Waikanae River Environmental Strategy

An outcome of the Waikanae Floodplain Management Plan

greater WELLINGTON
REGIONAL COUNCIL
Te Pane Matua Taiao

Foreword

The first Waikanae River Environmental Strategy was published in 1999 following the development of the Waikanae Floodplain Management Plan. Since then there have been significant environmental improvements within the Waikanae River Corridor, particularly in terms of restoration planting and the development and enhancement of access and pathways for walking, cycling and horse riding.

Many of these improvements are recommendations from the 1999 version of this Strategy, which have been implemented by Greater Wellington Regional Council and Kāpiti Coast District Council, together with the community.

This updated version of the Strategy identifies key features of the Waikanae River environment, with a focus on the River Corridor downstream of the Water Treatment Plant. It sets out an agreed vision and objectives and provides updated recommendations for the management of the river environment going forwards.

This Strategy is the combined effort of the Greater Wellington Regional Council and Kāpiti Coast District Council. The Department of Conservation, Te Atiawa ki Whakarongotai, the Friends of the Waikanae River, and other members of the community have also made a valuable contribution to the Strategy review.

Cr Barbara Donaldson
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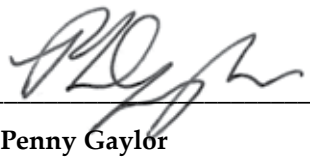
Environment Management Portfolio Leader

Greater Wellington Regional Council



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Contents

List of Figures

INTRODUCTION AND BACKGROUND

1. Introduction

1.1 Background to the updated Waikanae River Environmental Strategy

The Waikanae River – A Treasured Natural Resource

The Waikanae River is a unique natural resource of tremendous value. It is a popular place for recreation, particularly in the area downstream of the State Highway 1 (SH 1) Bridge. Recreational activities in this area include swimming, fishing, kayaking, picnicking, playing sport, walking, running, cycling and horse riding.

Cyclists enjoying a ride on the south bank

The Waikanae River has important historical and cultural values and is a taonga of Te Atiawa ki Whakarongotai, who are tangata whenua in this area and kaitiaki of the river.

The river is also a special place in ecological terms. It provides a 'mountains to sea' ecological corridor from the Tararua Ranges to the Waikanae Estuary Scientific Reserve and the Kāpiti Marine Reserve, with Kāpiti Island Nature Reserve (a predator free sanctuary for bird life) located directly offshore (see Fig. 4).

Volunteer groups, including the Friends of the Waikanae River (FWR), the Kāpiti Ecological Restoration and Maintenance Trust (KERMT) and the Waikanae Estuary Care Group are undertaking projects to restore and enhance the Waikanae River environment. The Kāpiti Coast District Council (KCDC), the Greater Wellington Regional Council (GWRC) and the Department of Conservation (DOC) also undertake work to enhance the river environment and support the work of volunteers.

Managing Flood Risks From the Waikanae River

Although it is an asset and a taonga, the Waikanae River is also a hazard, as it has the potential to flood parts of Waikanae and Otaihanga. Flood events not only have the potential to damage property, they also put human life at risk.

In 1955, a large flood extensively damaged houses on the floodplain. Following this flood an erosion and flood control scheme was established, which included stopbanks and erosion protection works. The flood control scheme covers the section of the river from the just below the Waikanae Water Treatment Plant to the river mouth. This area is known as the 'River Corridor'.[1]

The Development of the 1997 Waikanae Floodplain Management Plan (FMP) and 1999 Waikanae River Environmental Strategy

In 1997, GWRC's Flood Protection Department, in consultation with the Waikanae and Otaihanga communities, prepared the Waikanae Floodplain Management Plan (WFMP), which set out a package of measures to manage the flood risk. These measures included building and maintaining structural works, erosion control, gravel management, planning controls, and increasing community preparedness for flood events.

[1] The River Corridor comprises the riverbed and adjacent floodway downstream of the Water treatment Plant (see Fig. 2). It is the minimum area necessary to manage a major flood and let flood waters pass safely to the sea. Therefore, appropriate land uses and development potential are extremely limited. Generally the main activities that take place in the Waikanae River Corridor are recreational activities, ecological restoration, and flood risk management activities.

In association with flood risk management activities, the Flood Protection Department undertakes and supports actions to enhance the environment of the River Corridor.

Recognising that flood protection measures can create both environmental effects and opportunities to enhance the river environment, the community developed the following objectives, which were included in the Waikanae FMP:

- *To ensure methods included in the Floodplain Management Plan preserve or enhance the environmental character of the river and floodplain*
- *To ensure public access to the river is maintained so as to enhance its amenity value and use for recreational purposes.*

The FMP also included an objective relating to tangata whenua (Te Atiawa ki Whakarongotai):

- *To ensure the traditional, spiritual and cultural values of the tangata whenua are adequately recognised in accordance with the principles of the Treaty of Waitangi.*

To support these objectives and provide an agreed framework for protecting and enhancing the river's values, GWRC prepared the 1999 Waikanae River Environmental Strategy[2] (the 1999 Strategy) with support from KCDC.

The Waikanae River Ecological Strategy[3] (the Ecological Strategy) was also prepared in 1999 as a condition of GWRC's resource consent for flood risk management activities. The Ecological Strategy was a response to a submission from tangata whenua regarding the need for a restoration programme based on sound ecological principles.

Review of the Waikanae FMP and Waikanae River Environmental Strategy

The Waikanae FMP and the Waikanae River Environmental Strategy have been reviewed and updated to reflect the current situation. GWRC published the updated Waikanae FMP in 2013. The review of the Waikanae River Environmental Strategy has been led by GWRC and supported by KCDC. The review involved consultation with volunteer groups, tangata whenua, DOC and others in the community with an interest in the river.

The review revealed that significant changes to the Waikanae River environment had taken place since the 1999 Environmental Strategy was prepared. Of particular note was the significant restoration work that had taken place, which has had a transformative effect on the local ecology and the recreation, landscape and amenity values downstream of the SH 1 Bridge.

Restoration planting

In addition to the restoration planting, a number of recommended actions from the 1999 Strategy have been implemented, including the establishment of new pathways and signage. In 2009, the Te Arawai Bridge was completed, providing a strategic pedestrian link between the north and south banks of the river. KCDC has purchased a large block of land adjacent to the River Corridor on the south bank, which will be used to establish a significant recreational reserve. The Waikanae River is now -more than ever- a people place and an ecological corridor.

This updated Strategy provides a snapshot of the current river environment and key values that are associated with it. It provides an agreed vision, objectives, and a range of recommended actions to guide those carrying out activities in the river and River Corridor. It provides guidance on restoration, to encourage a consistent and co-ordinated approach to restoration of the River Corridor. It also sets out to better co-ordinate flood risk management activities with environmental enhancement and restoration activities.

This updated Strategy has incorporated a number of aspects of the Ecological Strategy, so that the two documents are more closely aligned. It also has been extended to include the reach of the river between the Water Treatment Plant and the SH1 Bridge.

[2] GWRC, 1999.
[3] Park, 1999.

1.2 Purpose of the Strategy

Greater Wellington Regional Council, Kāpiti Coast District Council, The Department of Conservation, the Waikanae community, Te Atiawa ki Whakarongotai and nearby landowners are all making efforts to protect and improve the Waikanae River environment. This Strategy is intended to assist and co-ordinate these efforts.

This strategy presents an agreed vision and objectives that the different parties can work towards. It also sets out a range of recommended actions for enhancing the Waikanae River Environment in line with the vision and objectives. The 'environment' includes the biophysical environment, as well as cultural, historic and recreational environment.

The Strategy is primarily an outcome of the Waikanae Floodplain Management Plan, and therefore, GWRC is the principal author of the Strategy. For GWRC the Strategy provides a framework for the environmental enhancement work that the Flood Protection Department undertakes in conjunction with their flood protection activities on the Waikanae River. The Strategy also aims to ensure that environmental enhancement and restoration activities carried out by other parties do not conflict with flood protection activities in or near the River Corridor.

Kāpiti Coast District Council, the other principal partner in the Strategy, will use it as a reference in relation to:

- its statutory land management functions
- its operational works
- any proactive efforts to improve the river environment.

Because of its significant management role in the river environment, particularly around the Estuary, the Strategy also recommends actions that the DOC could undertake.

Other groups and individuals with an interest in the Waikanae River can refer to the Strategy when planning activities or developments in or near the River Corridor. These groups include:

- Te Atiawa ki Whakarongotai (mana whenua ki Waikanae)
- Community groups
- Environmental organisations
- Private landowners
- Utility owners/operators.

The Strategy places no obligation on the parties involved, beyond their existing statutory responsibilities.

1.3 Structure of the Strategy

Part A sets out the background information relevant to the Strategy, including the key values associated with the Waikanae River and key issues relevant to the restoration and management of the river environment.

Part B includes the Vision and Objectives for the river environment and general methods for achieving that vision. Part B is applicable to the Waikanae River environment, and in some instances, the wider catchment.

Part C of the Strategy focuses on the River Corridor - downstream of the Water Treatment Plant (Fig 1). The following river reaches[4] are identified and described in more detail in Part C of the Strategy:

1. **Reikorangi/Water Treatment Plant Reach:** from the Water Treatment Plant downstream to the Rail Bridge
2. **Parikawau/Edgewater Park Reach:** from the Rail Bridge downstream to Walnut Grove (on the north bank)
3. **Waipunahau/Jim Cooke Memorial Park Reach:** from Walnut Grove to Paretai Grove (on the north bank)
4. **Pukekawa Reserve Reach:** from Paretai Grove to Kauri Road (on the north bank)
5. **Te Aorere/Waikanae Christian Holiday Camp Reach:** from between the western end of Pukekawa Reserve on the north bank, downstream to residences at the eastern end of the settlement of Otaihanga (on the south bank)
6. **Arapawaiti/Otaihanga Reach:** from the eastern end of Otaihanga (on the south bank) to approximately XS 50, where the dune on the north bank comes close to the river
7. **Kenakena/The Estuary:** Extending over the final 50 m of the river, from Mazengarb Stream confluence to the river mouth.

Part C contains recommendations for the management and enhancement of the River Corridor in each of these reaches in line with the vision and objectives of this Strategy. Recommendations for appropriate plant species for restoration planting for each of these reaches are contained in Appendix 2.

[4] The reaches cover both sides of the river.

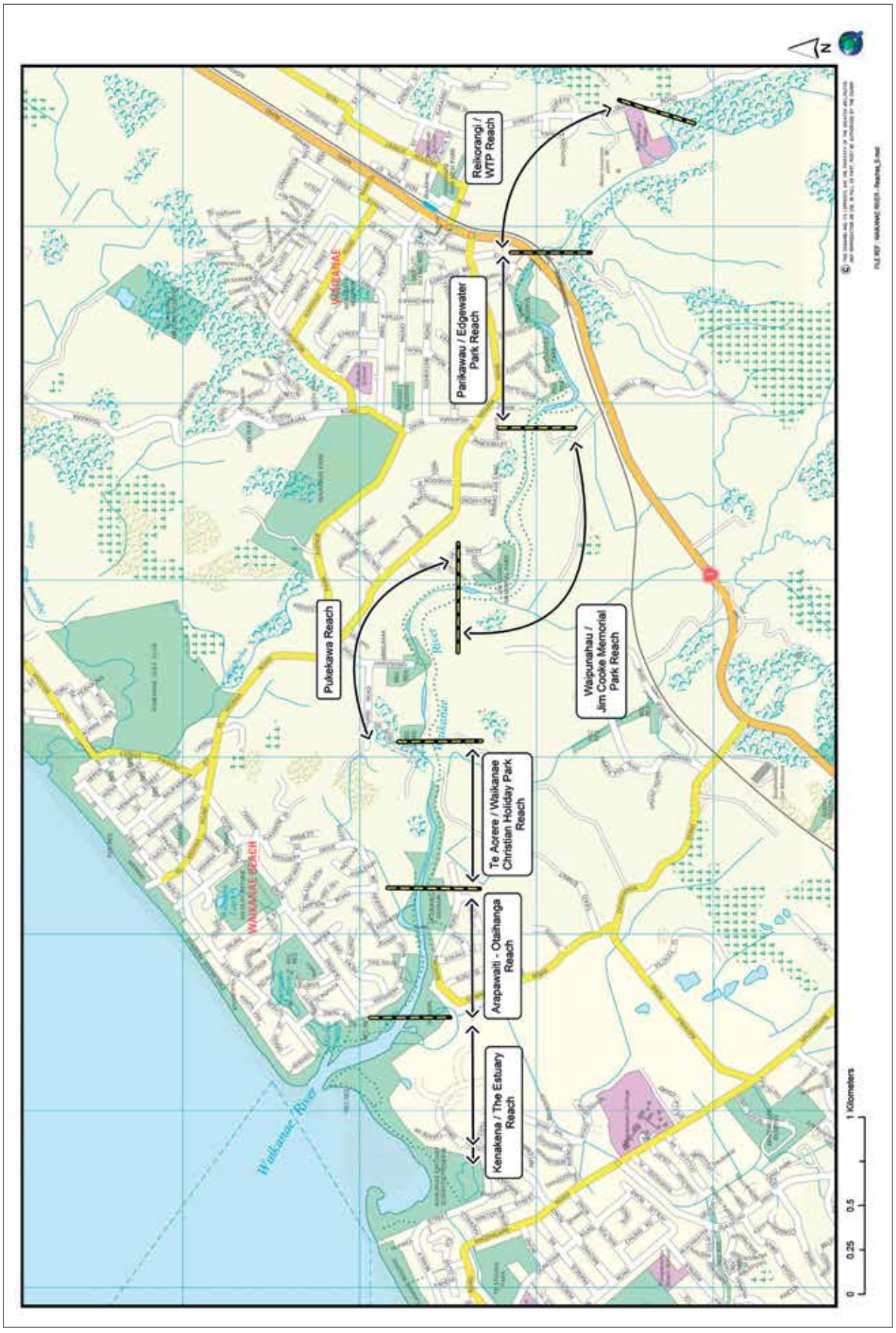

Figure 1: The Seven Reaches identified in Part C of this Strategy.

1.4 Scope of the Strategy

1.4.1 Obligations of Parties

The Strategy places no obligation on the parties involved, beyond their existing statutory responsibilities.

It is acknowledged that:

- GWRC, KCDC and DOC all have their own mandate and responsibilities
- GWRC, KCDC and DOC have limited financial resources, and the objectives in the Strategy may only be achieved over a long period
- The recommendations in this strategy are not binding on the parties involved and are subject to availability of funding and outcomes of community consultation
- Te Atiawa ki Whakarongotai have cultural responsibilities as kaitiaki of the Waikanae River, which need to be understood and respected
- Private landowners within the river environment have rights in relation to their property, which need to be understood and respected.

Therefore, the Strategy is intended to be flexible, relying on the good will and co-operation of all of those with a role in managing and enhancing the river environment.

1.4.2 The Strategy is a Long-Term Plan, Which Will be Realised in Stages

The Strategy is a long-term plan that can be realised in stages. It is intended to be flexible, relying on the good will and co-operation of the agencies and stakeholders involved.

Opportunities to address different aspects of the Strategy will arise at different times.

1.4.3 Area Covered by the Strategy

The Strategy applies to the Waikanae River, its environment and the wider catchment. However, the focus of the Strategy is on the River Corridor - between the Water Treatment Plant River Mouth (just upstream of the SH 1 Bridge) and the river mouth, including the Estuary. This section of the Waikanae River is actively managed to reduce flood risks to the Waikanae and Otaihanga communities. It also has the greatest recreational usage and is undergoing a significant restoration effort. Therefore, this is the area where pressures on the environment and potential for conflicts between uses are the greatest.

Feedback from consultation on this updated Strategy has indicated that some parties would like to see the focus of the Strategy extended to include the River upstream of the Water Treatment Plant. This should be considered when the Strategy is next reviewed.

