditional weapons in close quarter warfare. The first official exchanges of gifts and notably the introduction of the potato hence the name of our sacred Pa and urupa Wharetaewa or “house of the

potato". The first map of Aotearoa was drawn on the deck Endeavour by our Ngati Hei ancestor Toawaka in his effort to describe to Cook and his officers – 'you are here'. These events were astutely recorded in Cooks log and thus began the written history of New Zealand.

Considering all that has happened since 1769 in more recent times, Ngati Hei has been a reasonable Iwi in terms of developing relationships with its Treaty partners. Ngati Hei has been both active and "reactive" in major projects with the Crown, its agents and the private sector. Whether establishing a Marine Reserve (*Te Whanganui O Hei Marine Reserve*) to monitoring developers or working alongside scientists on Islands – this is all part of our fundamental duty as responsible Kaitiaki within Ngati Hei tribal rohe.

The tribal dynamics of wars and marriages between Ngati Hei with almost every tribe on the Peninsular in both ancient and contemporary times has its typical challenges. In those earlier times these occurrences has always been the feudal nature of tribalism throughout Maoridom. The advent of colonization and western legislation and infrastructure has led to major land loss and the lack of adherence or misinterpretation of Article Two treaty rights. This in turn has led Maori to look more discerningly at traditional and oral histories, rohe, manawhenua, manamoana, kaitiakitanga.

Today Ngati Hei considers its kaitiakitanga (area of responsibility) to be from Whangapoua to Opoutere. Our ancient association with this rohe both culturally and spiritually shall never be departed from us. Although we have lost the greater part of our rohe to western land ownership titles we still maintain a type of "intangible guardianship" over our traditional manawhenua and manamoana.

*An excerpt from 'Te Takoto O Te Whenua O Hauraki' (Hauraki Landmarks) by Taimoana Tūroa (Page 50 last Para)*

*" In terms of its impact upon the heritage of Hauraki, Ngati Hei has played a much greater part historically than other resident tribes. It occupies a senior place in the order of settlement and has maintained a firm visible presence in the light of its tempestuous past. Unlike the ignominious fate suffered by the contemporaneous kin tribe of Ngati Huarere, Ngati Hei has survived the assailing efforts of dislodgement over many centuries"*

It is with vigilant optimism that we will approach the next thousand years of kaitiakitanga.

Modern impacts on flora, fauna and natural resources within our rohe is of great importance to us. The challenge for Ngati Hei, its Treaty Partner and its agents will be transposition of traditional Kaitiakitanga into a more modern context. Ngati Hei are currently formulating its own Iwi Management Plans that will address environmental, coastal and fisheries issues. However at this time that is another discussion. Ngati Hei will seek re-designed relationships and meaningful co-governance aspirations with our Treaty Partner and their agencies going forward and into the future.

## Appendix 4. Community representatives for initial working party

Name	ID at 1 <sup>st</sup> Meeting	Organisation
Sarah Alves	√	Guardians of Paku Bay Assn
Joyce Birdsall	√	Guardians of Paku Bay Assn Tairua Environment Soc. Tairua Ratepayers Assn. Inc
Pat Gilberd	√	Tairua Ratepayers Assn. Inc Guardians of Paku Bay Assn
Lou van Jaarsveld	√	Tairua School
Jocelyn Taylor	√	Guardians of Paku Bay Assn
Matt Heath	√	
John and Rona Lomas	√	Guardians of Paku Bay Assn
Neville Mace	√	
Katherine Mason	√	Pacific Paradise Ltd. (Marina)
Brian Payne	√	
Ivan Serich	√	
Craig Watts	√	Tairua Marine Ltd (marina)
Chris New	√	Tairua/Pauanui Community Board and Harbour Committee



# Appendix 6. 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 7. 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 8. Tairua Harbour and catchment important characteristics

From: [Waikato Regional Council internal report 2006/09](#).