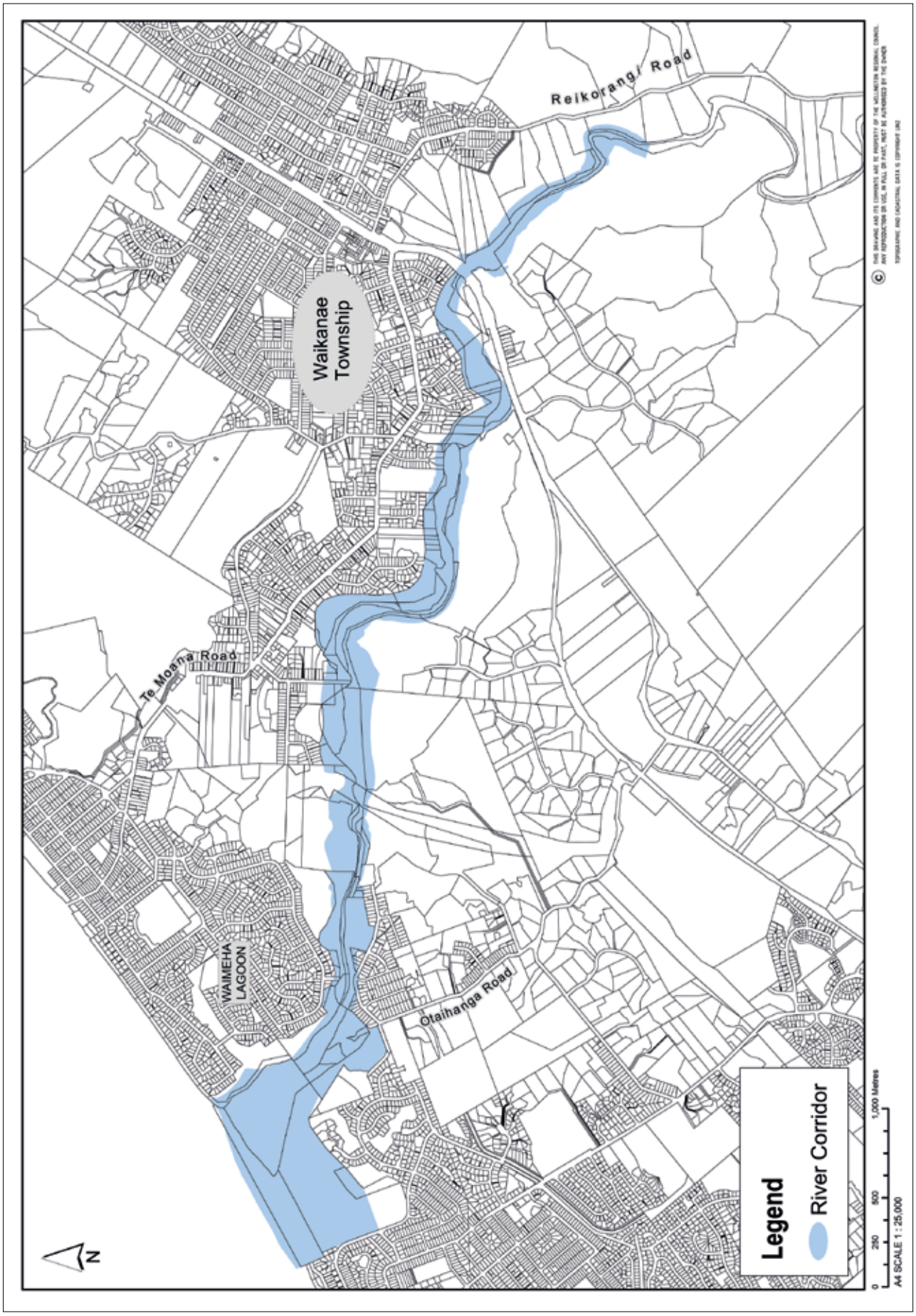

Figure 2: The Waikanae River Corridor[5]

[5] The River Corridor is also depicted in red on the maps of each river reach in Part C of this Strategy.

1.5 Limitations of the Strategy

This Strategy provides a snapshot of some of the key ecological, recreational, cultural and historic values associated with the Waikanae River, and sets out recommendations for their protection and enhancement. However, it is unlikely that all values present in the River environment have been captured in the Strategy. In addition, the Waikanae River environment will change over time, as too will our knowledge of this environment and subsequently, the community's expectations regarding how it should be managed.

Therefore, the Strategy provides a starting point for those undertaking activities that may affect the Waikanae River environment, but it must be read alongside current scientific information and knowledge about the Waikanae River Environment and in the context of the outcomes of community engagement.

1.5.1 Water Quality and Allocation

The strategy contains information on water quality, and some of the recommended actions can enhance water quality, however the Strategy does not comprehensively address water quality or allocation issues associated with the Waikanae River or associated waterways. These issues are addressed through the Regional Plan and RMA process.

1.5.2 Flood Risk Management Activities and Their Effects

The Strategy does not identify specific actions that will be undertaken to manage flood risks to the Waikanae and Otaihanga communities. These actions are identified in the Waikanae FMP.[6]

While this Strategy contains some specific recommendations relating to managing the effects of flood risk management activities in the Waikanae River environment, the Code of Practice[7] provides the overall framework for managing the effects of flood risk management activities.

1.6 Parties with a Role in Implementing this Strategy

1.6.1 Greater Wellington Regional Council

The GWRC Flood Protection Department is responsible for developing and implementing the Waikanae Floodplain Management Plan and this Environmental Strategy.

The GWRC Flood Protection Department administers land in the River Corridor between the Water Treatment Plant (just above the SH 1 Bridge) and the river mouth, for flood risk management purposes (see Fig 2). In association with flood risk management activities, the Flood Protection Department undertakes and supports actions to enhance the environment of the River Corridor. These actions are guided by this Strategy.

Greater Wellington Regional Council's Biodiversity Department supports restoration and pest control efforts in the Waikanae River Environment, with a particular focus on areas identified as Key Native Ecosystems (KNE's). The Environmental Regulation Department issues and monitors resource consents relating to works carried out in and near the river. The Environmental Science Department undertakes water quality monitoring.

1.6.2 Kāpiti Coast District Council (KCDC)

The Kāpiti Coast District Council administers land in and adjacent to the River Corridor. KCDC has regulatory responsibilities for land use management of the River Corridor and its environs, excluding the bed of the river. KCDC's key mechanism for regulation and management is the Kāpiti Coast District Plan. KCDC has a role implementing some non-structural methods here and in the wider catchment.

KCDC undertakes and supports ecological restoration and other environmental enhancement works in the River Corridor and its environs. These actions are guided by this strategy.

In an operational role, KCDC is responsible for the management of parks and reserves adjacent to the river, including Jim Cooke Park and the new recreation reserve that will be developed on the former Howarth Block and Turf Farm land on the South bank.

1.6.3 Department of Conservation (DOC)

DOC manages the Waikanae Estuary Scientific Reserve at the mouth of the river, and the Tararua Forest Park at the headwaters. DOC also advocates for the protection of threatened habitats and species through the statutory resource management processes. It is responsible for the Wellington Conservation Management Strategy (established in 1996), which includes the Kāpiti-Horowhenua area and the Scientific Reserve. DOC has responsibilities for the protection of fish passage in inland waterways in accordance with its responsibilities under the *Freshwater Fisheries Regulations (1983).*

[6] GWRC. 2013.

[7] At the time of publishing this Strategy, the COP was in the process of being updated. Please contact GWRC Flood Protection for the latest version.

1.6.4 Te Atiawa ki Whakarongotai

The rohe of Te Atiawa ki Whakarongotai are marked by the following boundaries: from Kukutauaki to Whareroa (seaward), inland to Pukemore and Maunganui, northward to Kapakapanui and Pukeatua, to Ngawhakangutu, then westward to Kukutauaki. Thus Te Atiawa ki Whakarongotai hold mana whenua status over the Waikanae River and its surrounding environment.

The basis and principles of the relationship between Greater Wellington Regional Council and Te Atiawa ki Whakarongotai are outlined in the 'Memorandum of Partnership'.[8]

Te Atiawa ki Whakarongotai is represented by Atiawa ki Whakarongotai Charitable Trust. The principal marae, Whakarongotai, is located in the centre of Waikanae township.

1.6.5 Restoration Groups

Community groups such as the Friends of the Waikanae River (FWR), the Kāpiti Ecological Restoration and Maintenance Trust (KERMT), and the Waikanae Estuary Care Group are involved in the protection and restoration of the ecological values of the River Corridor and Estuary.

2. Te Atiawa ki Whakarongotai Response to the Strategy

Te Atiawa ki Whakarongotai (TAKW) were asked to provide comment on the Strategy and have done so in specific parts. However we wish to provide some key recommendations and a general response to the Greater Wellington Regional Council for the future management and planning of the Waikanae River.

Recommendation One: A Partnered Approach to the Waikanae River Environment Strategy

In keeping with the Memorandum of Partnership between GWRC and TAKW, we suggest for the future that GWRC move to develop a Waikanae River Environmental Strategy with TAKW. A shared vision and objectives could be established, and the tino rangatiratanga of TAKW is recognised and protected. In particular, TAKW has an interest in being involved in prioritising and implementing protection and improvement methods. TAKW currently do not have the resources to facilitate our involvement in the development of this Strategy or any in the future.

Recommendation Two: Support the Development of a Te Atiawa ki Whakarongotai Environmental Plan

TAKW are currently seriously under resourced and it is quite challenging to contribute to or make comments on documents such as this Strategy. Such work rests upon the good will of individuals within the iwi to offer their time, but TAKW do not have any certainty that they will always have access to this support. TAKW needs to have a complete and up to date Environmental Plan that can support their input to regional and district planning, and to better communicate their perspectives and values with regards to environmental and resource management.

[8] GWRC, 2012.
[9] Statistics New Zealand , 2013.

Recommendation Three: Continue to Move Towards a More Integrated Strategy

TAKW acknowledge the 2014 Strategy has a more integrated approach than the previous 1999 version. However, the framework of this Strategy remains quite heavily focused on ecological considerations and does not fully integrate social, cultural and economic considerations in a way that is consistent with a kaitiaki based approach. The implications of this are that there are likely to be some distance between Council and TAWK in terms of how they prioritise issues, their approach to protection and improvement, and what each Treaty partner is trying to achieve through such a strategy.

Recommendation Four: Develop a Project Identifying Mahinga Kai and Species of Significance Within the Waikanae River Environment.

Similar to the wahi tapu and species of cultural significance projects that Kāpiti Coast District Council have commissioned, TAKW sees the need for the identification of mahinga kai sites and species of significance to inform future protection and improvement of the river environment in a way that upholds the values of TAKW.

Recommendation Five: Council to Work With TAKW to Identify Specific Recommendations of the Strategy That TAKW Could be Involved in Implementing

TAKW seeks to create a dialogue with Council to identify specific protection and improvement methods TAKW can be involved in through the implementation of the Strategy in the future.

At this stage, TAKW can identify the following areas that they would be particularly interested in being involved with:

1. In the River Environment:
    a. Improving and restoring indigenous vegetation and habitat, particularly in mahinga kai sites and with taonga species
    b. Improving and restoring fish habitat, particularly in mahinga kai sites and with taonga species
    c. Improving recreation and access areas particularly in the provision of public restrooms.
2. In the River Corridor:

    TAKW are interested in improving and restoring habitat across the whole River Corridor. However, there are two reaches of the corridor that of particular interest:

    a. Arapawaiti/Otaihanga – There are various mahinga kai sites and taonga species populations. There are also several wahi tapu sites in this area
    b. Kenakena/Estuary - There are various mahinga kai sites and extremely significant taonga species populations. There are also wahi tapu sites in this area.

Recommendation Six: For GWRC to Carry Out a regular 'Iwi Walkover' with Representatives From TAKW

PART A: CONTEXT

This section sets out the key features and values associated with the Waikanae River.

It then identifies some key issues relevant to the restoration and management of the Waikanae River environment.

3. Key Features and Values

3.1 The Waikanae River Catchment

3.1.1 The Waikanae River Catchment

The Waikanae River flows from the western foothills of the Tararua Ranges, some 50 km north of Wellington City. It is approximately 25 km long. The upper catchment to the water treatment plant covers 125 km^2, with 60% covered in old-growth forest and regenerating native bush and the remaining 40% in pasture. The main tributaries are the Ngatiawa and Rangiora Rivers, and the Reikorangi and Maungakotukutuku Streams. These all join the main stem of the river in the steeper, upper part of the catchment.

Downstream of the Water Treatment Plant weir, the river meanders for approximately 7 km across a low gradient alluvial floodplain to an Estuary lying between the coastal settlements of Waikanae Beach (to the north) and Paraparaumu Beach (to the south). Tidal influence affects the Waikanae River as far upstream as XS 120 (approximately).

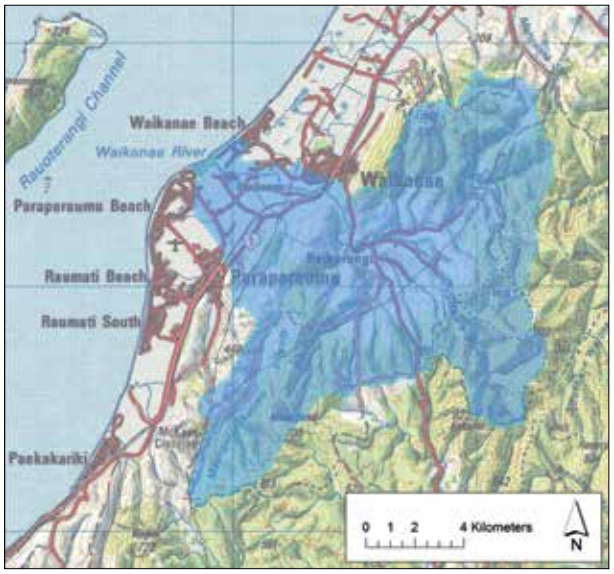

Figure 3: The Waikanae River catchment

3.1.2 Change Over Time

At the end of the 19th century, the Waikanae River branched into two separate channels just downstream of the current SH 1 Bridge. The more northerly channel meandered across the floodplain and followed much of the course of the present Waimeha Stream, where it lies to the north of, and approximately parallel to Te Moana Rd. Near the intersection of Te Moana Rd and Te Rauparaha Street the channel turned southwest, flowing through the Waimeha Lagoon before joining the main stem of the Waikanae River again, near the present estuary. From here the united river flowed south through an extensive estuary and reached the sea near Kenakena (now Mazengarb Rd in the Paraparaumu Beach settlement).

Land use changes in the late 19th century associated with European settlement, including forest clearance and land drainage, led to the drying up of the upper section of the river's northern channel. This isolated the lower section of the channel, which became the separate Waimeha Stream. In the 1920s, an artificial cut was made to create a new mouth for the Waimeha Stream to allow for subdivision of the original Waikanae Beach settlement.

The Waimeha Stream is approximately 3 km long. It now drains a small local catchment on the floodplain that extends northwards to the boundary of the Pekapeka Stream catchment. The tidal influence of the stream extends upstream to the golf course.[10]

3.1.3 A 'Mountains to Sea' Ecological Corridor

The Waikanae River provides a 'mountains to sea' ecological corridor linking the Tararua Ranges to the Waikanae Estuary Scientific Reserve and the Kāpiti Marine Reserve, with Kāpiti Island Nature Reserve, a predator free sanctuary for bird life, located directly offshore (Fig 4).[10]

An ecological corridor provides opportunities for native birds, fish, plants, lizards and insects to move between habitats. This helps to increase genetic diversity amongst plant and animal populations, and provides opportunities for plants and animals to adapt to a changing climate. An ecological corridor also provides an important 'stepping stone' for species travelling between other fragmented ecological areas in the floodplain.

[9] Tonkin and Taylor Ltd, 2013.
[10] GWRC, 1999.

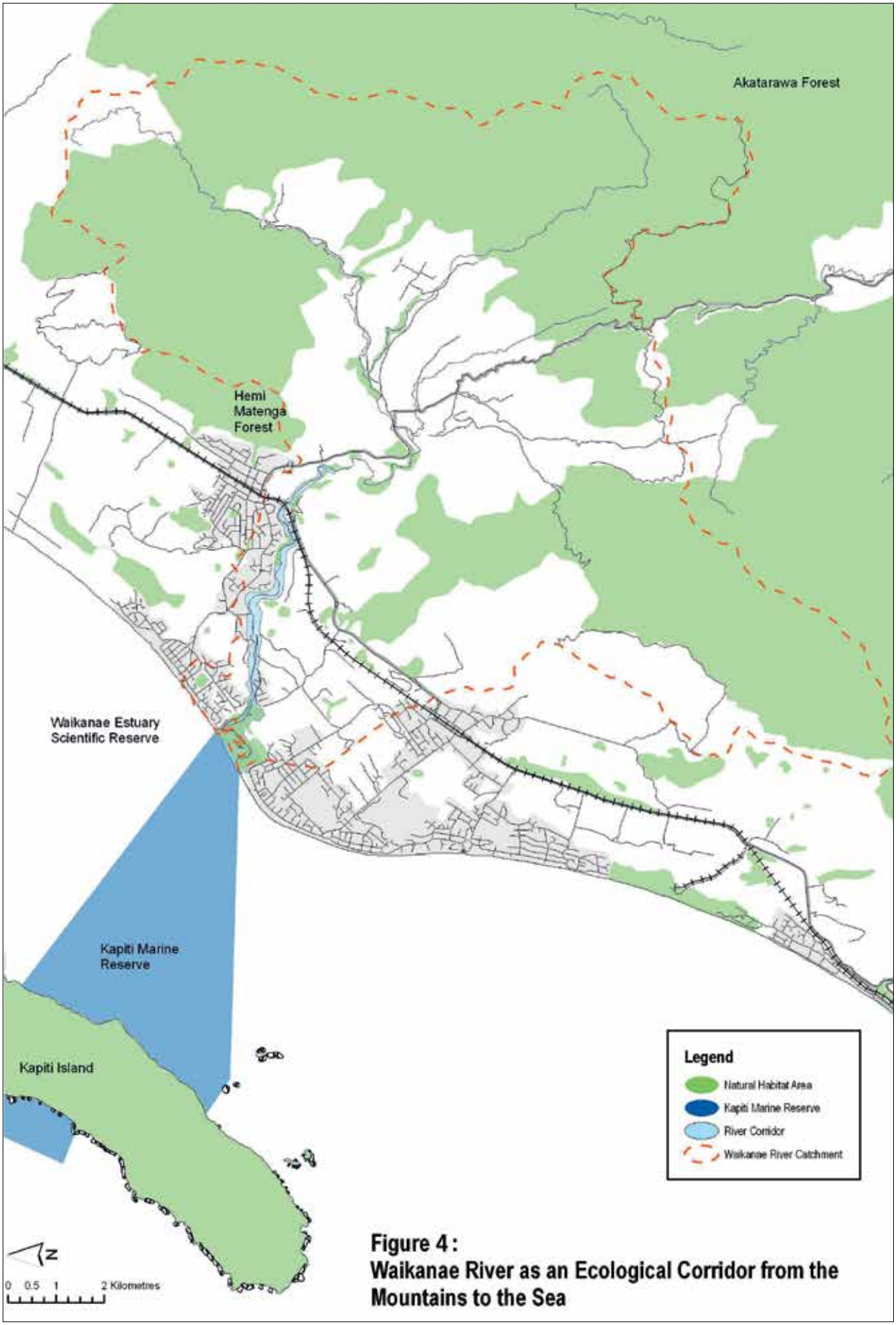

Figure 4: The Waikanae River as part of an ecological corridor from the Tararua Ranges to Kāpiti Island

3.1.4 Urban Settlements

The settlements of Waikanae and Waikanae Beach lie immediately to the north of the Waikanae River, while Otaihanga lies upstream of the mouth on the south side of the river. Residences at the northeastern end of Paraparaumu Beach lie at the western edge of the Waikanae River Estuary.

These areas are experiencing population growth, particularly Waikanae Beach, Waikanae East, and Otaihanga. The high percentage of the total population over 65 years in Waikanae and the Kāpiti Coast generally reflects their popularity as a retirement destination.[11]

3.2 Ecological Values[12]

The river environment and estuary are ecologically important, providing habitats for indigenous and sport fish species, invertebrates, and a diverse range of birds.

3.2.1 Indigenous Vegetation

European settlement began on the Waikanae floodplain in the 1880s, and with it came a process of forest clearance and swamp drainage that markedly changed the landscape and vegetation of the area.

In pre-European times the floodplain was a mosaic of wetland areas of open water, raupo swamp and flax, blending into swamp forest containing kahikatea, pukatea, and swamp maire. Such as can be seen at Nga Manu today. On the drier, more stable inland dunes, coastal forest including tawa and kohekohe could be found. Native sand-binding plants (pingao and Spinifex hirsutus) would have been present on the dunes.

The original swamp and coastal forest of the surrounding floodplain has been replaced by pasture and residential development. The vegetation of the coastal foredunes has been greatly modified by the introduction of marram grass and lupins to help stabilise the sand.

Between Reikorangi and SH 1, the river is still bordered by stands of titoki, kohekohe, tawa and rewarewa, with a few podocarps (e.g. rimu). Similar forest probably lined the banks below SH 1 although the meandering nature of the river in some parts of this area may have been more favourable to kahikatea and other species adapted to periodic inundation.

Today the riverbank vegetation contains willows planted for flood protection purposes, together with a few remnant patches of kohekohe forest and a mix of native trees that have been planted by volunteers. A variety of introduced plants, some of which have spread from adjacent farmland, can also be found along the riverbanks.

There are important surviving remnants of original vegetation associated with the Estuary and adjacent wetland areas, particularly within the Waikanae Estuary Scientific Reserve at the mouth of the Waikanae River.

Voluntary efforts to restore the indigenous vegetation of the River Corridor and the Estuary have had a transformative effect on the Waikanae River environment, particularly in the reaches below SH 1. Three key volunteer groups involved in the restoration work are the Friends of the Waikanae River (FWR), the Kāpiti Ecological Restoration and Maintenance Trust (KERMT), and the Waikanae Estuary Care Group. GWRC, KCDC and DOC have supported these efforts.

Ecological restoration

3.2.2 Lagoons, Ponds, and Wetlands

There are a number of small lagoons, ponds, and wetlands in the floodplain of the two waterways. These include:

- The Waimeha Lagoon, which lies in part of the former south-flowing course of the Waimeha Stream, is fed by drains in the Waikanae Beach settlement, and is drained by a small stream to the Waimanu Lagoon
- The Waimanu Lagoon, also in the former course of the Waimeha Stream, was developed in the 1970s by draining swampland and enlarging the watercourse. The outlet of the lagoon is controlled by a floodgate

[11] Tonkin and Taylor Ltd, 2013.
[12] This section largely adapted from Tonkin and Taylor Ltd, 2013.

- The Otaihanga Oxbow (located on the south bank immediately to the west of residences lying on the north western end of Makora Rd), created as a result of a major flood in 1927 or 1928 that caused the river to cut through a large dune
- Several small oxbows on the north bank of the Waikanae River, including the oxbow on the north bank opposite Otaihanga Domain, which is being restored by KCDC and community groups
- Weggery Lagoon, located on the north bank, opposite the Otaihanga Boating Club
- Lake Puketewhaino at the Paraparaumu end of the Waikanae Estuary Scientific Reserve
- A lagoon of shallow brackish water on the beach part of the Scientific Reserve
- Ponds within the Nga Manu Sanctuary, lying to the northeast of the Waimeha Stream, which have been artificially enlarged to create waterfowl habitat
- Totara Lagoon and associated Te Harakiki Swamp (which includes the Waikanae Sewage Treatment ponds), also lying to the northeast of Waimeha Stream.

Banded Kokopu – one of the native fish species found in the Waikanae River

3.2.3 Bird Life

The restoration work to enhance the ecological corridor, combined with a pest animal trapping programme has been beneficial for bird species. A number of native bird species are present, including kereru (wood pigeon), tui and koromako (bellbird).

The Estuary also provides valuable native bird habitat, with many native and introduced species frequenting the area. Amongst these are banded dotterel (Nationally Vulnerable[13]) and several pied stilts (At Risk –Declining) which have been recorded at the Estuary where a small area of mudflats provides suitable foraging habitat. In early 2012, three fernbirds (Bowdleria punctata) were observed in the Estuary area. This bird has a threat ranking of 'At Risk –Declining.'

Kāpiti Island Nature Reserve, an island sanctuary for native birds, is located directly offshore from the estuary.

3.2.4 Fish

The Regional Policy Statement (RPS) identifies the Waikanae River as having significant indigenous ecosystems; having high macro invertebrate community health, providing habitat for threatened indigenous fish species, providing habitat for six or more migratory indigenous species, and providing inanga spawning habitat.[14]

New Zealand Freshwater Fish Database (NZFFD) records indicate that the Waikanae River supports a diverse population of native fish (fourteen freshwater and one marine/estuarine species) as well as the introduced brown trout. Nine of the native species have a threat status of 'At Risk – Declining' due to declining numbers nationally.

3.2.5 Water Quality

GWRC's Environmental Science Department monitors water quality and ecological health at two sites on the Waikanae River. Up until August 2003, these sites were located in the upper reaches at Reikorangi Bridge and in the lower reaches at 'Oxbow Ramp'. Following a review of the Rivers SoE monitoring programme, both sites were relocated: the upper reach site was shifted to Mangaone Walkway and the lower site (which was tidally influenced and so deemed inappropriate for the programme) shifted upstream to Greenaway Road.

The change in monitoring sites in 2003 as well as changes in analytical laboratories and some testing methods since the release of the original Waikanae River Environment Plan in 1998, prevent any meaningful assessment of changes in water quality over the full time period from 1998 until now. However, water quality trend information is available for part of this period for the original Reikorangi Bridge and 'Oxbow Ramp' sites.

[15] Threat ratings are according to the NZ Threat Classification System. DOC, 2014.
[16] GWRC, 2013.

Based on the Waikanae River monitoring results over the last five or so years, water quality in the upper reaches remains in excellent condition and does not appear to have deteriorated. Water quality in the lower reaches at Greenaway Road is also considered to be very good- especially when compared with that of the lower reaches of most other rivers in the region. However, mats of potentially toxic cyanobacteria (phormidium spp) are a regular feature on the river bed at Greenaway Road during summer/autumn and often lead to the erection of health warning signs at bathing sites.

In terms of ecological health, both monitoring sites support healthy macro invertebrate communities, although the upper reaches tend to record higher health index scores than the lower reaches. Changes in physical habitat, including periphyton cover, are likely to account for some of the difference in index scores between sites.

3.3 Recreational Values

The Waikanae River is a popular recreational resource for local residents and visitors, particularly in the north bank amenity areas between the coast and SH 1 and at Otaihanga Domain. The new KCDC Recreation reserve on the south bank will in time become an open space destination of regional significance. The recreational value of the river corridor is enhanced by its proximity to residential areas and the variety of activities available. The Regional Freshwater Plan (RFP) and the Regional Policy Statement (RPS) recognise the Waikanae River for its significant amenity and recreational values. Figure 4 shows recreational assets in and near the River Corridor.

3.3.1 Cycleways, Walkways, and Bridleways (CWB)

There is a shared path approximately 2.5 m wide running either side of the Waikanae River between SH 1 and the coast. The majority of the shared path is public land, however there are places where it passes through private land such as the Equestrian Centre downstream of Jim Cooke Park and at the Waikanae Christian Holiday Park.

On the south bank, much of the shared path is also the haul road; an operational area used by Flood Protection vehicles, including heavy machinery, to access the river. Walkers, cyclists and horse riders also use this road, but private vehicles are not permitted without special agreement from the Flood Protection Department. The shared path on the northern side of the river is not used by vehicles.

There are two footbridges across the river. The newest is the Te Arawai foot bridge, approximately 2 km downstream of SH 1, and the second is a further 3 km downstream at Otaihanga Domain. The Otaihanga Suspension Bridge receives up to 1,200 crossings per day in summer and around 700 per day in winter.[15]

The north bank of the Waikanae River is part of Te Araroa, New Zealand's Trail – the 3000 km long pathway from Cape Reinga to the Bluff. The Kāpiti Coast Cycle Route between Paraparaumu and Peka Peka crosses the Waikanae River at the Otaihanga suspension bridge and continues on the true right of the river downstream to Tutere St in the Waikanae Beach settlement.

The Waikanae Estuary Scientific Reserve is linked to the Otaihanga Domain and the coast via a network of tracks, bridges and boardwalks managed by the Department of Conservation.

The Waikanae River Bridleway is approximately 8 km long and runs between Greenaway Road and the beach. Parking and access to this ride is off the end of Greenaway Road, Waikanae. The ride is generally quiet on weekdays, (except before 9 am and just after 3 pm when there is a pulse of school children cycling on the north bank, which riders should be aware of).[16]

The Waikanae River is a very popular destination on fine weekends.

The Te Arawai Bridge

[15] Tonkin and Taylor Ltd, 2013.
[16] NZ Bridleways, 2010.

3.3.2 Parks and Reserves

The following parks and reserves are located in or near the lower Waikanae River Corridor:

- Edgewater Park is accessed via Fleetwood Grove. Edgewater Park provides picnic tables, children's swings, and a toilet.
- KCDC Recreation Reserve – KCDC has purchased 60 hectares of ex turf farm land on the south bank outside of the River Corridor, to be developed into a significant recreation reserve including sports fields and passive recreationl areas. The area can be accessed by foot from the from the North bank via the Te Arawai footbridge, and from Lancelot Grove in Otaihanga by car.
- Jim Cooke Park is accessed from Nimmo Avenue West and Charnwood Grove. This is a popular community sporting facility, with toilets and changing facilities available.
- Pukekawa Reserve contains picnic facilities.
- Otaihanga Domain is accessed from Makora Road. This is a passive reserve, providing open space and family amenities including a playground and toilets. The Otaihanga Suspension Bridge provides access across the river for pedestrians and cyclists.

Whitebaiting is popular in the lower reaches

Figure 5: Parks, reserves, paths, bridleways and recreational assets in and near the Waikanae River Corridor[17]

3.3.3 Fishing

The Waikanae River supports a trout fishery which attracts anglers from the Wellington and Horowhenua Regions. The river is very accessible in the reaches downstream of SH 1. The fishing season extends from October to April, with the busiest time being pre-Christmas.

The river is also popular for whitebaiting. Whitebaiting is permitted within the Waikanae Estuary Scientific Reserve by Gazette notice, during the season from 15 August – 30 November. There is also some netting for flounder and fishing for kahawai and mullet in the lower reaches and at the river mouth.

[17] Image courtesy of KCDC.

3.3.4 In-River Recreation

The lower reaches of the Waikanae River and the Waimanu Lagoon areas provide safe and sheltered reaches for entry level and children's water-based activities: principally kayaking, tubing, canoeing, rowing, and swimming. There is limited yachting, wind-surfing, and radio-controlled boat use.

The Otaihanga Boating Club is located on Makora Rd. This building provides a community facility for meetings and functions. According to its website, the Club also holds the rights to a boat ramp located just downstream of the Boat Shed building which can accommodate small boats.

Help prevent the spread of dydimo – check, clean and dry

3.3.5 Kāpiti Equestrian and Vaulting Centre

The Waikanae Equestrian and Vaulting Centre is located on the north bank of the river at 13b Nimmo Ave West. The Centre offers a range of equestrian experiences.

3.3.6 El Rancho Holiday Camp

The Waikanae Christian Holiday Park ('El Rancho') is located beside the river at the end of Kauri Rd. Covering 70 acres (28 ha), it receives 12,000 guests annually. The main services offered include holiday accommodation, conferencing, ministry programmes and recreation. Use of the Waikanae River, particularly for kayaking, is a prominent feature of the recreation programme.

3.4 Landscape Values

The Waikanae River is an important visual link between the Tararua Ranges and the coast. It is also significant as a distinct feature that provides variation in the landscape of the coastal plain.

From a landscape perspective, there are four distinct reaches within the lower River Corridor:

- Water Treatment Plant to SH 1: This area includes the gorge and forested terrace environs immediately downstream of the water treatment plant
- SH 1 to Jim Cooke Park: The river is visually secluded, set down below terraces with remnant kohekohe forest a dominant visual feature
- Jim Cooke Park to Otaihanga: This reach passes through lower lying land where creeks, streams and backwaters are more of a natural feature and it is visually influenced by surrounding rural land
- Estuary section: The riverscape broadens into a wide Estuary where tidal conditions and an estuarine habitat are the dominant influences.

3.5 Tangata Whenua Values

3.5.1 Historical Settlement of Waikanae by Te Atiawa ki Whakarongotai

The earliest accounts of Atiawa ki Whakarongotai go back to the Kāhui Mounga collective that had spread itself from Taranaki and the Central Plateau region through to Te Upoko-o-te-Ika, or what is now the Wellington region, between the 1820s and 1840s. During this time, a number of waves of heke (migrations) occurred. After much conflict with other tribes throughout the journey to the Kāpiti district, and on arrival there, the migrants carefully began the establishment of resource rights through raupatu, or conquest.

Piopio Te Kairākau is a prominent ancestor for Atiawa ki Whakaronatoi Iwi. Of Te Tini-o-Pohokura decent, she married a descendant of the famous Toi Kairākau, named Atakore, in order to bring warfare between the tribes to an end.

Eventually Piopio Te Kairākau's people migrated further south to the Kāpiti region. The name of this ancestress was bestowed upon two pou, or pillars, that rested on each side of the Waikanae River. One of these pou, named 'Piopio', was located at what is now known as Piopio Place, near the Waikanae beachfront. The other pou, named 'Te Kairākau', was located at what is now the Camelot Subdivision in Ōtaihanga. Pou are traditional signs of occupancy.[18]

3.5.2 The naming of the Waikanae River

Preceding the Te Tini-o-Pohokura settlement was the journey of an ancestor named Haunui-a-Nanaia, who has a direct relationship with the ancestral canoes of Kurahaupō and Aotea. Haunui-a-Nanaia is well-known as the ancestor who named various tributaries and landmarks from Whanganui to Wellington including many rivers.