<b>Estuary Characteristics</b>	<ul style="list-style-type: none"> <li>▪ <b>Barrier-Enclosed Lagoon.</b></li> <li>▪ Bar-built, well mixed<sup>1</sup>; Largely sand infilled harbour enclosed by a 3 km long barrier spit and barrier tombolo bridges Paku Island and northern volcanic headland<sup>5</sup>; Compound estuary – barrier-enclosed estuary – single-spit + tombolo<sup>24</sup>.</li> <li>▪ Short residence time; mixed; tidal prism/total volume high; high susceptibility to eutrophication, sediment infilling and vegetation infilling; low channel/shoal, inlet and barrier stability.<sup>24</sup></li> <li>▪ 1976 condition: clean; similar condition to 1965.<sup>1</sup></li> <li>▪ Sedimentation rates above that for other estuaries – shellfish smothered.<sup>42</sup></li> </ul>
<b>Area of Estuary</b>	<ul style="list-style-type: none"> <li>▪ 605.21 Ha<sup>69</sup></li> <li>▪ 1061/640<sup>5</sup> ha; 4.3 km<sup>2</sup><sup>31</sup>; 5.9 km<sup>2</sup>.</li> <li>▪ Intertidal area: 81% of high tide area<sup>31</sup>; 70% of harbour area at MHWS.<sup>42</sup></li> </ul>
<b>Catchment Characteristics</b>	<ul style="list-style-type: none"> <li>▪ Area of catchment: 282.58 km<sup>2</sup>.<sup>69</sup> 52km<sup>2</sup><sup>31</sup>; 284.3 km<sup>2</sup>.</li> <li>▪ Average annual rainfall: 2384 mm<sup>69</sup>. 1,600-2,400 mm/year.<sup>3</sup></li> <li>▪ Geological features: volcanic.<sup>3</sup></li> <li>▪ Dominant Base Rock: Hard Volcanic Rock (54%), Weathered Soft Volcanic Rock (27%)<sup>69</sup></li> <li>▪ Dominant land-use: indigenous forest (54%)<sup>69</sup>, shrubland, pasture, plantation forest.<sup>4</sup> Land vegetation cover mapping – Tairua catchment.<sup>43</sup></li> <li>▪ Dominant Soil Type: Yellow Brown Earth (56%), Yellow Brown Loam (22%)<sup>69</sup></li> <li>▪ Erosion potential: moderate/high.<sup>3</sup></li> </ul>
<b>Major Habitat Types</b>	<ul style="list-style-type: none"> <li>▪ Saltmarsh (9%)<sup>3</sup>, seagrass (20%)<sup>3</sup> and mangrove (5%)<sup>3</sup> communities.<sup>6</sup> Gradation from salt to freshwater wetlands intact in Tairua.<sup>5</sup></li> <li>▪ Mud/sandflats 46%.<sup>3</sup></li> </ul>
<b>Significant Biological Communities/ Species</b>	<ul style="list-style-type: none"> <li>▪ Nationally important for resident and frequenting, rare and threatened wading and coastal bird species.<sup>5,6</sup></li> <li>▪ Shellfish beds.<sup>6</sup></li> </ul>
<b>Maori Significance</b>	<ul style="list-style-type: none"> <li>▪ Site of significance to Hauraki iwi.<sup>6</sup></li> </ul>
<b>Community Significance</b>	<ul style="list-style-type: none"> <li>▪ Shellfish gathering.<sup>44</sup></li> <li>▪ Recreational activities (boating, fishing).<sup>5</sup></li> </ul>
<b>Management Issues</b>	<ul style="list-style-type: none"> <li>▪ Coastal settlement: ~1436 properties.<sup>3</sup></li> <li>▪ Coastal structures: ~180.<sup>9</sup> Structures include: shore stabilization, bridges, pipes and outlets, causeways, reclamation.</li> <li>▪ Forestry activities in catchment, timber processing (sawmill and potentially contaminated site).<sup>44</sup></li> <li>▪ Canal development, dredging navigable channels.<sup>44</sup></li> <li>▪ <i>Spartina</i>.<sup>5</sup></li> <li>▪ Boat moorings and boating activity.<sup>5</sup></li> <li>▪ Sedimentation within harbour from catchment activities is identified as the main threat to the system.<sup>5</sup></li> <li>▪ Shoreline erosion on estuary beaches.<sup>45</sup></li> </ul>
<b>Existing Information</b>	<ul style="list-style-type: none"> <li>▪ Water quality monitoring (historic).<sup>33</sup></li> <li>▪ Bathing beach surveys 1991 onwards.<sup>10, 11</sup></li> <li>▪ Marine Biotoxin Monitoring Programme.</li> <li>▪ Benthic surveys 1984, 1994.<sup>44, 46</sup></li> <li>▪ Vegetation maps.<sup>27, 44, 46</sup></li> <li>▪ Heavy metal content shellfish.<sup>14, 15</sup></li> <li>▪ Shellfish bacteria levels.<sup>47</sup></li> <li>▪ Sediments - erosion/sediment yield, geomorphology and processes affecting estuarine beaches.<sup>42, 48, 49, see 26</sup></li> </ul>

	<ul style="list-style-type: none"> <li>▪ Hydrodynamics – estuarine/coastal mixing.<sup>50, 51, see 26</sup></li> <li>▪ Bathymetric information.<sup>39</sup></li> <li>▪ Tide gaugings.<sup>40</sup></li> <li>▪ AEE (Pauanui waterways; sewage treatment and disposal; burial water supply pipeline; reclamation for oxidation ponds).<sup>see 13, 21, 26</sup></li> <li>▪ Consent monitoring (Pauanui waterways; sawmill contaminant monitoring, forestry impacts).<sup>see 13, 21, 26</sup></li> </ul>
<b>Catchment Monitoring</b>	
<b>Other Issues</b>	<ul style="list-style-type: none"> <li>▪ Whitebait spawning habitat.<sup>6</sup></li> <li>▪ Regionally significant geopreservation sites (Pauanui mudflats, barrier spit and geomorphological features and shore platform).<sup>5, 6</sup></li> <li>▪ Regionally significant archaeological sites.<sup>5, 6</sup></li> </ul>

# Appendix 9. Harbour assessment

## File Note

**File No:** Z21 H090  
**Date file note created:** 4 August 2010  
**Date(s) content of file note refers to:** 5 March 2010  
**From:** Emily O'Donnell  
**Subject:** Tairua harbour Inspection March 2010 – Dr Catherine Beard and Emily O'Donnell

The estuarine and harbour environments of the Tairua system hold many ecological treasures. Currently there is good representation of different systems and habitats. The task will be preserving and enhancing these before they degrade further.

The greatest generic threats presently are weed species, specifically the greatest single threat is the presence and expansion of salt water Paspalum.

Summarised below as the notes and findings during a snap shot inspection of the Tairua harbour and surrounding wetlands. These are indicative only and are for the purpose of informing the Tairua Harbour and Catchment Management Plan. Site specific restoration plans would be needed for each individual site as uptake of works commenced.