The naming of the Waikanae River symbolises the serene nature of this area. The term "Waikanae" has two proverbial meanings. The first:

"Ka ngahae ngā pī, ko Waikanae"

"Staring in amazement, hence Waikanae"

This proverb recalls when Haunui-a-Nanaia was crossing the river. It was during a cloudless night in which the stars and moon were prevalent in the skies. When Haunui-a-Nanaia stared into the river waters, he noticed myriads of Kanae, or Mullet, swimming in shoals. What startled him was that the eyes of the Kanae were gleaming from the reflection of the stars and moon. Haunui-a-Nanaia was 'staring in amazement'. The essence of this proverb is also personified by the following proverb:

"Ko tōku waikanaetanga tēnei"

"This is my peace and humility"

This simple proverb captured by the naming of the river symbolises Te Atiawa ki Whakarongotai's relationship to the Waikanae area.[19]

3.5.3 Mahinga Kai and Other Natural Resources

There are a range of mahinga kai areas in the Waikanae River Environment as the river has been a key source of traditional food historically, and is still an important area within which to source kai and other natural resources. Te Atiawa ki Whakarongotai are seeking to develop an Iwi Environmental Management Plan that documents all the mahinga kai sites and species of significance.[20]

3.5.4 Wāhi Tapu and Other Sites of Significance Associated With the Waikanae River Environment

There are a number of known Wāhi Tapu sites located in or near the Waikanae River Corridor, especially in the lower reaches of the river. These include urupa (grave sites) as well as historic pā sites and food cultivation areas. More detail about some of these sites can be found in the next section on historic heritage.

Te Atiawa ki Whakarongotai (TAKW) are working with KCDC to identify wahi tapu sites. For more information please contact KCDC or Te Atiawa ki Whakarongotai.

Figure 6 (below) shows the location of some known wāhi tapu sites and areas of cultural significance. More detail on some of these sites follows. This is not an extensive list, and there may be additional sites which have not yet been discovered. The GW Heritage Discovery Protocol should be followed if an archaeological site is discovered.

Figure 6: Some sites of Māori cultural significance[21]

[18] Atiawa ki Kapiti (2014).
[19] Atiawa ki Whakarongotai, date unknown.
[20] Atiawa ki Whakarongotai, 2014.

[21] Ngaia, 2011 (image courtesy of Boffa Miskell and Ben Ngaia).

3.6 Historic Heritage

Pā sites on the southern side of the river included Te Uruhi, Kenakena, Arapawaiti, Kaitoenga, Kaiwarehou and other pā. Pā sites on the northern side of the river included Waimea, Waikanae, Pikehō, and Ūpoko te Kaia.

Other sites of historical significance in or adjacent to the River Corridor include the Ferry Inn, Kāpiti's oldest building, and the Takamore Wahi Tapu Area.

3.6.1 Arapawaiti[22] Pā[23]

The Māori Land Court Minute books report that at the time of the battle of Kuititanga in 1839, Arapawaiti was a pā of the people of Ngāti Rukao. There were others also living here at this time: Te Miti, Te Hore, Te Rangihauku and Te Aunga, Te Kurukanga, Rangitauhuku, Rangiwhakaruru.

Arapawaiti was a significant area on the southern side of the Waikanae River Mouth. A rich estuary with tidal influence would have been a major attraction for those living in this area.

Many people are recorded in the Māori Land Court Minute Books stating that Arapawaiti was at one time a cultivation site of Tuhata and those of Kaitangata and Ngāti Rahiri.

3.6.2 Arapawaiti (Ferry Inn)

Close to the south bank of the Waikanae Estuary, near Arapawaiti Pā, is the oldest surviving building in the Kāpiti region. Known as the Ferry Inn, as well as Arapawaiti, the house was built by Tom Wilson in 1848. It was his base as keeper of the river crossing and provided food and accommodation to travelers on the beach highway.

Although much altered, Arapawaiti is historically very significant, and is a Category 2 Historic Place (register number 4967). Its earliest history as a ferry inn makes it very rare. Few other buildings of this type survive to this day.[24] [25]

3.6.3 Arapawaiti Cemetery Reserve

This site has recently been called the Arapawaiti Cemetery Reserve. Local history states that it was an urupā for 'Māori leaders'[26]. The Arapawaiti Urupa (cemetery) is the family urupa of the descendants of Thomas Wilson.[27]

3.6.4 Kaitoenga Pā[28]

Kaitoenga was one of a number of Ati Awa settlements adjacent to, and on the southern side of the Waikanae River. It is said to have been located slightly inland from Arapawaiti Pā.

Native Land Court evidence was provided by Tamihana Te Karu explaining that his parents cultivated in the area of Kaitoenga. And, according to Mere Pomare the Otaraua chief Eruini Te Tupe established a fortified Pā at Kaitoenga.

3.6.5 Kaiwarehou Pā[29]

Kaiwarehou sits on the southern bank of the Waikanae River, east of the current Otaihanga settlement. This site is on the southern side of the river nearly opposite to the current-day Pukekawa Reserve. It is on the western side to where the Mangakotukutuku Stream enters the Waikanae River.

3.6.6 Ngahuruhuru and Waimeha Pā[30]

In October 1839, a significant battle known as Te Kuititanga, was fought between Ngati Raukawa and Te Ati Awa. It was centred on the Waimea Pa site, located within the large cultivation ground known as Ngahuruhuru. The bodies of those killed in battle were buried where they fell and scattered throughout the Ngahuruhuru cultivation grounds. The site was subsequently considered wahi tapu and only used for burials.[31]

3.6.7 Takamore Wahi Tapu Area

The Takamore Wahi Tapu area is one of the most important cultural sites on the Kāpiti Coast. Many significant events and people are associated with the site, including the association with the deity Rongomai; the murder and burial of the Te Ati Awa cheiftainess, Pohe; the multiple burials of koiwi tangata; and the 1839 battle of Te Kuititanga.[32] Takamore is a registered Wahi Tapu area (register number 7263).

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[22] Many variations in spelling exist: Arapauaiti, Arapaoiti, Arapaoaiti. A point on the north western end of Kapiti Island has the same name.
[23] Adapted from Te Ati Awa ki Whakarongotai, 2014b.
[24] KCDC , no date.
[25] Heritage NZ, 1999. Arapawaiti. http://www.heritage.org.nz/the-register/details/4967.
[26] Adapted from Te Ati Awa ki Whakarongotai, 2014b.
[27] KCDC, no date.
[28] Adapted from Te Ati Awa ki Whakarongotai, 2014b.
[29] Also spelt in places as Kai-ware-hou, Kaiwharehou, Kaimanawawharehou, and other variations.
[30] Taken from Te Ati Awa ki Whakarongotai, 2014b.
[31] Heritage New Zealand, 2012.
[32] ibid.

3.7 Flood Risk Management Activities

Flood protection works have been undertaken in the Waikanae River for almost 60 years, and today the floodplain is protected by flood protection infrastructure that is valued at $4.8 M. The requirement to address the flood hazard associated with rivers is enshrined in legislation[33] with the Greater Wellington Regional Council (GWRC) assuming responsibility for this function in the Wellington Region.

The overarching vision and strategy for flood protection work in the Waikanae River is contained in the Waikanae Floodplain Management Plan (WFMP) (Wellington Regional Council, 1997). This FMP was developed through consultation and agreement with the local communities. This document establishes the level of protection from flooding that has been determined necessary by the community and outlines the measures by which it will be achieved.

These measures include capital works such as construction of stopbanks, operational works within the river, and other off-river works (such as moving people and infrastructure away from the flood risk). In turn, these requirements are reflected and developed further in the Regional Council's Long Term Plan, Asset Management Plans, and annual work programmes. The operations and maintenance works undertaken by GWRC are required to respond to the challenges of a dynamic river system. These include repairing damage caused by periodic flood events, and managing the continuous transport of gravel through the river system and the deposition and build-up of gravel in the lower reaches.

For more information about flood risk management activities associated with the Waikanae River, refer to the Waikanae River Floodplain Management Plan[34].

3.8 Infrastructure and Services[35]

In addition to the flood protection works already described above, infrastructure and services within the River Corridor include:

- The Waikanae Water Treatment Plant, located on the true right bank of the Waikanae River approximately 1200 m upstream of the SH 1 Bridge, and accessed via Reikorangi Rd
- The North Island Main Trunk railway bridge, approximately 50 m long
- The SH 1 bridge, approximately 30 m downstream of the rail bridge, which is two lanes wide and approximately 70 m long
- The Dricon concrete plant and Gold Coast Removals Ltd house storage site, on the south bank immediately west of the SH 1 bridge
- Two sets of Transpower high voltage transmission lines cross the river between Nimmo Avenue East and Nimmo Avenue West. The distance to the river of the closest pylon is approximately 35 m (on the north bank)
- The Te Arawai footbridge upstream of Jim Cooke Memorial Park, which was constructed in 2009
- The Otaihanga footbridge over the river, providing access between Otaihanga Domain and the Oxbow on the northern bank.
- Underground services at:
  - XS 070 – power, sewer and telecommunications
  - XS 110 to XS 120 – telecommunications
  - XS 155 gas & telecommunications.
- The new MacKays to Peka Peka Expressway, involving a new 4 lane, 16 km long motorway extending from just south of Poplar Ave, Raumati to just north of Peka Peka Rd will cross the Waikanae River east of Otaihanga Road.

[33] GWRC has statutory responsibility for the minimising and preventing of flood and erosion damage under the Soil Conservation and Rivers Control Act 1941 (sections 10 and 126), and avoidance or mitigation of natural hazards under section 30 of the Resource Management Act1991 (RMA). By definition, 'natural hazards' include flooding.

[34] GWRC, 1997.

[35] Adapted from Tonkin and Taylor, 2013.

4. Issues

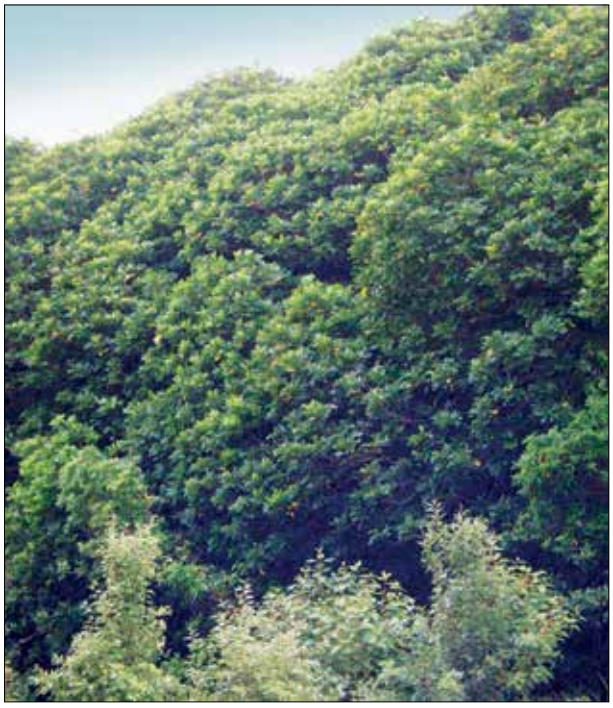
This section identifies key issues that should be considered in the management of the Waikanae River environment.

4.1 Fragmentation and loss of Remnant Vegetation and Habitats

Before human intervention, the Waikanae River floodplain had a much greater diversity of habitats than it does today. The river system included extensive areas of swamp forest and wetlands, and on higher ground, other types of dry land habitats occurred.

Only a few remnants of these habitats now remain and most of these, by virtue of their rarity, have important conservation value. Most of the remnants are small and isolated from other natural habitats, which reduces the diversity of species and long-term viability of the habitat overall.

All remaining areas of indigenous vegetation are valuable to the ecology of the area because they provide seed sources for native plants, habitat for native animals and form 'stepping stones' or islands of natural habitat in a modified landscape.[36] They also help enhance the variety and quality of the rural and urban landscapes in the area. Consequently, efforts to protect these areas are vital.[37]



Kohekohe Forest Remnant in the River Corridor

[36] Boffa Miskell Ltd, 1992.
[37] Park, 1999.

4.2 Fish Habitat

The Waikanae River has been identified as having a number of significant [freshwater] ecosystems, as demonstrated by the following criteria:

- A catchment with a high percentage of indigenous vegetation cover
- Having habitat for threatened indigenous fish species in the catchment
- Having habitat for six or more indigenous fish species in the catchment
- Containing Inanga spawning habitat (estuarine environment only).

Nine of the native freshwater fish species found in the Waikanae River have a threat status of 'At Risk – Declining.'[38]

Habitat for both trout and indigenous fish species needs to be provided for within the catchment. This means maintaining fish passage, riparian vegetation, spawning habitat and habitat variation (eg, pools and ripples for both native and indigenous species; wetlands, backwaters for indigenous species, and undercut banks for trout).

The lower reaches of the river provide important habitat for inanga (whitebait) spawning.

The removal and modification of riparian vegetation and modification of stream alignments have affected the ecological quality of tributaries such as the Waimanu, Muaupoko and Mazengarb Streams. The Mazengarb Stream has also been affected by water pollution.

4.3 Loss of Riparian Vegetation

Riparian vegetation is important for the following reasons:

- It slows the rate of run-off and therefore water entering rivers and streams, thus helping to spread peak load flows
- It contributes to the quality of the water, by trapping silt and other contaminants
- It provides a corridor of vegetation which birds and insects can use to move between
- It provides cover and food for water invertebrates and shelter, food and nesting for other animals including birds.[39]

Community groups, Councils and DOC are all involved in various projects restoring riparian vegetation in the Waikanae River Corridor.

[38] GWRC 2013.
[39] Boffa Miskell Ltd, 1992.

Controlling weeds such as tradescantia allows natural regeneration to occur

4.4 Weeds

Ecological weeds are significant threats to the indigenous native vegetation in the ecological corridor of the Waikanae River. There are more than 60 species of identified ecological weeds, many are internationally recognised as weeds of severe impact. In addition, for many of these species their distribution is widespread and abundant and they are having a marked effect on mature and regenerating native forest.

Weeds can be divided into three categories according to their habit and impact on native flora:[46]

- *Climbers/ ramblers* such as banana passionfruit and blackberry can smother and suffocate native vegetation eventually killing it as well as pose a threat to restoration efforts. The most abundant exotic climber species present in the River Corridor are convolvulus, blackberry, and German ivy. Other species present of high impact include banana passion fruit, blue morning glory, cape ivy, everlasting pea, and Japanese honeysuckle
- *Groundcovers* such as tradescantia can carpet the forest floor and prevent native seedling establishment and thus recruitment of canopy species into the understorey. The most abundant exotic groundcover weed species on the Waikanae River are montbretia, tradescantia and nasturtium. Other species present include agapanthus, artillery plant, arum lily, and pampas grass
- *Woody weeds* are tree and shrub species that can push into native bush or open habitats. They have the ability to shoulder in and displace native species. Some of the worst weedy tree species are brush wattle, sycamore, poplar, buddleija, and brush cherry. There are also several non-local native species that such as karaka, puriri, karo, northern lacebark, and pseudopanax hybrids, that can displace locally native species and thus negatively affect the restoration work that is taking place in the River Corridor.

Willows are the most abundant exotic tree species found in the River Corridor. However, these are planted intentionally by Greater Wellington Regional Council's Flood Protection Department in order to prevent erosion of the riverbank edges.

[40] Warr, 2002a.
[41] Milne and Perrie, 2005.
[42] Warr, 2002a.; Milne and Perrie, 2005.
[43] GWRC 2012/2013.
[44] Note that the lower quality rating in the upper reaches is due to naturally occurring factors.
[45] Perrie and Cockeram, 2010; Perrie, 2009; Perrie, 2007.
[46] Urlich, 2014.

4.5 Pest Animals

Pest animals have a huge detrimental impact on the ecological integrity of the Waikanae River Corridor. Possums destroy native forest through browsing and have an impact on the fledging success of native bird species. Cats, rodents, and mustelids (stoats, ferrets and weasels) prey on native bird species, native invertebrates, and lizards. Hedgehogs have a strong impact on native invertebrates. Hares and rabbits can eliminate palatable plant species within forests, and they undermine young native plantings in restorative plantings.

In 2012 GWRC, in partnership with KCDC and Transpower 'Greenlines Initiative," set up a possum and predator network along the River Corridor from SH 1 overbridge to the estuary. This network consists of possum bait stations and predator traps. The local community has taken on the maintenance of these baiting and trapping lines and these efforts should have a big positive impact on native flora and fauna in the corridor. Rabbit control is also carried out by both GWRC and KCDC.

4.6 Climate Change

In the medium to long term, climate change effects have the potential to increase both the frequency and magnitude of natural hazard events that already occur in the area.

Increased intensity of rainfall events will put pressure on stormwater systems and flood risk management works. Higher rainfall may also result in higher rates of sedimentation at river mouths and in estuaries, increasing the flood risk in those areas by raising the base level of the riverbed.[47] Increased sedimentation will also affect the ecology of those areas.

A major consequence of climate change is sea level rise. In estuary environments, as sea level rises it increases the volume and peak velocity of water flowing in and out of the estuary on each tidal cycle. This can lead to erosion, sediment deposition and shoreline changes in response to the increased flows and flow rates. It can also push up water table levels, impeding drainage of surface and storm water, leading to increasing incidences of flooding in low lying areas. This effect will be magnified during storm events when high river levels and storm tides cause floodwaters to back upstream. In the long term, these effects could lead to permanent inundation in some areas.[48]

Climate change will have impacts on the distribution of species. The establishment of a mountains to sea ecological corridor provides opportunities for species to naturally adapt by migrating to more suitable habitat as sea levels and temperatures increase.

Climate change is also expected to have impacts on weed and pest animal species, which need to be better understood in the context of the restoration of the Waikanae River Corridor.

[47] Ministry for the Environment, 2010.
[48] Dawe, 2014.

4.7 Access and Recreation

At present, walking and cycling access to the river is generally good on the north side with many linkages into nearby streets. However, on the south bank walkways and cycleways access is limited, necessitating return by the same route or a commitment to walk nearly the entire length of the river on both sides if a circular route is desired. The Te Arawai footbridge at JCP has been provided to enhance access.

On the south bank, the haul road is used by walkers, runners, horse riders, cyclists and Flood Protection Department vehicles. This situation creates a potential for conflict between the different users.

Vegetation should be planted back from the shared path and kept trimmed back so that horse riders and cyclists have clear vision ahead. Where vegetation on both sides of the track is dense, regular bays should be provided for horse riders to move off the track and let pedestrians and cyclists through.

There are a number of fording points suitable for horses as shown in figure 5.

Dense willow plantings can restrict access to the river. Swimming holes naturally occur on the outside of river bends where the bank is vulnerable to scouring. As a result, GWRC often ends up filling in existing swimming holes as part of its flood risk management works. There are however, opportunities to create new swimming holes on the downstream side of rock groynes put in place for flood risk management purposes.

Illegal motorbike access is an ongoing problem.

There is an identified need for more toilets and seating along the River Corridor.

4.8 Managing Adverse Effects of Flood Risk Management Activities

Some river management activities can have adverse effects on the environment or other values. As the River Corridor has been restored and public access has been enhanced, it has become a much more popular place for recreation and leisure. As a result, expectations of the community regarding the way that flood risk management activities are carried out is changing, with GWRC staff noting increasing community interest in the use of flood risk management methods that limit adverse ecological, recreational, visual, and cultural effects.

However, it is important to remember that the river remains a significant hazard and there are situations where the need to protect the community from flooding will outweigh the need to protect or enhance environmental values. The Resource Management Act (1991) and associated planning documents provide the high-level framework for managing effects associated with flood protection activities.

4.8.1 The Code of Practice (COP)

GWRC Flood protection produces a Code of Practice (COP), for routine operations and maintenance works. This document outlines agreed methods for limiting the adverse effects of flood risk management activities. Together, the COP, resource consent conditions and this Strategy provide an environmental framework for GWRC's flood risk management activities.

Flood risk management techniques evolve over time and a common theme in this evolution is a greater use of techniques that preserve and at times enhance the river's values. GWRC is currently updating the Code of Practice. The new Code of Practice will be region-wide and will inform all flood risk management activities. Note that this Strategy does not attempt to comprehensively address the effects of the flood risk management activities, as these are addressed in the Code of Practice.

4.8.2 Research and Monitoring

GWRC also proposes a programme of research and monitoring of the environmental effects of flood protection activities (such as gravel extraction) in the rivers it manages. The outcomes of this monitoring will be subject to evaluation and review which in turn will lead to adjustments to the Code of Practice, through an agreed process that includes consultation with tangata whenua and the community.

The management of the effects of flood protection activities is governed by the Code of Practice and resource consent conditions

4.9 Co-ordinating Flood Risk Management and Restoration in the River Corridor

GRWC's Flood Protection department need to be able to carry out work in and around the river in order to maintain the level of flood protection for the Waikanae and Otaihanga communities agreed in the WFMP. There are also important flood protection assets such as stopbanks, river corridor flow paths[49] and survey sightlines which should be kept clear of trees. Therefore it is important to plan restoration and environmental enhancement work in the river corridor in consultation with GWRC's Flood Protection Department. This helps ensure that environmental enhancement activities do not undermine flood risk management assets.

Although there has not been a major flood event for some time, it is important that flood protection assets are maintained, so when a flood does occur the system designed to protect the community works effectively. It is also important to recognise that there will be instances where protecting the community from flood risk will outweigh the enhancement of other values at particular locations.

Appendix 1 contains more information about co-ordinating flood risk management and restoration work in the River Corridor.

[49] See Appendix 1.

PART B:
A Framework for Protecting and Improving the River Environment

This section includes the Vision and Objectives for the Waikanae River environment and general methods for achieving that vision. This section is applicable to the Waikanae River, the River Corridor, and in some instances, the wider catchment.

5. Vision and Objectives

5.1 Vision

The agreed vision that this Strategy sets out for the Waikanae River environment is:

To restore and maintain the ecological integrity of the Waikanae River environment while providing for its sustainable use and enjoyment by the community.

5.2 Objectives

5.2.1 Maintain the Waikanae River Corridor as a greenbelt and a 'mountains to sea' ecological corridor.

The Waikanae River Corridor is one of several greenbelts or 'green corridors' in the Kāpiti district. A greenbelt is an area of undeveloped land that is set aside near an urban area to provide open space and passive recreational opportunities, amongst other goals. Greenbelts may also protect significant native ecosystems. The maintenance and enhancement of the Waikanae River as a greenbelt was a key objective of the 1999 Strategy, and continues to be a key objective of this strategy.

The 1999 Strategy also discussed the Waikanae River as part of an ecological corridor. This is also reflected in KCDC's Open Space Strategy.[50]

An ecological corridor connects significant ecological areas together. The Waikanae River can be understood as an important ecological corridor as it provides a linkage between the Tararua Ranges and the Waikanae Estuary Scientific Reserve, which is connected to the Kāpiti Marine Reserve and the Kāpiti Island Nature Reserve (see Figure 4).

Managing the Waikanae River as a whole ecosystem that is connected with other ecosystems within the catchment is an important component of the ecological corridor concept. This was highlighted by tangata whenua in response to the 1999 Strategy.

As a central ecological corridor, the Waikanae River can provide a basis for developing a network of connected habitats over the wider catchment in the longer term. This would improve the ecology of the floodplain and river, providing the conditions for more native plant and animal species to enter.

The Waikanae River as a 'mountains to sea' ecological corridor and greenbelt

5.2.2 Encourage Informal, Passive, and Unstructured Recreational Opportunities

The Waikanae River and River Corridor is highly valued as a recreation resource. It provides the community with the opportunity to undertake a range of recreational activities in a natural setting.

An objective of this Strategy is to continue to provide for and enhance recreational use, and in particular, to promote passive and unstructured activities such as picnicking, swimming, walking, fishing, horse riding, and cycling within the River Corridor.

Where possible the separation of pedestrians from cyclists, vehicles, and horses is encouraged.

5.2.3 Recognise and Provide for Kaitiakitanga and Tangata Whenua Values and Objectives[51]

Te Atiawa ki Whakarongotai sees the river from its origins in the tears of Ranginui and in the formation of streams in the Tararua Mountains. Management of the river should include consideration of the wider catchment, including the river's natural floodplain, its sister tributary, the Waimeha, as well as its flow into the Tasman Sea (Te Tai o Rehua).

As well as being connected to the wider environment, the Waikanae River has complex and ancient associations with tipuna of its many occupying hapu. The health and wellbeing of the river is seen as being connected to the health and wellbeing of the people of Te Atiawa ki Whakarongotai.

[50] KCDC 2012.
[51] This section provided by Te Atiawa ki Whakarongotai.

The status of Te Atiawa ki Whakarongotai as mana whenua of the Waikanae River Catchment gives them the rights and responsibilities to practice kaitiakitanga over the River environment and corridor. Kaitiakitanga is the practice of guardianship in accordance with tikanga Māori. Kaitiakitanga seeks to integrate the management of the ecological health of the river system with the social, cultural, and economic outcomes of the community.

The following is a list of key values which the practice of kaitiakitanga seeks to uphold and how they are relevant to the Waikanae River environment. This should not be considered an exhaustive list but instead should provide guidance as to what outcomes may be important from a kaitiaki perspective.

Mauri: Life, health, vitality, and energy. This pertains to both the whole river system and all that which exists within it including inanimate objects such as soil and rock. This can be measured by a variety of variables including biodiversity, water quality, forest composition etc.

Māramatanga: Knowledge, analysis, creativity. This can be measured by the degree of protection and respect for knowledge and intellectual property connected to the river system, and the generation of new knowledge and research that enables the community to better protect and improve the river system.

Mana: Autonomy, security, self-determination. This can be measured by the degree to which tangata whenua have access to decision-making on the river system and the degree to which local people can gain sustenance and social cohesion through a relationship with the river system.

Wairua: Spiritual well-being, peace, reverence. This can be measured by the protection offered both to the waahi tapu within the river system and to the natural character of the River Corridor.

Whakapapa: The natural connections and genealogy. This can be measured by the degree to which ecological and ethnobiological relationships that exist within the river system are protected and enhanced.

5.2.4 Maintain a Natural and Varied Landscape

The Waikanae River is an important visual link between the Tararua ranges and the coast. It is also significant as a distinct feature that provides variation in the landscape of the coastal plain.

The Strategy is primarily concerned with the river landscape on the coastal plain where development pressure is greatest. The landscape qualities that are sought for this area are:

- A large proportion of indigenous vegetation, habitats and landforms
- Sufficient vegetation to enhance the river as an unbroken natural feature
- Variation, with a mix of enclosed bush, open spaces and visual links with the surrounding rural landscape
- Minimal structural development.

The community values the rural character of the Waikanae River, they do not want the River Corridor to become highly developed parkland. Therefore, parts of the River Corridor walkway should be maintained to a more natural standard, consistent with the informal character of the River Corridor.

Waikanae River

6. Methods for Improving the River Environment

This section details a number of actions that can be taken to improve and manage the river environment in line with the vision and objectives of this strategy.

6.1 Community Involvement

Community involvement in the management of the Waikanae River is crucial for long-term environmental protection and enhancement. Methods to enable this involvement are:

- Councils and DOC to engage regularly with community groups working in the River Corridor and Estuary
- GWRC to organise an annual walkover of the River Corridor to provide community groups, tangata whenua and the wider public an opportunity to inspect and discuss flood protection activities and other relevant matters.

6.1.1 Friends of the Waikanae River

To ensure continued community involvement in the implementation of the Waikanae Floodplain management Plan, GWRC established a community group called Friends of the Waikanae River (FWR)[52]. The vision of the FWR is that the Waikanae River and its environment is enhanced and maintained in optimum condition for all to enjoy. To this end the FWR undertake restoration work, including operating a community nursery to produce eco-sourced native seedlings which are planted in the River Corridor.

FWR is an advisory group. It has a Memorandum of Understanding with GWRC and a Terms of Reference, which outlines the relationship with GWRC and functions of the group. FWR acts as a channel of communication between the community and the statutory bodies responsible for managing the river. GWRC Flood Protection staff assist with the co-ordination of the group and meetings are held on an agreed basis.

The group is reviewed every three years. The review looks at how things are working and ways that GWRC can best support the efforts of the group.

Friends of the Waikanae River Native Plant Nursery

6.1.2 Te Atiawa ki Whakarongotai

Te Atiawa ki Whakarongotai are the iwi that hold mana wheuna status over the Waikanae River. Subsequently they have a kaitiaki role in relation to the Waikanae River. Te Atiawa ki Whakarongotai are represented by Te Atiawa ki Whakarongotai Charitable Trust.

The Greater Wellington Regional Council and KCDC have established processes and principles for working with tangata whenua, and these should guide tangata whenua the implementation of this Strategy in regards to engagement with Te Atiawa ki Whakarongotai.

Greater Wellington Regional Council and the iwi of the Wellington region, including Te Atiawa ki Whakarongotai, have a Memorandum of Partnership (MOP). The MOP establishes a structural and operational relationship between the Council and tangata whenua. This relationship is in the context of the Treaty of Waitangi, Te Tiriti o Waitangi, and the legislation which gives functions, duties, and powers to Greater Wellington, including the Resource Management Act. The MOP is built on and replaces the Charter of Understanding.

Te Atiawa ki Whakarongotai have made a number of specific recommendations relating to enhancing their participation in the management of the Waikanae River, these are contained in section 1.6.

[52] GWRC, 2013.

Te Atiawa ki Whakarongotai planting day

6.1.3 Annual Walkover of the River Corridor

GWRC holds an annual 'walkover' of the River Corridor with KCDC, FWR, DOC, interested members of the community and tangata whenua. The walkover is required as part of the consent for operations on the Waikanae River and ensures everyone is informed about any proposed works. It also provides the opportunity to identify and discuss issues regarding restoration work on the River Corridor.

Key Recommendations – Community Involvement

Recommended Action	Parties Involved
Continue to work with the FWR as set out in the Memorandum of Understanding (MOU) and Terms of Reference (TOR) between the FWR and GWRC.	GWRC FWR
Hold an annual walkover of the river with the FWR, the community and tangata whenua to discuss flood protection and environmental enhancement works.	GWRC FWR Tangata whenua
Engage with Te Atiawa ki Whakarongotai in a way that recognises their role as kaitiaki for the Waikanae River.	GWRC KCDC Tangata whenua
Engage with Te Atiawa ki Whakarongotai to identify means of implementing the recommended actions contained in Section 1.6.	GWRC KCDC Tangata whenua

6.2 Maintaining Land Uses Which Provide For A Greenbelt and 'Mountains to Sea' Ecological Corridor

Since the 1999 Strategy was published, the Councils have implemented a number of methods outlined in the Strategy to maintain land uses providing for a greenbelt. These include:

- Land use covenants
- District plan provisions such as rural zoning
- Public land ownership
- Land Information Memorandums (LIMS).

6.2.1 Avoiding Development in the River Corridor

In 1999, the Strategy stated that the greenbelt concept did not exclude development in the River Corridor, provided this development was discrete and of low density. Ten years on, the thinking in terms of what is appropriate development in the River Corridor has progressed, and development in the River Corridor is now discouraged.

Key Recommendations: Maintaining Land Uses Which Provide For A Greenbelt And 'Mountains To Sea' Ecological Corridor

Recommended Action	Parties Involved
Where habitats remain in private ownership, encourage landowners to commit to long-term protection by way of a land use covenant.	KCDC GWRC
Support landowners who have entered into covenants with Council with rates remission for areas that are legally protected.	KCDC
Provide for future habitat restoration by acquiring strategically located land – for the purpose of establishing wildlife corridors to connect remnant habitats with other natural habitats. These areas are in the River Corridor.	KCDC GWRC
Continue to identify sites of ecological significance on GIS District Plan features layer and on LIMS for properties within and adjacent to the Waikanae River.	KCDC
Use LIMS to reference the Strategy for properties within the River Corridor.	KCDC

6.3 Protecting and Restoring Indigenous Vegetation and Habitat

Within the River Corridor there are a number of sites where ecological restoration is taking place. This restoration work supports the objective of enhancing the Waikanae River as a greenbelt and 'a mountains to sea' ecological corridor.

Appendix 1 provides general guidance on restoration in the Waikanae River Corridor, and Appendix 2 provides guidance on selecting appropriate plant species for restoration of the River Corridor, based on the reaches identified in Part C of this Strategy.

6.3.1 Restoration: What Are We Aiming to Restore?

The Ecological Strategy[53] notes that "the essential meaning of restoration is a return to a previous condition." However it also highlights the fact that it is unrealistic to attempt to re-establish the precise natural environment of the Waikanae River that existed prior to human habitation. The Strategy notes that ecological good practice for the restoration of the Waikanae River must recognise:

- "The indigenous values that have prevailed in the ecosystem's historical ecology and thus continue to shape any consideration of its intrinsic values, notably its ecological integrity
- That as a River Corridor whose biota has been substantially re-constituted by exotic species, it now functions differently than it did when it was predominantly an indigenous ecosystem, notably its ecological processes of seed dispersal, competition, etc
- The various ecological realities that will continue because the River Corridor ecosystem is part of a cultural landscape."

In this way, the Strategy recognises that while restoration efforts should aim to restore and enhance natural ecosystems that have been lost or damaged by human activity, rather than create new ecosystems, these efforts must also take into account a range of present day factors. These include the presence of non-indigenous species in the catchment, and the use of the River Corridor for recreational purposes and flood risk management activities. However the overarching goal of restoration should still be to restore the "indigenous values that have prevailed in the ecosystem's historical ecology".

There are many factors to consider when planning a restoration project

6.3.2 Selecting Restoration Sites

The Ecological Strategy identifies priority areas for restoration, based primarily on locations with high ecological values. These are generally reflected in Part C of this Strategy.