Area	Issue	Recommendation	Estimate (total)
1	<b>Grahams Creek</b>		
	Weed species: salt water pasapalum (SWP) , pampas in saltmarsh.	SWP spraying programme with by kill of pampas	<b>SWP</b>
	Present at time of inspection: Heron, Stilts, Banded Rail.	Rat control to protect bird and other species	\$1,000 set up \$500 annually
2	<b>Harbour Side of Manaia Road Cause Way</b>		
	Salt water pasapalum expansion, impacting on fringe and native herb area (glass wort, samulous)	Harbour wide SWP control	<b>SWP</b>
	High tide and low tide bird roost areas	Proposal for man made birds roosts, these need to be managed for weeds.	Bird roosts in conjunction with proposed marina development
3	<b>Beach Front</b>		
	Beach Care: Active dune planting and beach care goof spinafex and pinago	Continuation of beach care programme	\$unknown
	Consideration of rocky shore environment as it is often over looked	Potential issues/threats: sediment from land based activities smothering sea and herbaceous life.	-

	Wilding pine and eucalyptus	Looks like some control via ring barking or direct drill has occurred. Continuation of this activity needed.	Price unavailable. Works would be on going
4	<b>Pepe Stream/Harbour</b>		
	Salt water paspalum		<b>SWP</b>
	Good salt marsh area western side		-
	Good native regen true left of Pepe stream through to front of Country Club	Weed control inc SWP Ensure minimising nutrient inputs from golf green	\$5000 (does not inc SWP)
	Gallagher Drive Wetland – good native regeneration. Easy restoration site. Sequence from s/water to fresh. Weeds: SWP, wattle, pampas, fairy grass WNS, honey suckle, tall fescue, willow Native species inc: Raupo, baumea, garnia, tree fern, coprosma, flax	Weed Control – potential for board walk. Larger trees possibly need to be mechanically removed	\$5000 (does not inc SWP) <b>SWP</b>
5	<b>From Pepe Bridge to Rewarewa Valley Road</b>		
	SWP along harbour fringe		<b>SWP</b>
	Some other weed issues along fringe ie wild ginger		\$1000
	Rewarewa valley Rd – Wetland area	Willow control needed Planting potential	\$2000 \$10,000
6	<b>Pauanui – from Warf to Point</b>		
	No real erosion issues		-
	SWP along fringe doesn't seem to be progressing sea ward like Tairua side		<b>SWP</b>
7	<b>Red Bridge Road</b>		
	Recent mangrove expansion – last 10-12 years	Mangrove management as part of wider plan	<b>Mangroves</b>
	Transfer station/dump upstream? Is there any leaching occurring?		
	Cemetery area – complaints about mangroves	Mangroves?	<b>Mangroves</b>
8	<b>Oturu Stream mouth and harbour end</b>		
	Landward side of SHWY good saltmarsh		
	Weeds – wattle, wilding pines, pampas		\$2000
	Mangrove expansion – could impact on main channel and Oturu channel? Maybe seagrass beds		<b>Mangroves</b>
	Salt marsh proper in good condition and sequence		-
9	Wetland area weed and possible land management issues if surrounding area cleared and developed	Restoration and Protection	\$30,000
	Weed management		\$5000
10	<b>Existing boardwalk area (Pauanui)</b>		
	Good vege sequence (salt marsh – scrub – salt marsh to mangrove		
	Weeds – pampas, wattle, SWP, wilding pine		\$3000 <b>SWP</b>
	Good restoration potential – up		\$60,000

	stream side of ponds		
	Are there any leaching issues from treatment plant? Has there been any?		
11	<b>Pauanui Waterways</b>		
	Entrance to water ways – NZ dotterel site		
	Upper cannels stilts feeding		
12	<b>Pauanui Beach</b>		
	Beach care group active	Needs on going support	\$unknown
	Southern end wilding pines	Control needed	Price unavailable. Works would be on going
13	<b>Salt marsh habitat for protection – SWP and pampas</b>		
	Salt marsh habitat for protection – SWP and pampas		<b>SWP</b>
	SWP Island forming in harbour		<b>SWP</b>
14	<b>Illegal dumping of green waste</b>		
	Illegal dumping of green waste		
	Weeds – pampas, wilding pine, wattle, SWP islands		\$2000 <b>SWP</b>
15	<b>Wetland – Manuka and tangle fern significant area</b>		
	Wetland – Manuka and tangle fern significant area	Need to ensure area is preserved and managed well particularly in regards to surrounding land management ie forestry and potential for run off	
	Weeds: wattle, pampas		\$5000
16	<b>Tanners</b>		
	Weed control needed		\$3000
	Enhancement planting would greatly benefit this site		\$15,000
17	<b>Duck Creek</b>		
	SWP		<b>SWP</b>
	Significant coastal and freshwater wetland system	Pest control – rats and stoats	Set up - \$5000 Annual \$2000
18	<b>Coastal wetland tidal and freshwater influence</b>		
	Coastal wetland tidal and freshwater influence		
	Land management	Weed control Enhancement Planting Protection from grazing	\$1,500 \$30,000 \$3,000
19	<b>Lower reach – Woody Stream</b>		
	Wetland area	Weed control Currently fenced Planting buffer between pasture and wetland	\$1000 - \$15,000
20	<b>Cabbage Tree/Flood Plain Forest</b>		
	Weed issues	Privet, silver poplar, wattle, honey suckle	\$40,000
	Education and recreation	Good site form community involvement	-
		Infill planting	\$40,000

**SWP** = works and expenditure needs to be carried out as part of larger scale works.

**Mangroves** = works and expenditure needs to be carried out as part of a comprehensive plan

Total works estimates

Please note that the following estimates do not include:

- Application and implementation of a salt water paspalum control consent
- Application and implementation of a mangrove control consent
- All costs involved in planting works as this is hugely dependent on volume, species and extent of planting
- Beach care activities and planting

**\$284,500**

# Appendix 10. Assessment of catchment

## File Note

**File No:** Z21 H090

**Date file note created:** 30 November 2010

**Date(s) content of file note refers to:** 29 March 2010

**From:** Emily O'Donnell

**Subject:** Tairua River Assessment Summary

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This document is a summary of the inspection reports carried out by Roger Spooner 1 April 2008 (DOC# 1298415) and Matthew Highway and Kerry Smith 29 March 2010 (DOC # 1656207)

### Tairua River Main Channel

Assessment of the Tairua River main channel. Reaches identified by where feature occur or where tributaries enter the system.