In addition to the existing ecological value of a restoration site, factors which may make a site attractive from a restoration perspective include it's accessibility for planting and maintenance work, its proximity to other sites, it's cultural history, and the opportunity the site provides to enhance of the amenity values of the River Corridor.

Health and safety and the avoidance of conflicts with flood risk management activities are also important considerations when selecting a site. Appendix 1 contains guidance on avoiding conflicts with flood risk management activities when planning a restoration project.

[53] Park, 1999.

6.3.3 Eco-Sourcing

Eco-sourcing refers to the use of plants propagated from seed collected from naturally occurring populations of locally native plants (i.e. from the relevant ecological district), sourced from as close to the restoration site as possible.

The Ecological Strategy recommends that restoration planting in the River Corridor use eco-sourced plants. This is consistent with GWRC's Eco-sourcing Policy, which requires that restoration programmes carried out or supported by the Council use plants grown from eco-sourced seed. KCDC also supports the use of eco-sourced plants for restoration work within the Waikanae River Corridor.

A rationale for using eco-sourced plants for ecological restoration projects is that doing so helps to maintain the unique qualities of that particular ecosystem. This contributes to the maintenance and enhancement of biodiversity across the region.

Ecological restoration is different from amenity planting. Areas where ecological restoration is undertaken are generally those places which have been identified as having or potentially having high ecological values, and may represent unique or relatively rare ecosystems. Councils are currently undertaking and funding significant ecological restoration work in the Waikanae River Corridor because the area has important and unique ecological values, being a major river and riparian ecosystem that is part of a 'mountains to sea' ecological corridor, connecting protected areas (see Figure 4).

For more information on eco-sourcing and a list of suggested species for each reach, see appendices 1 and 2.

6.3.4 Inter-Planting Willows With Native Vegetation

Although exotic species such as willows play a part in providing flood risk management as a front-line of defence for riverbank edges, there are opportunities to trial inter-planting willows with native species in some locations. However in such circumstances it should be recognised that the native plants may be damaged by floods and by flood protection activities, such as maintenance of the willows.

Willows can also be replaced by native species if the willows are no longer required for flood protection purposes.

6.3.5 Restoring Wetlands

Wetland habitat is nationally under-represented. Natural wetlands in the floodplain, especially those close to the Waikanae River, perform a water storage function in times of flooding. Wetlands throughout the catchment have the ability to absorb and cleanse floodwaters. Therefore, wetlands play an important part in managing flood risk.

The restoration of wetlands should be undertaken in close collaboration with KCDC and/or GWRC Biodiversity staff to ensure successful outcomes.

Further information on good practice for restoration in the River Corridor can be found in Appendix 1.

6.3.6 Controlling Pests and Weeds and Other Environmental Enhancement Work

Greater Wellington Regional Council, Kāpiti Coast District Council and community groups, including the FWR and KERMT are all engaged in pest plant management to support restoration efforts taking place on the river and maintain the overall ecological values of the of the river environment.

KCDC funds the KERMT Trust to employ a contractor to work part-time restoring the river corridor. KCDC also employs two Environmental Restoration officers to provide practical help and a Biodiversity Advisor to provide technical advice to community restoration groups, including those working on the river.

GWRC's Flood Protection department provides funding to engage a contractor to oversee corrections workers for 1 day a week. This model, using free labour from corrections workers, has enabled a huge amount of high labour cost weed control work to be done for a minimal cost.

At the request of the community, GWRC's Flood Protection Department has removed a number of exotic tree weed species including macrocarapas and pines from the River Corridor.

There has been some contention regarding the removal of mature non-local native plants that were planted by volunteers as part of past efforts to beautify and enhance the river environment. Although these plants may be undesirable from an ecological restoration perspective, they are also valued by some members of the community for other reasons. Therefore, any removal of mature non- local native plants that were planted by volunteers, by either Council, should only be undertaken in consultation with the relevant volunteer group.[54]

[54] In emergency situations, GWRC Flood Protection may need to remove trees without consultation.

Preventing weed infestation in restoration areas is a particular challenge. However, experience has shown that with appropriate site preparation and follow up maintenance spraying, weeds can largely be eradicated in these areas. Although, the potential for reinfestation via birds and animals, as well as following floods, means that on-going vigilance is necessary.

Weeds can smother native trees and prevent regeneration

Garden dumping is a practice that originates from adjoining landowners and from easy vehicle access points. Garden dumpings are sources of weed invasion and actions should be taken to identify and dissuade people from this practice.

In 2012 GWRC in partnership with KCDC and Transpower 'Greenlines Initiative" set up a possum and predator network along the Waikanae River Corridor from SH 1 overbridge to the Waikanae Estuary.

Community groups working on the river also undertake weed and pest control.

6.3.7 Further Opportunities

Further opportunities to support the restoration of the Waikanae River Corridor include:

- Expanding weed control programmes
- Expanding pest animal control programmes
- Removing willows and other exotic tree species where they are being succeeded by indigenous vegetation and not needed to provide front-line riverbank defences
- Limiting the spread of invasive non-local species
- Fencing remnant habitats and riparian margins of the river and its tributaries
- Enrichment and maintenance of established restoration sites.
- Establishing new restoration sites to:
  - Enhance riparian habitat
  - Link existing habitat remnants
  - Create a buffer around existing remnants.
- Retaining open space areas where habitat could be developed in the future
- Providing advice to landowners on riparian planting
- Restoration and environmental enhancement projects
- Implementing the recommendations of the Waikanae River Ecological Strategy
- Open space and conservation covenants
- Adhering to principles of best practice restoration when undertaking Central and Local Government funded works
- Encouraging landowner and community support for restoration projects.

Pest control in the River Corridor

6.3.8 Co-Ordinating Flood Risk Management Activities and Restoration Activities in the River Corridor

As the restoration effort in the Waikanae River has stepped up over the last decade, it is important to ensure that restoration efforts are aligned with other uses land in the River Corridor, such as recreational uses and flood risk management.

The Waikanae River creates a significant flood hazard to the Waikanae and Otaihanga communities, which are located in the floodplain. The Waikanae Floodplain Management Plan (WFMP), which was prepared in 1997 in consultation with the community, sets out the agreed methods that GWRC and other parties will take to manage flood risk associated with the Waikanae River.

Floodplain management planning involves selecting a combination of flood risk management techniques which, taken together, will provide an agreed level of flood protection to the community. These methods include non-structural measures including community preparedness and planning methods to ensure that new development in the floodplain is situated away from floodable areas or is resilient to flooding. However, as there is already significant development in the floodplain, structural and river maintenance methods must also be employed to manage risk to existing development in the floodplain. Structural measures include building and upgrading stop banks and raising houses and roads. River management methods, such as bank edge protection and gravel extraction are used to keep the river within a set alignment and ensure that the river maintains its designed capacity to contain and carry away high flows.

It is important that any restoration work or development in or near the River Corridor takes into account the need for GWRC Flood Protection staff to carry out routine maintenance and repairs to flood protection assets, as well as any planned alignment or structural works identified in the WFMP.

Several River Corridor Flow Paths for have been identified within the River Corridor. GWRC Flood Protection can provide a map showing the location of River Corridor Flow Paths on request.

Overflow paths are land areas immediately adjacent to the River Corridor that would be inundated rapidly during a major flood event. Very often these overflow paths lead fast flowing water away from the River Corridor and across the floodplain.

It is important that the River Corridor Flow Paths and overflow paths are not blocked by structures or dense vegetation as this could cause floodwaters to build up and overtop stopbanks.

The River Corridor also contains a number of other features critical to flood risk management activities including survey sight lines and storage areas for gravel and rock, which need to be taken into account when planning restoration planting and other environmental enhancement activities in or near the River Corridor.

GWRC asks that anyone planning to undertake restoration work in the River Corridor (or any other form of environmental enhancement) seek advice from the Flood Protection Department on potential conflicts with flood protection activities during the planning stage of the restoration project. Appendix 1 contains more information about how to take flood risk management activities into account when planning restoration planting in or near the River Corridor.

6.3.9 Key Recommendations: Improving and Restoring Vegetation and Habitat

Recommended Action	Parties Involved
Continue to provide guidance on restoration planning and planting, controlling weeds in riparian margins, looking after urban/rural streams in the Wellington region and wetland restoration.	GWRC
Continue to provide guidelines for growing native plants in Kāpiti and environmental guidelines for rural living.	KCDC
Subject to the availability of funds, provide eco-sourced seeds to FWR as well as other community groups in Kāpiti.	KCDC
Provide technical advice and information to landowners, developers and community groups on habitat protection, enhancement and creation of wetlands, backwaters and oxbows through the KCDC Biodiversity Advisor, GWRC groups and River Ranger opportunities.	GWRC KCDC
Expand the current river hand position	GWRC
Work with volunteer groups to ensure that restoration activities are aligned with this Strategy	GWRC KCDC
Adhere to the Flood Protection Department Environmental Enhancement Policy when undertaking environmental enhancement works.	GWRC
Ensure that all restoration activities are assessed for flood protection conflicts prior to the commencement of site preparation.	GWRC
Continue to provide rates remission or direct grants from the Heritage Fund in exchange for habitat protection,[55] and identify ecological sites in the District Plan Heritage Register as a mechanism to protect ecological features.	KCDC
Continue to support weed and pest control programmes and consider expanding these programmes as funds permit.	GWRC KCDC

6.3.10 Protecting and Enhancing Fish Habitat

The Waikanae River provides valuable habitat for both indigenous and sporting fish species. It is listed in the Regional Policy Statement as having high macro invertebrate community health, as a providing habitat for threatened indigenous fish species including six or more migratory indigenous species and providing inanga spawning habitat.[56]

A number of methods are available to protect and enhance fish habitat including:

- Protection and enhancement of riparian vegetation
- Removal of barriers to fish passage
- Avoiding or mitigating the effects of in-stream works by GWRC and KCDC wherever possible
- Monitoring to observe trends and measure impacts eg, Fish and Game annual drift dives
- Maintaining and enhancing water quality.

6.3.11 Maintaining Fish Passage

The majority of native freshwater fish species need access to the sea for part of their life cycle. Structures such as culverts, floodgates and weirs can obstruct upstream fish passage, presenting a significant problem to these species, as they cannot migrate to suitable upstream habitat. In accordance with the Freshwater Fisheries Regulations (1983), DOC has a responsibility to ensure that fish passage is maintained. Within the Waikanae River catchment, DOC has surveyed in-stream structures to identify fish barriers. Ongoing surveys are likely to add further structures to this list.

A range of fish friendly design solutions are now available to mitigate the impacts of in-stream structures on fish passage. These should be applied in situations where fish passage is being obstructed. For example, the Waimanu lagoons floodgate now allows fish passage through a separate pipe containing a fish ladder. The pipe allows water from the estuary into the lagoons at the peak of high tides, and from the lagoons to the sea at all times except for when the lagoon level falls below the level of the fish passage pipe, as sometimes happens when the pond levels are lowered to kill waterweeds.

[55] Applicable where the site is identified as an ecological site in the District Plan.
[56] GRWC, 2012.

The Waimanu Lagoon floodgate now allows for fish passage

The lower reaches of the river are important habitat for whitebait spawning. Therefore, the protection and enhancement of whitebait spawning habitat should be promoted in these areas.

6.3.12 Flood Protection Works

Flood Protection activities should take into account the movements and spawning requirements of trout and native fish species. A variety of flow velocities (including the presence of pools, runs and riffles) should be maintained to improve fish and invertebrate habitat, and whitebait spawning habitat should be maintained or enhanced where possible.

Flood protection activities can be carried out in a way that preserves or enhances in-stream habitat. This may involve maintaining or restoring a variety of river flows, river edge types, backwaters and wetlands.

Wherever possible, riparian management including the restoration of bank edges should be a priority in design. Where flood risk management structures such as riprap and groynes are used, these need to provide for fish habitat by:

- Limiting the need to disturb the bed of the river with machinery
- Creating pools as a result of the current moving against the hardened surfaces
- Providing calm spots and areas for riparian planting between groynes and in rip rap
- Incorporating unmodified riparian areas and restoring these.

GWRC has particular resource consent conditions to meet minimum pool and riffle counts for trout, monitored by Fish and Game.

The Code of Practice contains more information on methods to mitigate the environmental impacts of flood protection works.

6.3.13 Maintaining and Enhancing Water Quality

Methods available for maintaining and enhancing water quality include:

- Riparian planting
- Adherence to the Code of Practice and relevant resource consent conditions to reduce sedimentation when undertaking flood risk management works
- Regional plan provisions e.g., Freshwater Plan and the Proposed Natural Resource Plan
- Support for landowner and community efforts to restore riparian margins
- Stormwater runoff treatment
- District Plan provisions
- Low Impact Urban Design and Development (LIUDD) initiatives.

River close-up

6.3.14 Key recommendations: Protecting and Fish Habitat

Recommended Action	Parties Involved
Continue to provide advice on riparian management to private landowners.	GWRC KCDC
Provide financial assistance for riparian projects through the Heritage Fund.	KCDC
Encourage the storage of stormwater where possible on site, either on individual properties or within subdivisions (for example using constructed wetlands for water storage).	KCDC
Where gravel and silt build up is occurring, consider a broad range of flood risk management options.	GWRC
Restore existing wetlands where they are located in the River Corridor and in other areas in the catchment through mechanisms such as subdivision consents.	GWRC KCDC
Where exotic species, such as willows are no longer needed for flood protection on riparian edges, replant riparian margins with appropriate native species to enhance river and ecosystem habitat.	GWRC
Continue ongoing surveys of in-stream structures in the Waikanae catchment and implement modifications where they create an obstacle to fish passage.	DOC Fish and Game NZ GWRC
Where practical identify and implement opportunities to enhance fish habitat as part of flood risk management works.	GWRC DOC Fish and Game NZ KCDC
Monitor trout numbers in the Waikanae River by undertaking an annual drift dive survey.	Fish and Game NZ
Manage the river and stream banks for whitebait spawning by planting appropriate species and not clearing the existing vegetation at spawning time (September-May).	GWRC
Where practical, identify and implement opportunities to enhance fish habitat as part of flood risk management works.	GWRC DOC Fish and Game NZ KCDC
Continue to monitor water quality and flows	GWRC

6.4 Providing for Recreation and Access

Providing for recreation and access can involve providing CWBs, improving public access to the river, the creation of swimming holes as part of river works, providing facilities such as toilets and carparks within areas adjacent to the river, and providing location and interpretation signage.

6.4.1 Cycleways Walkways and Bridleways (CWBs)

The 1999 Strategy confined cycling and horse riding to the south bank only, apart from access across the river at Greenaway Road. Since that time, there are some allowances for pedestrian and cyclist access through private property, which has been negotiated with private landowners. As parts of the river walkway pass through private land it is important that the wishes of the owners be respected to ensure continued public access. Cycling is now well accepted on the north bank. Ongoing education is required to reinforce the "share with care" message.

The development of a walkway/cycleway from Otaihanga to Mazengarb Park via the Mazengarb Stream has been a condition of subdivision consent in this area. Although polluted at present, this waterway has potential to be improved and the riparian margins re-vegetated to make an attractive public access route.

6.4.2 Access and Esplanade Strips and Esplanade Reserves

KCDC has a policy of providing public access to and along water bodies, such as the Waikanae River, through the provision of esplanade reserves, esplanade strips and access strips.[57] Opportunities occur where land adjacent to the river is subdivided, and reserves and strips can be required as a condition of consent.

[57] Kapiti Coast District Council, 1999.

Where public access is a high priority and/or subdivision is unlikely KCDC will negotiate with landowners to establish access and esplanade strips.

6.4.3 Local/Central Government Funded Works

Recreation facilities, CWBs and access and esplanade steps can be funded by central and local government works - either as distinct projects or as part of larger development, for example flood risk management works. Opportunities include:

- The introduction of separate tracks along both banks of the Waikanae River where practicable as and when other works or projects are being completed
- Improvements to the existing networks to provide higher levels of service
- Enhancing the public access network inland of SH 1 especially from the gorge into the hinterland. This requires further investigation and may not be feasible without significant investment and political will
- Creating new access corridors through the willows. Corridors of up to six metres wide are possible without compromising the integrity of flood risk management works
- Providing more toilets and enhancing the facilities at the various park areas along the river. (Note that public facilities have been confined to the areas of greatest use where there is drive-on access)
- Creating new swimming holes on the downstream side of rock groynes put in place for flood risk management purposes
- The development of locational and interpretive signage.

6.4.4 Landowner and Community Support

Public access ways across private land depend upon the co-operation of the landowners. This depends on the goodwill of the landowner and the encouragement, technical advice, labour and materials provided by local government and community groups.

6.4.5 Key Recommendations: Recreation and Access

Recommended Action	Parties Involved
Provide information and support to landowners on the appropriate location and development of access ways and recreational facilities on their land.	KCDC GWRC (within the River Corridor)
Continue to provide materials, technical guidance and supervision for community projects.	KCDC GWRC
Where possible, undertake improvements to recreational facilities and public access as part of ongoing maintenance and during the implementation of major river works.	GWRC
Continue the building and maintenance of cycleways, walkways and bridleways (CWB) in co-operation with landowners and service groups, including the continuation of the CWB on the south bank. Continue the development of recreational facilities subject to funding from the annual plan, CWB programme and reserve contributions from subdivision and development.	GWRC KCDC
Ensure that planting alongside the CWB and haul road takes into account the need to provide for the safety of walkers, cyclists and horse riders using the track.	GWRC KCDC
Consider facilitating the development of swimming holes when designing flood risk management works. Known swimming holes (such as the SH 1 and JCP sites) should be signposted, and public access and picnic areas provided for wherever appropriate.	GWRC KCDC
Investigate the suitability of an appropriate public walkway/cycleway network for upper areas of the Waikanae catchment.	KCDC GWRC
Continue to maintain cleared access ways to the river through dense willow plantings at various points.	GWRC
Develop an open space/recreational Strategy for the Waikanae River. Included in this will be the development of multi-use tracks and standards for recreational assets such as tracks, interpretation and facilities and management of illegal access by motorbikes.	KCDC

PART C: PROTECTING AND IMPROVING THE RIVER CORRIDOR

Since the 1999 Strategy was developed, there have been a number of improvements to the different reaches of the Waikanae River Corridor. This section identifies the progress made and current issues in more detail, and makes recommendations for the future management of the River Corridor.

7. Reikorangi/Water Treatment Plant Reach[58]

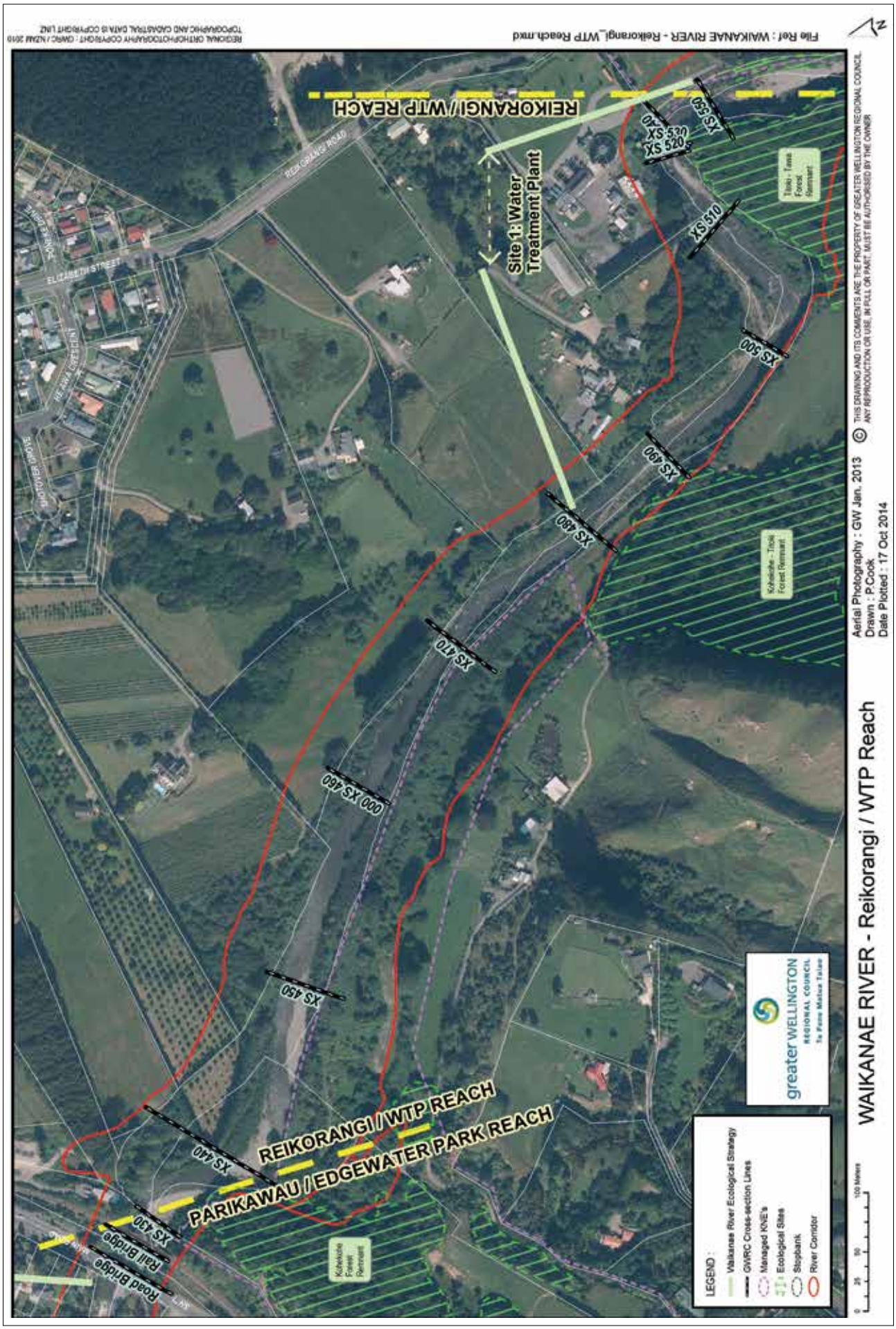


Figure 7: Reikorangi/WTP Reach

7.1 Situation

This reach extends from the Water Treatment Plant downstream to the Rail Bridge. The river is bounded on both sides by rural land, including three areas of remnant bush with high ecological value. These are identified in the District Plan's Heritage Register.[59] There are a number of high riverbanks on both sides of the river, which are prone to collapse. There is a high level of private ownership in this reach, which restricts public access.

7.2 Vegetation Management

The following description of the ecological values of this reach has been taken from the Ecological Strategy:

"This reach of the river is surrounded on both banks by two remnants of lowland alluvial floodplain forests that predate the establishment of Waikanae as a settlement. The resultant situation of a major river with primary alluvial terrace forest on both banks and in close proximity to the riparian zone is one now regionally rare in the lower North Island; certainly on the Kāpiti Coast or Greater Wellington Region.

The forest type is mainly of a well-drained alluvial terrace forest of pukatea, tawa, kohekohe and titoki with a residual element of kahikatea and matai that have survived 19th century timber extraction. Additional tree species include nikau, porokaiwhiri, kaikomako, rewarewa, ngaio, mapou, mahoe, mamaku and kawakawa. A wetter variant of the forest, tending to swamp forest occurs nearby on private land, and adjoins hill forest dominated by kohekohe, tawa, titoki and hinau.

This is the site of highest natural ecological integrity on the entire Waikanae River Corridor. It is a vital site as a wildlife corridor in terms of the linking between forest remnants that enables seed-disperser birds and insect pollinators of forest tree species to move between areas for feeding and breeding. It is this principle that best enables natural forest succession across the landscape" (p.12).

The Ecological Strategy states that the area surrounding the water treatment plant is the most viable area for the restoration of indigenous ecological values in the Waikanae River Corridor. This is because of increasing human pressure and the expansion of potential weed species in the reach itself.[60]

The Ecological Strategy also notes that there is potential for riverbank collapse in this reach and hence riparian management is needed to address any erosion.[61] As a remedial action, this will help preserve existing remnant vegetation as well as future restoration work.

Some restoration work was undertaken in this reach in the early 2000s. Some of the trees planted have survived, however weed infestation has been a problem.

KCDC and GW Biodiversity are working collaboratively with private landowners who have bush remnants on the south bank between SH 1 and the WTP, helping them control pest animals and weeds, as part of GW's Key Native Ecosystem program and as part of a KCDC program to incentivize restorative management of bush remnants.

[58] This reach was included in the 1999 Ecological strategy and has now been added to the area covered by the Environmental Strategy. The majority of the Māori names given to the reaches in this document also come from the Ecological Strategy. These reach names are for the purpose of this Strategy only. Atiawa ki Whakarongotai note that identification of mana whenua place names associated with the Waikanae River is currently an unfolding piece of work.

[59] The Ecological Areas defined on the maps in Fig 7-13 are taken from a GIS layer supplied by KCDC (KCDC 2007). That the Proposed Kāpiti Coast District Plan 2012 may identify additional ecological sites in these areas.

[60] Park, G, 1999, p. 12.

[61] Park, G, 1999.

7.3 Recommended Actions

7.3.1 Vegetation Management

	Recommended Actions	Parties Involved
River cross section (XS)	**North bank/South bank**	
440-540	Clear weed infestation that is present in this reach.	KCDC GWRC
440-540	Restoration: Create a pattern of riverbank plantings that are as close to as is possible the natural indigenous forested riverbank situation.	KCDC GWRC
440-540	Where forest remnants exist or restoration work is carried out, monitor riparian margins to ensure their stability.	GWRC KCDC
440-540	Encourage re-vegetation or restoration of native forest cover on the steeper slopes of the tributary valleys and on the riverbanks of the Reikorangi basin.[62]	GWRC KCDC
440-540	Where exotic species are not needed for riparian edges (for bank edge protection), replant riparian margins with native species to enhance river and ecosystem habitat.	GWRC
440-upwards	Continue to support landowners in restoration and weed/ pest animal control activities	KCDC GWRC

[62] Park, G, 1999.

8. Parikawau/Edgewater Park Reach

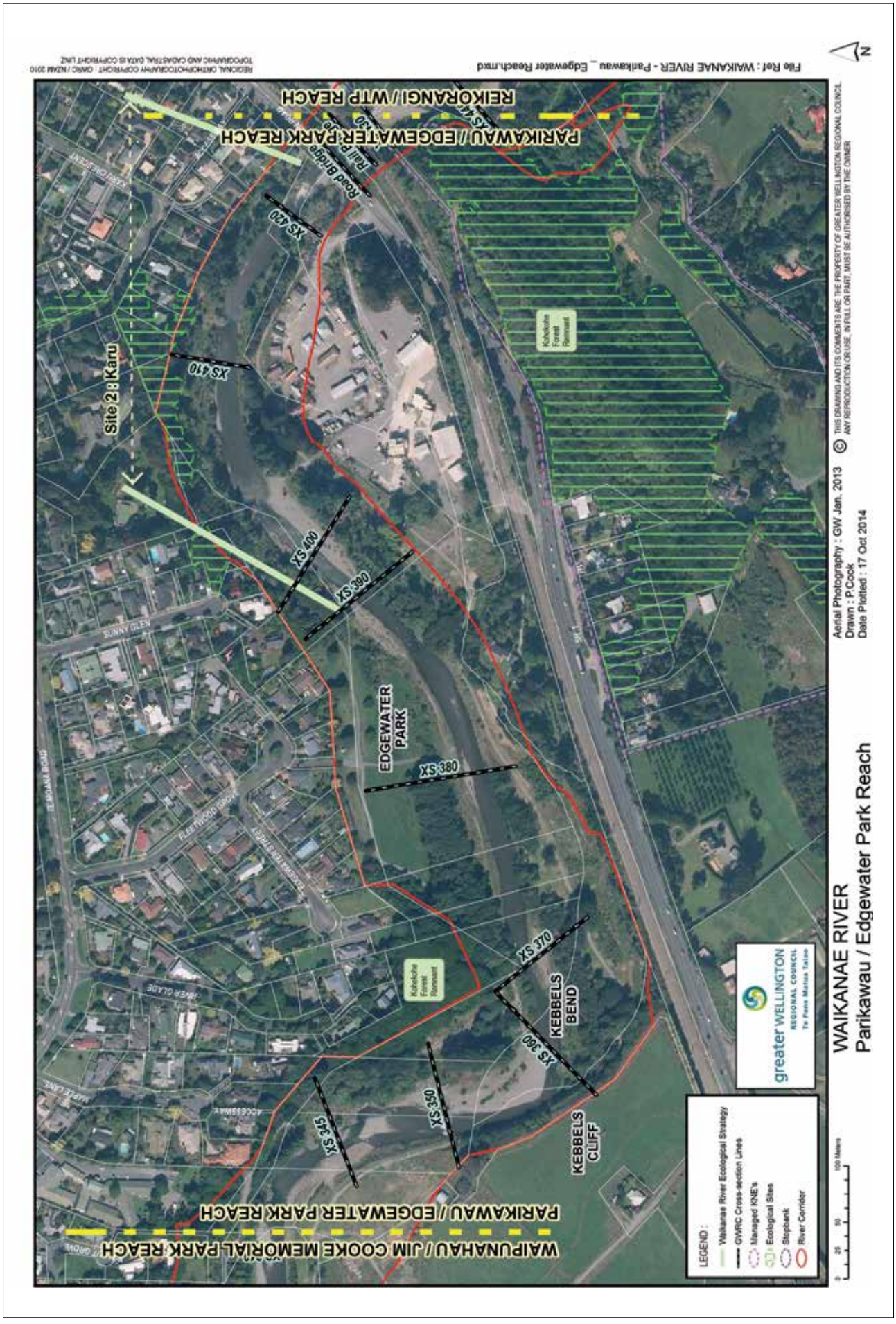


Figure 8: Parikawau/Edgewater Park Reach

8.1 Situation

This reach extends from the Rail Bridge downstream to Walnut Grove (on the northern bank).

Edgewater Park is accessed from Fleetwood Grove. It includes picnic facilities, a toilet and playground equipment. Swimming holes are found in this area of the river.

Access to the North Bank is via several access points from nearby residential areas. Access to the South Bank is via a path, GWRC's haul road and a recently created path on top of rock lining. The River Corridor is bounded on the northern side by residences.

On the south bank a concrete works (Dricon) and a house removal storage site (Gold Coast Removals Limited) occupy the area immediately below the bridge. This site is somewhat screened from the riverbed by vegetation. The area south-west of this (between Dricon and Kebbels Cliff) is being restored with funding from the Honda Tree Fund.

The Kāpiti Coast District Council has purchased approximately 60 hectares of land (the former Howarth Block and Turf Farm) which borders the River Corridor on the south bank of this reach from Kebbels Cliff and continues to approximately XS 270, opposite Jim Cooke Park. This land has been gazetted as a recreation reserve.

The Ecological Strategy identifies 'Karu' as a site within this reach[63]. It extends from Edgewater Park on the north bank to SH 1.

Native vegetation is a feature of this reach with:

- A remnant of kohekohe forest opposite Kebbel's Bend
- Patches of kohekohe and other natives mixed among exotic vegetation on the higher ground in the Corridor
- A forest remnant on the hill behind the highway.

The exposed cliff faces on the South Bank at river cross section 383 are a geological feature and relatively rare in Kāpiti. These should be preserved.

8.2 Progress

The recommended actions for this area in the 1999 Strategy were largely protection of the kohekohe remnant, weed control and restoration planting. Extending the kohekohe forest type upstream of Edgewater Park remains an important action, with some progress in this area of the River Corridor.

Both KCDC and GWRC have supported weed control and restoration in this area with the assistance of the volunteers and landowners.[64]

Walkway improvements have been made through land purchase and a new track negotiated at the bottom of Kebbel's Cliff. Major landscaping work in Edgewater Park was completed in 2008 and KCDC has been improving tracks nearby since then. It is currently a dogs on-leads area.

Interpretative signage has been provided at Edgewater Park. Land ownership on the south bank (industrial land) has also been achieved through purchase (now leased to Gold Coast Building Removals Limited and the Dricon Waikanae Premix Plant) to facilitate improved River Corridor management. Public access is now possible above the riverbank around the outside of the industrial sites.

8.2.1 North Bank

KCDC and GWRC plantings have been consistent with the methods suggested, although there is opportunity for further restoration work upstream of Edgewater Park to SH 1. This includes wetland restoration and possible heritage trails through planting.

8.2.2 South Bank

GWRC has not yet achieved the alignment of the river at Kebbel's bend. Hence the associated action regarding the introduction of local native species (to link restoration in this reach on both sides of the river) will be investigated more fully when this alignment work is complete.

Gradual phasing out of poplar trees was recommended in the 1999 Strategy and GWRC have undertaken some removals.

[63] Park, G, 1999, p. 22.
[64] Kapiti Coast District Council, 2001, Section 7.1, p. 17.

Runner at Edgewater Park.

8.3 Vegetation Management

The kohekohe forest remnants in or near this reach are of high ecological value due to their comparative rarity. Therefore, protection and enhancement of these remnants is the principal ecological objective in this area. The Ecological Strategy notes that indigenous restoration at the northern end of Edgewater Park ('Karu' site) is possible[65]. The forest remnant is important as the kohekohe provides the habitat for restoration of the understory once weeds have been controlled. Therefore, it is possible to interplant with other species appropriate for this area.

GWRC's Flood Protection department has provided funding to engage a contractor to work alongside corrections workers for one day a week. A particular focus of this work has been in the area on the South Bank, between Dricon and Kebbel's Bend, with excellent results. Thick infestations of weeds have been cleared and a number of exotic trees have been removed. Corrections have also been able to mulch plants, cut tracks, dig holes in hard ground and plant trees. This model has been extremely productive

On the south bank, there is an area of former wetland upstream of Kebbel's Bend. Restoration work has begun in his area.