- a) Tanners Mill to Hikuai Stream (3.5 km)**
- There are some significant sand deposits resulting from tidal influence.
  - There are some very good riparian margins within this reach that should have good ecological values; and would be ideal with further enhancement.
  - Some areas adjacent to pasture land, needs fencing and stabilising with plantings.
- b) Hikuai Stream to SH 25 Bridge (3.2 km)**
- There are some significant areas that need fencing; mainly on the RB but some on the LB as well
  - Some 6 sites need intensive stabilisation
  - There are several locations where there are poplars growing on the bank right on the very edge of the channel; and these will create maintenance issues in the longer term.
  - The two sites of intensive erosion control works carried out by Transit NZ need to be further enhanced.
  - There are silver poplars downstream of the SH 25 bridge on the left bank becoming established and will become a problem in time.
  - There is crack willow downstream of the bridge on the right bank growing on the edge of the channel. These are causing an obstruction to flood flows and will create maintenance problems in time.
- c) SH 25 Bridge to Old Road Bridge (1.1 km)**
- Left bank is fenced; right bank is road reserve
  - Both banks have significant presence of mature crack willows.
- d) Old Bridge to Puketui Valley Road (2.6 km)**
- The right bank is mostly fenced through Alan Morrisons with well vegetated riparian margins.

- There is a 500 m section of left bank adjacent to Hikuai School Road that isn't fenced.
  - There are 3 places where large poplars are growing on the edge of the channel and will create problems in time. One site already has trees falling in, and need attention.
  - Some willow removal required, especially on the gravel islands that are forming.
  - The island adjacent to Hikuai School Road needs opening up.
  - There is one bad corner on Hikuai School Rd that needs attention.
  - There are significant areas of land infested with willows, silver poplars, privet and Wattylys etc. This area needs to be "contained" to avoid spread. Probably not worth clearing unless the community wanted to make an ecological project of it.
- e) Puketui Valley Road to Second Branch Trib (2.2 km)**
- The river margins are generally fenced. Some areas need to be permanently fenced.
  - Significant areas have had the channel reformed in the past, to alleviate problems caused by excessive gravel deposits.
  - Further follow up planting is required where the channel has been reformed.
  - There is a significant volume of gravel in the channel that needs to be managed, stabilised, and/or removed.
- f) Second Branch Tributary and Upstream**
- Area through Karls mainly fenced with generous riparian margins. Some required by their bridge.
  - Large volumes of gravel in channel of main stream and in the second branch tributary. This needs to be monitored and/or managed.
  - Island adjacent to Puketui Valley Road needs willows sprayed.

## Tairua Catchment Tributaries

- g) Boom Stream**
- Approximately 50% of this stream is unfenced from stock. As a result bank erosion and infilling of the channel has occurred.
  - There are some potentially problematic willows occurring on the downstream side of the Tairua-Pauanui road bridge.
  - The area in between the Tairua River and Boom stream has severe bank erosion occurring on the Tairua river side where 10-20m of fence has fallen in. Willows and poplars have been planted along here to help stabilise the bank.
  - The lower reach where Boom Stream meets the Tairua River holds an good sized area of regenerating natives.
- h) Hikuai Stream**
- Fencing is present along the entire stream.
  - It is generally in good condition with little advantageous weed species.
  - There is a block of mature native that is unfenced outside the protected area of the stream margin. Fencing this area will help promote regeneration.
- i) Woody Stream**
- This stream was completely fenced during the time of inspection
  - Some riparian vegetation exists on the forestry side of the stream, particularly as it enters the Tairua River.
  - The stream is highly channelled within farmland but is well maintained with well engineered floodgates.
  - Setting fence back several metres and planting along the northern side of this stream would help stabilise the banks and reduce maintenance requirements as well as help shade the stream.

- j) Duck Creek**
- There is no stock surrounding this waterway
  - From where it enters the Tairua River and upstream, there approximately 1.5km of native wetland surrounding the stream.
  - Above this area the stream is in golf course land and forestry, where it also has wide wetland riparian margins.
  - No management issues were seen within this tributary
- k) Gumdigger Gully**
- This stream is surrounded by forestry in the upper catchment and a fenced residential sub-division.
  - It runs through a large wetland of good ecological value before reaching the Tairua River.
- l) Oxley Gully**
- The majority of the catchment of this stream is in forestry
  - Stream runs through industry (quarry) and residential towards the Tairua River.
- m) Tramway**
- Some good fenced margins with manuka/ kanuka where the stream meets farmland out of forest block.
  - Good fencing but little
  - Stream runs through industry (quarry) and residential towards the Tairua River.
- n) Stoney**
- Majority of the stream appears to be fenced.
  - An area upstream of Sh25 and the DOC boundary is unfenced
  - Large areas of regenerating bush on the true left
  - Largely free of pest plants
- o) Kaituna Stream**
- Some large areas of unfenced stream.
  - The majority of the native bush areas towards the top of the catchment are fenced off.
  - Some patches of large scale bank erosion upstream of the SH25 bridge.
  - The stream would benefit from fencing and planting.
- p) 1<sup>st</sup> Branch**
- Fenced on true right the whole way and an orchard on the true left.
  - Riparian margins are well vegetated with natives
  - Predominantly a native forest catchment
- q) 2<sup>nd</sup> Branch**
- Stream is fenced off with a good cover of indigenous vegetation
  - Predominantly a native forest catchment
  - Confluence with Tairua River has changed markedly over the last decade. In 2004 a large vegetated area (approx 5000m<sup>2</sup>) was present, with the channel splitting. 2007 aeriels show it completely gone, with a large open gravel area now existing. This could be a significant contributor to the large amounts of gravel in transit on the Tairua River at present (see attached photos)
- r) 3<sup>rd</sup> Branch**
- Stream is fenced off with a good cover of indigenous vegetation
  - Predominantly a native forest catchment
- s) 4<sup>th</sup> Branch**
- Stream is fenced off with a good cover of indigenous vegetation
  - Indigenous riparian cover is at times replaced with pampas.

- t) Tairua River from 3<sup>rd</sup> Branch upstream to 4<sup>th</sup> Branch**
- 90% Fenced. Just one small patch unfenced upstream of the 4<sup>th</sup> branch.
  - True right is a large area of native forest. True left is also covered in native bush, in some areas however pampas and *Elaeagnus* dominate.
- u) Pepe**
- Stream is fenced through the Laycock Property.
  - Areas of gravel build up and erosion requiring attention.
  - Majority of previous erosion control planting has gone, needs planting plan implemented and supported with Instream management until area has stabilised.
- v) Graham's Stream**
- Majority of the stream is fenced one side (with bank showing signs of stock erosion) or not stocked.
  - Turners property fencing on one side required for approx 1200m.
  - Access issues for stream maintenance through residential/lower reaches of stream.
  - Small quantity of pest plants require spraying through lower reaches.
- w) Cordyline Wetland (Tairua river margin, between Woody stream and Hikuai stream)**
- Mature area of unique *Cordyline australis* forest. This type of vegetation is scarce in the rest of the Catchment.
  - Weeds are encroaching on the native vegetation and control will be needed to protect the forest long term.
  - Honeysuckle, Privet and Wattle are the main threats seen during this quick survey.
  - A more detailed survey of the area may help identify restoration priorities.
- x) Oturu**
- Mostly native regenerating riparian margins.
  - Where the stream meets the farm there are channelled drains entering the stream.
- y) Swampy**
- The stream has well vegetated margins within farm land before it meets the harbour.

## Overview of Works Required

In order to effectively manage this section of the river system, it is recommend the following actions need to be undertaken in this catchment.

- i) Channel Management**
- Clear all channels of obstructions or blockages.
  - Fence out all waterways where stock have access (includes tributaries and drains).
  - Manage vegetation in the channel and floodway areas including:
    - removal of unwanted vegetation
    - systematic replacement of large poplars and replacement with appropriate species.
  - Repair eroding corners through site specific works. This involves methods such as rock riprap, soil conservation planting, and fencing. Includes further works on the corners that Transit NZ have been involved with.
  - Appropriately manage the huge volume of bedload material. This can be achieved by extraction of sands and gravels; and/or stabilisation on site where appropriate.

## ii) Riparian Enhancement

- Retire and plant all fringe areas with appropriate species (hybrids where erosion is prevalent; native where appropriate).

## iii) Upper Catchment Protection

- Retire all bush areas from stock access.
- Carry out pest control operations in pine and native bush.
- Rigidly manage forestry operations
- Encourage further retirement.

## Estimated Costs

### Tairua Main Channel

#### a) Tanners Mill to Hikuaia Stream (3.5 km)

• Remove visible sand deposits (hopefully we could get someone who wants it, to take it away for no cost)	- excavate			10,000
• Fence (2.0 km) Est cost \$7200	-	THE 35%		2,500
	COUNCIL			
	-landowner	65%		4,700
• Pole plant (0.8 km)	- materials	60 @ \$10		600
	- labour	60 @ \$4		200
• Plant stakes (100m)	- materials			100
	- labour			100

#### b) Hikuai Stream to SH25 Bridge (3.2 km)

• Clear crack willows below bridge	- clear (3 days)			5,000
	- dispose			2,500
• Remove isolated willows in Darrahs	- clear			1,500
	- dispose			800
• Remove / manage silver poplars	- remove			3,000
	- dispose			1,500
	- spray			500
	- chemicals			500
• Manage poplars	- remove			5,000
	- dispose			2,500
	- chemicals			500
	- spray			500
	regrowth			
• Fence (3.0 km) Est cost \$10,800	-	THE 35%		3,800
	COUNCIL			
	- landowner	65%		7,000
• Plant (1 km stakes 3 km poles)	- materials	230 x \$10		2,300
		1000 \$ \$3		3,000
	- labour			3,000

**c) SH 25 Bridge to Old Road Bridge (1.1 km)**

• Remove willows	- clear		10,000
	- dispose RB		5,000
	- dispose LB		5,000
• Follow up spray	- labour		1,000
	- chemical		500
• Follow up pole plant	- materials		1,800
	(180)		
	- labour		700

**d) Old Bridge to Puketui Valley Rd (2.6 km)**

• Remove large poplars	- clear		4,000
	- dispose		2,000
• Remove willows in channel	- clear		3,000
	- dispose		1,500
• Manage gravel in channel (islands etc)			5,000
• Follow up spray	- labour		1,000
	- chemicals		500
• Fence (600 m) Est cost \$2,200	- THE	35%	800
	COUNCIL		
	- landowner	65%	1,400
• Follow up planting	- materials	50 @ \$10	500
		200 @ \$3	600
	- labour		600

**e) Puketui Valley Rd to Second Branch Trib (2.2 km)**

• Follow up on gravel management			10,000
• Follow up planting	- materials	1000@ \$3	3,000
	- labour	1000@ \$1	1,000
	- machine		2,000
• Fencing (200 m) Est cost \$1,000	- THE	35%	400
	COUNCIL		
	- landowner	65%	600

**f) Upstream of Second Branch Tributary**

• This area is probably best left in its natural state with some minor works			
• Fence (200 m) Est cost \$1,000	- THE	35%	400
	COUNCIL		
	- landowner	65%	600
• Spray out willows etc	- labour		200
	- chemicals		100

• Allow some gravel management	<u>3,000</u>
<b>Estimate of Main Channel Works</b>	<b>\$127,300</b>
<b>Landowners Contribution</b>	<b>\$38,900</b>

## Tributaries

### a) Boom Stream (From Memo by R. Spooner)

• Fence below road (800 m)	Est cost \$3000	- THE COUNCIL 35%	1000
		-landowner 65%	2000
• Riparian planting/ weed control	Est cost \$30,000	- THE COUNCIL 35%	10500
		-landowner 65%	19500
• Fence above road (say 3 km)	Est cost \$11000	- THE COUNCIL 35%	4000
		-landowner 65%	7000

### b) Hikuai Stream

• Fence below road (400 m {2we})	Est cost \$800	- THE COUNCIL 35%	560
		-landowner 65%	1040
• Planting	Est cost \$9000	- THE COUNCIL 35%	3150
		-landowner 65%	5850
• Fence above road (200m)	Est cost \$800	- THE COUNCIL 35%	280
		-landowner 65%	520

### c) Woody Stream

• Planting (dependant on weed control below). Est Cost \$15,000		- THE COUNCIL 35%	5250
		-landowner 65%	9750
• Weed control	Est cost \$5000	- THE COUNCIL 35%	1400
		-landowner 65%	2600

### d) Tramway

• Planting. Est Cost \$8,000		- THE COUNCIL 35%	2800
		-landowner 65%	5200

### e) Stoney

• Fence upstream of SH25 on true right (800m) Est. cost: \$4,400		-landowner 50%	2200
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	This is a Doc administered riparian area.	-DOC	50%	2200
<b>f)</b>	<b>Kaituna Stream</b>			
	• Fence upstream of road (4.5 km) Est cost \$25,000	-landowner -DOC	50% 50%	12500 12500
	Upstream of Road is Doc administered riparian area.			
	• Planting Est cost \$9000	- THE COUNCIL -landowner	35% 65%	3150 5850
	• Erosion excavator hire and pole and stake planting. Est cost \$5000	-landowner -THE COUNCIL	50% 50%	2500 2500
<b>g)</b>	<b>2<sup>nd</sup> Branch</b>			
	• Works with that gravel estimate		\$10,000 Cost will vary depending on amount	
<b>h)</b>	<b>4<sup>th</sup> Branch</b>			
	• Weed control to allow for natural regeneration Est cost \$4,000	THE COUNCIL landowner	35 65%	1400 2600
<b>i)</b>	<b>Tairua River from 3rd Branch upstream to 4th Branch</b>			
	• Weed control to allow for natural regeneration Est cost \$2,000	-landowner -THE COUNCIL	65% 35%	1300 700
	• Fence upstream of 3 <sup>rd</sup> branch (0.3 km) Est cost \$1,800	-landowner -THE COUNCIL	65% 35%	1170 630
<b>j)</b>	<b>Pepe</b>			
	• Planting materials, poplar willow poles/stakes sleeves. Est cost \$1650	-THE COUNCIL -landowner	35% 65%	578 1072
	• Gravel management. Est Cost \$4000	-THE COUNCIL -landowner	35% 65%	1400 2600
	• Planting Est cost \$5000	- THE COUNCIL -landowner	35% 65%	1750 3250
<b>k)</b>	<b>Grahams Stream</b>			
	• Fence down stream of state highway 300m Est cost \$1000	-landowner -landowner	35% 65%	350 650
	• Fence upstream state highway 900m Est cost \$3000	-THE COUNCIL -landowner	35% 65%	1000 2000

• Spraying Est cost \$1000	-THE COUNCIL	35%	1000
• Planting			
Est cost \$15000	- THE COUNCIL	35%	5250
	-landowner	65%	9750

**l) Morrisons Stream (out of report by R Spooner)**

• Fence upper reaches (say 3 km)			
Est cost \$11000	- THE COUNCIL	35%	4000
	-landowner	65%	7000

**m) Oturu Stream**

• Vegetation management and erosion/riparian planting			
Est cost \$12000	- THE COUNCIL	35%	4200
	-landowner	65%	7800

**n) Swampy**

• Planting			
Est cost \$10000	- THE COUNCIL	35%	3500
	-landowner	65%	6500

**o) Miscellaneous Fencing (out of report by R. Spooner)**

• Say 5 km			
Est cost \$18000	- THE COUNCIL	35%	6000
	-landowner	65%	12000

**p) Miscellaneous native planting**

• Say 5000			
Est cost \$25000	- THE COUNCIL	35%	8750
	-landowner	65%	16250

**Total Estimated Costs      \$363,450.00**

# Appendix 11. Nutrient management and managing soils

## Nutrient budgets and farm management

Nutrients are a valuable resource. They come from many sources; clover nitrogen fixation, the breakdown of organic material, the slow weathering of soil parent material, earthworm, bacterial and fungi activity, dung and urine and of course fertiliser. Some nutrients leave the farm gate as meat, wool and milk while others escape through runoff to waterways and to ground water by leaching.

If unwanted losses of nutrients can be slowed down more nutrients will be available for conversion to agricultural products and we protect our surface and ground water from degradation.

A nutrient budget accounts for input and outputs from the farm system. It helps determine whether nutrients are being used efficiently and indicate the amount of avoidable nutrient leaching and run off from the farm. There are many advanced options with nutrient budgets and management. Fertiliser representatives and farm consultants can assist in creating a nutrient budget specific to the farm system.

Nutrient management makes good financial and environmental sense. It helps to optimise production and ensure efficient use of nutrients. More nutrient than is needed leads to leaching of waterways.

The Waikato Regional Council's regional plan states that farmers applying more than 60kg of nitrogen per hectare per year must prepare and implement a nutrient management plan. This is based on soil tests and the OVERSEER® nutrient budget as prepared by a fertiliser representative. These plans describe the practical steps required to reduce nutrient and sediment loss, including nutrient loss to waterways, while providing financial benefits by reducing the amount spent on fertilisers.

### Recommended actions – on farm

- Move effluent irrigators frequently to prevent ponding of effluent and runoff into water ways.
- Consider expanding the effluent irrigation area. Ensure areas are suitable ie not near waterways and is not subsurface drained land.
- Regularly maintain the irrigator pump and pipes and ensure application rates allow for good pasture uptake and not causing ponding and run off of effluent.
- If applied by a contractor, increase the number of times they spread effluent from holding ponds.
- Maintain a safe distance between effluent system and waterways
- Fence and retire wetland areas and ponds. They act as filters and help denitrify excess nitrogen leaving the farm
- Establish the soil nutrient levels on farm by soil testing each management unit area on farm separately. Test for phosphorus, potassium, sulphur and magnesium.
- Establish the nutrients added to the farm though the application of effluent by testing the effluent.
- Get you fertiliser representative to develop a nutrient budget for your farm using OVERSEER®.
- Add only those nutrients required for optimum production.
- Think about management practices that contribute to environmental degradation and the alternatives that could add some improvement to your farm. Plan to implement these changes to move towards a sustainable future.

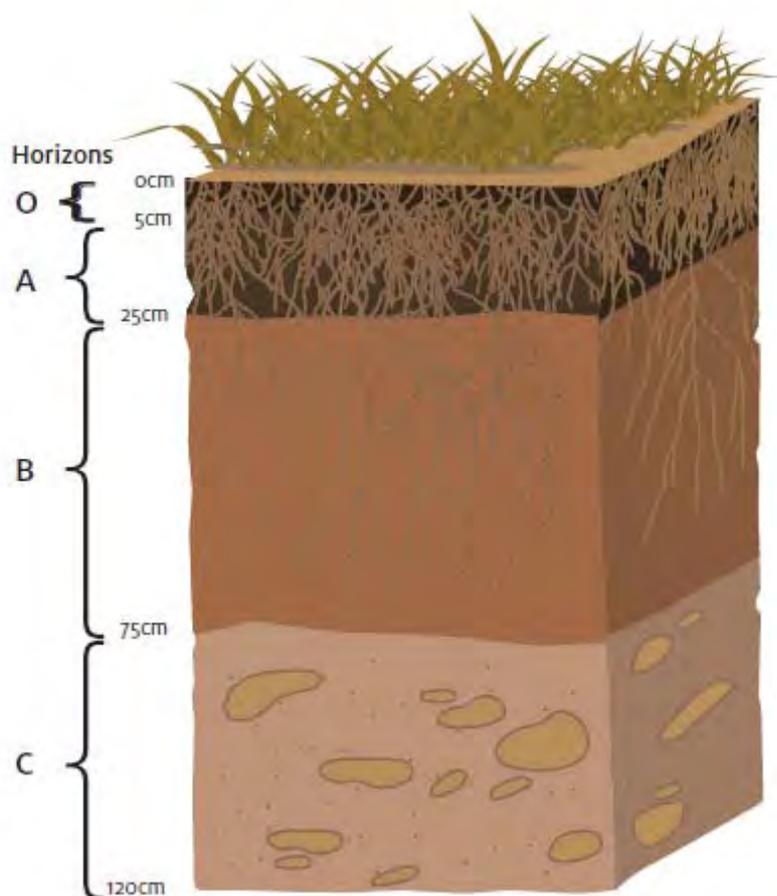
- Managing urine spots: Most N is lost through urine spots (effluent only equates for 10%) and this is lost in greater quantities over winter. Efforts to manage stock through winter months in particular can have big environmental gains.

## Managing soils

Generally pastoral farming in New Zealand is based on grass and clover systems, this is cheaper than the more intensive systems used over seas. To maintain productivity soils and their structure need to be preserved. The biological and organic system below ground is the engine room of a farming system.

Factors to consider in a healthy soil structure are:

- good root mass and depth
- porosity (soil pores)
- colour
- adequate soil fertility without any deficiencies for pasture growth
- number of earthworms present,
- soil smell, and
- high organic matter content.



**Figure 21. A soil profile showing a well aerated soil structure with few clods.**

Decline in soil quality has a significant impact on pasture production, pasture quality, animal health and the environment. Avoiding pasture damage is the best strategy as damaged paddocks take long periods of time to become healthy again and can be costly to farm production. Physically healthy and fertile soils lead to high pasture production.

Decline in soil quality has a significant impact on pasture production, pasture quality, animal health and the environment. Avoiding pasture damage is the best strategy as

damaged paddocks take long periods of time to become healthy again and can be costly to farm production. Physically healthy and fertile soils should enable high pasture production.

**Recommended Actions – on farm**

- Stand heavy animals off pasture in prolonged wet weather
- Pre graze paddocks prone to pugging before very wet weather arrives
- Back fence cows to limit pasture damage in winter
- If re-contouring, ensure erosion control measures are in place and use a skilled contractor. A resource consent may be required, check with Waikato Regional Council before commencing works
- Ensure pH is in the recommended range to create the best soil environment for earthworms (5.8 and 6.0, but on peat soils 5.0 and 5.5)
- Do not substitute fertiliser nitrogen for poor growing pastures as a first option. Examine the soil structure using a Visual Soil Assessment and soil and herbage test to eliminate any nutrient deficiency before considering nitrogen.

## Appendix 12. Draft Local Area Blueprints Actions with HCMP linkages.

TAIRUA/PAUANUI CATCHMENT								
Map reference	Action	Details	Lead partner	District theme	LAB response	BP Strategy	BP Goal	BP Outcome
Tairua 1	Threatened species maps	Develop threatened species location and distribution maps for use in plans and regulatory processes (particularly for NZ dotterel in this catchment).	DOC / EW	B11	1.1.1	1.9	1.6	1
Tairua 2	Community pest control	Continue community pest control schemes as prelude to species re-introductions	EW / DOC	B4	1.6.1	1.9	1.6	1
Tairua 3	Ecological enhancement & corridors	Complement district-wide protection of SNAs by identifying priority enhancement areas and corridors that reconnect coast to headwaters. Enhance vegetation connections between indigenous fragments (including SNA) within the Tairua LAB area.	TCDC / EW	B2	1.6.3	1.9	1.6	1
Tairua 4	Culverts for fish passage	Remediate high priority culverts impeding fish passage	TCDC / NZTA / EW	B3	1.6.3	1.10	1.6	1
Tairua 6	Harbour and catchment plan investigations	Undertake ecological enhancement of potential corridors through HCMP implementation.	EW	B5	1.6.3	1.9	1.6	1
Tairua 8	Pepe Stream water quality	Provide a range of mechanisms to improve the Pepe stream water quality as part of the Tairua Harbour and Catchment Plan.	EW	B5	1.4.6	1.6	1.4	1
Tairua 10	Dune restoration	Undertake weed control / eradication in forest / dune areas	DOC / EW / TCDC	B2	4.1.4	1.9	1.6	1
TAIRUA/PAUANUI OPEN SPACE AND ECOLOGY								
O1	Ecological planting	Riparian and biodiversity corridor protection	TCDC / EW	B2	1.6.3	1.9	1.6	1
O2	Grahams Creek enhancement	Grahams Creek subject to stormwater management; biodiversity protection (fish spawning, fern bird, banded-rail); recreation opportunities including walkway linkages and bird watching; interpretation and risk signage; water quality enhancement	TCDC / EW	B5	1.4.1	1.9	1.6	1

Map reference	Action	Details	Lead partner	District theme	LAB response	BP Strategy	BP Goal	BP Outcome
O6	Biodiversity opportunities	Seek opportunities to enhance biodiversity in the golf course wetland.	TCDC / owners	B6	1.4.1	1.9	1.6	1
O7	Flood alleviation	Look into flooding alleviation techniques including stop banks and stormwater outlets on roads. Especially consider Manaia Road which is subject to sea level rise. Development should be low intensity, avoided or on elevated building platforms.	TCDC / NZTA/EW	F2	4.2.1	4.1	4.2	4
O3	Biodiversity corridor	Create a biodiversity corridor from the Pauanui estuary (between Tangitarori Lane and the Waterways development) and the bushclad foothills	TCDC / EW	B5	1.6.3	1.9	1.6	1
O4	Sediment control / habitat enhancement	Sediment control, water quality enhancement, wetland, water polishing	EW / TCDC	B6	1.4.1	1.9	1.6	1
<b>TAIRUA/PAUANUI WATER SPACE</b>								
H1	Siltation issues / wetland enhancement	Use wetland enhancement at selected locations e.g. in the Duck Creek area to counteract siltation problems in the area	TCDC / EW	B6	1.4.1	1.9	1.6	1
H2	Dune restoration	Apply more dune restoration work at Ocean Beach	TCDC	B2	4.1.4	4.6	4.1	4
H3	Proposed Marina / number of moorings	Reduce the number of moorings in the navigation channel once Marina is consented	EW	C6	3.1.5	3.2	3.1	3
H6	Allocation of coastal marine space	Assist/inform the allocation of coastal marine space for use and protection	EW / DOC	C1	1.2.1	1.5	1.4	1
H7	Stormwater management and harbour water quality	Identify opportunities for HCMP to assist low impact design stormwater management plans to enhance harbour water quality.	TCDC	C3	1.4.4	1.6	1.4	1
H8	Seascape identification	Identify important seascapes	TCDC / EW	C2	1.2.1	1.3	1.2	1
H9	Weed control/biosecurity	Undertake control of saltwater paspalum	EW	B2	1.4.1	1.9	1.6	1
H10	Monitoring	Monitor illegal mangrove removal in Tairua Harbour and identify management areas for both protection and removal.	EW	C1	1.4.6	1.9	1.6	1

Map reference	Action	Details	Lead partner	District theme	LAB response	BP Strategy	BP Goal	BP Outcome
<b>TAIRUA/PAUANUI IWI</b>								
I3	Marine Reserve	Future Rohe Moana, marine reserve opportunity	TCDC / HW/EW	D9	1.2.1	1.9	1.6	1
I4	Pataka kai	Recognition of a significant area to Iwi / hapu / whaanau that have mana whenua over a resource both land and water	TCDC / HW	D9	1.3.1	1.6	1.4	1
I3	Ngā Waihotanga Iho (Iwi estuarine monitoring toolkit)	Tairua Harbour subject to Iwi estuarine monitoring. Use of the toolkit developed with NIWA to evaluate environmental change (using science and traditional knowledge to fulfill kaitiakitanga responsibilities)	EW/ HW	D9	1.3.1	1.6	1.4	1
<b>TAIRUA/PAUANUI TRANSPORT</b>								
T5	Harbourfront walkway	Advocate for a harbourfront reserve walkway	TCDC	E9	1.5.2	1.8	1.5	1
T6	Wider recreational linkages and other walkway projects	Provide technical input into walkway projects so they consider broad range of issues and opportunities such as flood hazard, biodiversity, education etc.  Note see also T7 – T10.	TCDC / DOC	E9	1.5.1	1.8	1.5	1
<b>TAIRUA/PAUANUI GROWTH</b>								
G8	Hazard assessment & management plan	Undertake a comprehensive hazard assessment and management plan in the community	TCDC / EW	F2	4.1.5	4.1	4.1	4
<b>TAIRUA/PAUANUI COMMUNITY</b>								
C1	Sports field development	Undertake a sports field development feasibility study considering land around Grahams Stream	TCDC / EW	G2	3.4.1	3.5	3.4	3
C4	Boat ramp upgrade	Upgrade the Tangitarori Lane boat ramp - dredge and provide public facilities	TCDC / EW	B8	3.1.5	3.2	3.1	3