Most of the river edge in this reach has been planted with willow and poplar, which creates a very regular and predictable vegetation character along the river itself and separates the river visually from its environs. To ensure bank stabilisation this type of planting will continue to be necessary on most of the river edge.

However, where willows are not necessary or only at a minimum depth, native plants can be introduced to replace willows or established as under planting.

The health of the kohekohe remnant forest downstream of Edgewater Park (river cross section 370, North Bank) is adversely affected by:

- Groundcover weed species inhibiting natural regeneration
- Vines threatening to smother trees
- Ground compaction from tracks.

8.4 Recreation and Access

There are several access points from nearby residential areas on the north bank, which are linked by a meandering path.

On the south bank, public access is available alongside the river's edge as a wilderness path. Further down, access is provided along GWRC Flood Protection's Haul Road and a newly created path on top of rock lining. This is however prone to flooding.

The haul road is an operational road used by Flood Protection vehicles. Private vehicles are not permitted, without permission from GWRC Flood Protection. There is a potential for conflicts between operational vehicles and non-motorised users of this access way (e.g. cyclists, walkers).

Public access is currently not permitted across the industrial sites.

There are swimming holes in this reach.

Swimming hole behind rock groynes

[65] Park, G, 1999.

Walkers on the haul road at Kebbell's bend

8.5 Interpretation

The significance of the kohekohe remnants in this reach justifies some on-site interpretation. They are a feature of interest and it is important to foster an understanding and appreciation of their ecological significance.

The haul road and other access tracks are regularly used by Flood Protection vehicles carrying out river maintenance work. It has been suggested that signage be installed at walkway entranceways alerting track users that Flood Protection operational activities may be taking place in the area.

8.6 Land Ownership

As noted above, public ownership of the industrial sites beside SH 1 has benefits for recreation and restoration. GWRC has purchased the industrial land that is part of the River Corridor on the south bank. As mentioned earlier, KCDC has purchased a large tract of the land bordering the River Corridor on the south bank and has gazetted it as a recreation reserve.

8.7 Flood Risk Management

The major bank edge protection works recommended by the WFMP in this reach have been implemented following the 1998 flood. No major new capital works are envisaged. Efforts will be focused on the maintenance of existing works.

8.8 Recommended Actions

8.8.1 Vegetation Management

River cross section (XS)	Recommended Actions	Parties Involved
	North bank	
390-420	Upstream of Edgewater Park: Extend the kohekohe forest through interplanting and weed control to encourage self-seeding of native species beneath the canopy. Use the Ecological Strategy as a guiding document for restoration of this area[66].	KCDC GWRC
All areas	Foster private landowner understanding of the ecological value of the local forest and potential weed problems from garden rubbish and garden escapes.	KCDC GWRC
370-380	In several places the river berm has been extended (low ground has been reclaimed behind older rock lining of the bank and willow plantings). Introduce appropriate native species into these areas and gradually confine the willow/poplar mix close to the river edge.	GWRC
All areas	Where it is necessary to use trees for the protection of river banks, investigate ways of increasing the species diversity - interplant native species, so they can regenerate naturally under managed willows.	GWRC
375-390	Retain the open character of Edgewater Park for its recreational value. Gradually remove the poplars and willows as the main tall trees and replace them with natives. Keep the planting of these to a minimum in the main park area to ensure adequate sunlight can penetrate during the winter. Ongoing weed control is needed. Properly formed tracks and/or boardwalks and fences have been constructed to define circulation routes and discourage uncontrolled exploration.	KCDC

[66] Park, G, 1999, p. 24.

All areas	Replace any exotic species not required for flood risk management purposes (front line defence) with appropriate native species. Where exotic species are not needed for riparian edges, replant riparian margins with native species to enhance river and ecosystem habitat.	GWRC
	South bank	
350-365	Following bank edge protection work at Kebbel's Bend, introduce local native species at the base of the cliff, linking upstream to the terrace vegetation and across the river to the kohekohe remnant.	GWRC
360-370	Implement wetland restoration in this area.	GWRC
380-390	Downstream of river cross section 380, continue to gradually phase out the poplar plantings and regenerate with native species, extending up the terrace edge to link up with the native vegetation on the private property and beyond to the forest remnant across SH 1.	GWRC KCDC
375	Keep some of the lower ground where the pines have been cleared as an open glade, for informal picnic use. Some willows will need to be retained adjacent to the river to control bank edge erosion.	KCDC
390-420	Extend the Kohekohe forest type in the area located by river cross section 380, into land currently owned by GWRC.	GWRC (within the River Corridor)
All areas	Replace any exotic species not required for flood risk management purposes (front line defence) with suitable native species. Where exotic species are not needed for riparian edges, replant riparian margins with native species to enhance river and ecosystem habitat.	GWRC

8.8.2 Access

River cross section (XS)	Recommended Actions	Parties Involved
	South Bank	
350-430	Investigate options to provide vehicle and walking access to the new KCDC recreation reserve	KCDC GWRC
350-360	Investigate alternative walking access on the south bank (as an alternative to the existing path along the rock lining).	GWRC KCDC
360-400	Introduce alternative contoured bush walkways as native plants are established - separate to the Haul Road (east of Kebbel's Bend). Walkways are to be kept to a wilderness standard, as canopy grows and develops.	GWRC

8.8.3 Interpretation

River cross section (XS)	Recommended Actions	Parties Involved
All areas	Provide professional advice on interpretative signs and potential locations for these on the River Corridor.	DOC Tangata Whenua GWRC
All areas	Provide signage alerting track users to operational activities potentially being undertaken in the area.	GWRC

9. Waipunahau/Jim Cooke Memorial Park Reach

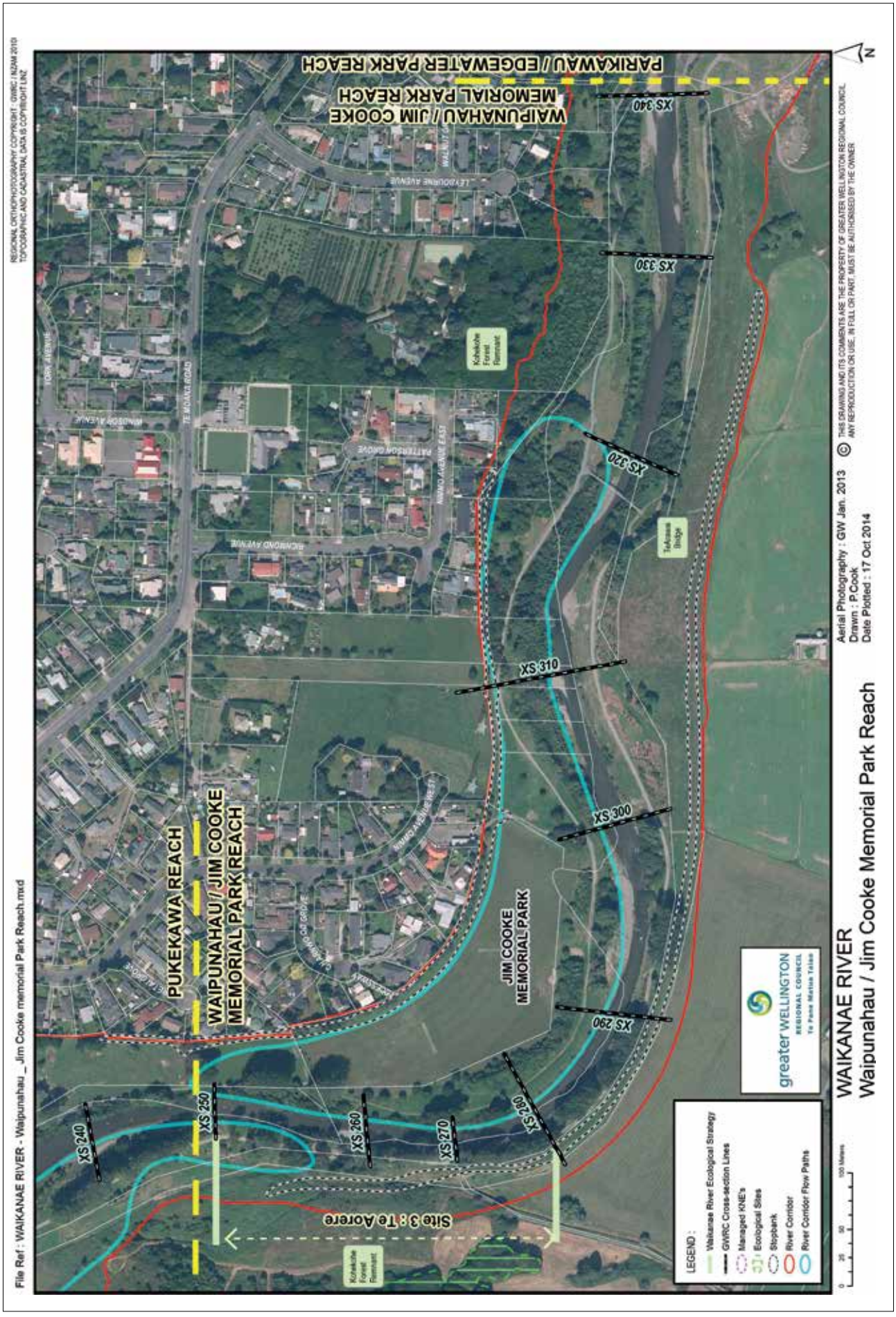


Figure 9: Waipunahau/Jim Cooke Memorial Park Reach

9.1 Situation

This reach extends from Walnut Grove to Paretai Grove (on the north bank). In this reach there is a distinct contrast between each side of the river.

On the north bank, the berm opens out to a strip of semi-restored open ground above the river and then broadens to wide-open grounds, including the sports grounds at Jim Cooke Memorial Park (JCP). Upstream of JCP, there is a significant kohekohe remnant on adjacent private land.

Presently, the south bank has a rural or natural/ wilderness character to it. The walking track is alternately open to the adjacent farmland with views of the inland hills or screened by rural shelter plantings. Along the river, the dense undergrowth of tree lucerne and some blackberry and willow has been removed, leaving the area mostly open. Restoration planting has commenced.

The Kāpiti Coast District Council has purchased approximately 60 hectares of land adjacent to the River Corridor on the south bank, (known as the Howarth Block and the Turf Farm). This section, currently referred to as the Otaihanga East Riverside Reserve Area, was purchased for public use and enjoyment including; sport and recreation, and a network of cycle, walking and bridle paths connecting surrounding communities as well as for its ecological values. The section has been gazetted as a recreation reserve. A management plan for this area is currently under production.

The prominent dune seen downstream in this reach (river cross section 260) provides a natural backdrop to the River Corridor. According to the Ecological Strategy, the area between river cross sections 250-280 is distinguished (topographically) as the inland limit of where coastal sand dunes adjoin the River Corridor.

The Ecological Strategy identifies this area as 'Te Aorere', a name derived from an old kainga site. Te Aorere was selected as one of five priority sites for restoration in the Ecological Strategy because of the native dune forest and groves of kahikitea, ti kouka in this area[67].

The dune on the south bank is a strong visual feature of this stretch with significant natural values. Also of geological significance is the area at river cross section 298, which has been identified as containing a 2500 year fossil forest.

There are popular swimming holes in this reach

9.2 Progress

The recommended actions in this reach in 1999 included the removal of pine trees, retaining open areas, the protection and enhancement of significant native remnants, weed control and the introduction of more native species. Many of these actions have been progressed.

Other actions were maintenance of the haul road for public access. This is an ongoing action. The kohekohe remnant was protected through the District Plan in 2000.

The Te Arawai footbridge upstream of JCP (across the Waikanae River) was constructed in 2009. The JCP open area has been retained for recreation.

KCDC and GWRC plantings have been consistent with the methods suggested. The pine trees noted have been removed and this area replanted in natives.

The desired character of JCP will be considered in landscape designs for flood risk management improvements (as part of stopbank reconstruction works - to facilitate compatible use for both formal and informal recreation).

The area containing existing pines in front of the private kohekohe forest remnant has been cleared and planted with natives by the landowner (XS 322-330).

The rural/natural character of the south bank has been considered in development.

[67] Park, G, 1999.

9.3 Vegetation Management

The kohekohe forest remnant (located on the north bank, between river cross sections 320-330) is of high ecological value due to its comparative rarity.

On the south bank, Transpower are implementing a "Greenlines' project in partnership with Kāpiti Coast District Council, supported by community groups. This project involves restoring native vegetation and furthering the existing cycle/walk/bridleway that runs alongside the river, linking the township to the beach.

In 2013, Transpower volunteers assisted in planting over 2500 native plants along the River Corridor. Transpower 'Greenlines' funding is also being used for signage, pest control, walkways, and further native tree planting.

Transpower 'Greenlines' restoration site on the south bank

9.4 Recreation Facilities

9.4.1 Jim Cooke Park

The upgrade of the stopbank at Jim Cooke Park may result in changes to the playing fields. GWRC will consult with KCDC and the community regarding these potential changes.

9.4.2 KCDC Recreation Reserve – South Bank

KCDC has purchased nearly 60 hectares of land adjacent to the River Corridor on the south bank, which has been gazetted as a recreation reserve. A draft management plan for this area will be released for public consultation in 2014.

The majority of the KCDC recreation reserve is outside of the River Corridor and is therefore is not part of the ecological area that is being restored by the volunteer groups and Councils.

Site of KCDC Recreation Reserve

9.5 Flood Risk Management

Reconstruction of the stopbank extending downstream from Nimmo Avenue West through Jim Cooke Park is proposed in the WFMP. Consultation on this option will take place in 2014.

Major river realignment was implemented in 2006. No more riverbank protection work is envisaged other than routine maintenance.

On the north bank a River Corridor Flow path has been identified between 250 and XS 320. Any new planting in these areas should be restricted to low lying grasses and flaxes to prevent blockages to flood flows, and GWRC Flood Protection must be consulted during the planning stage. (See Appendix 1).

9.6 Recommended Actions

9.6.1 Vegetation Management

River cross section (XS)	Recommended Actions	Parties Involved
	North bank	
315	Downstream from the FWR nursery, retain large open areas as a contrast to the enclosed character upstream. Consider developing picnic facilities.	KCDC GWRC
310	As far as possible, keep the area currently occupied by the exaggerated meander as low ground and revegetate with suitable native species to form a small wetland.	KCDC GWRC
All areas	Where the bank has hard edge protection (rip rap), consider using toetoe or another native plant as an alternative to willows behind this so that willow plantings do not screen the natural outlook across the river.	GWRC
250-320	Ensure that River Corridor Flow Paths are preserved.	GWRC KCDC
All areas	Replace any exotic species not required for flood risk management purposes (front-line defence) with suitable native species. Where exotic species are not needed for riparian edges, replant riparian margins with native species to enhance river and ecosystem habitat.	GWRC
All areas	Educate property owners about the need to avoid planting on stopbanks.	GWRC
330-320	Interpretation explaining the significance of the privately owned kohekohe remnant should be considered. Negotiate with private landowner.	GWRC
	South bank	
310-330	Rough open areas alongside the haul road can be cleared and shaped for restoration. Ongoing weed control will be needed in places, especially blackberry.	GWRC KCDC
270-290	Replace the existing poplars with suitable natives widely spaced as a feature around the bend encircling JCP.	GWRC
298	Create interpretive signage at river cross section 298 about the 2500 year old fossil forest identified in this area.	GWRC
250-280	Put effect to an indigenous link between the existing kohekohe remnant (K083) and the river's riparian zone, in a way that respects its cultural values to tangata whenua. This may include particular plant species or other heritage/restoration initiatives.	GWRC KCDC Tangata Whenua
298	Consider adding area containing the 2500 fossil forest area to the Heritage Register in the District Plan - for Sites of Geological Significance.	KCDC

9.6.2 Access

	Recommended Actions	Parties Involved
River cross section (XS)	**North bank**	
230-300	If the playing field area is modified because of the stopbank reconstruction, ensure the walkway route is obvious and accessible (see Recreation Facilities below).	KCDC
	South bank	
250-340	Ensure that the old haul road is maintained to a wilderness standard and for public safety.	GWRC

9.6.3 Recreation Facilities

	Recommended Actions	Parties Involved
River cross section (XS)	**North bank**	
230-300	Redesign the open space beside the river in the Jim Cooke Park area as part of the stopbank construction works, to facilitate compatible use for both formal and informal recreation.	GWRC (part of major works) KCDC
	South bank	
250-340	Consider the potential increase of informal recreation activity on the south bank due to the Te Arawai bridge and KCDC Recreation Reserve.	KCDC GWRC
	Take this strategy into consideration in the development of the KCDC recreation reserve	KCDC

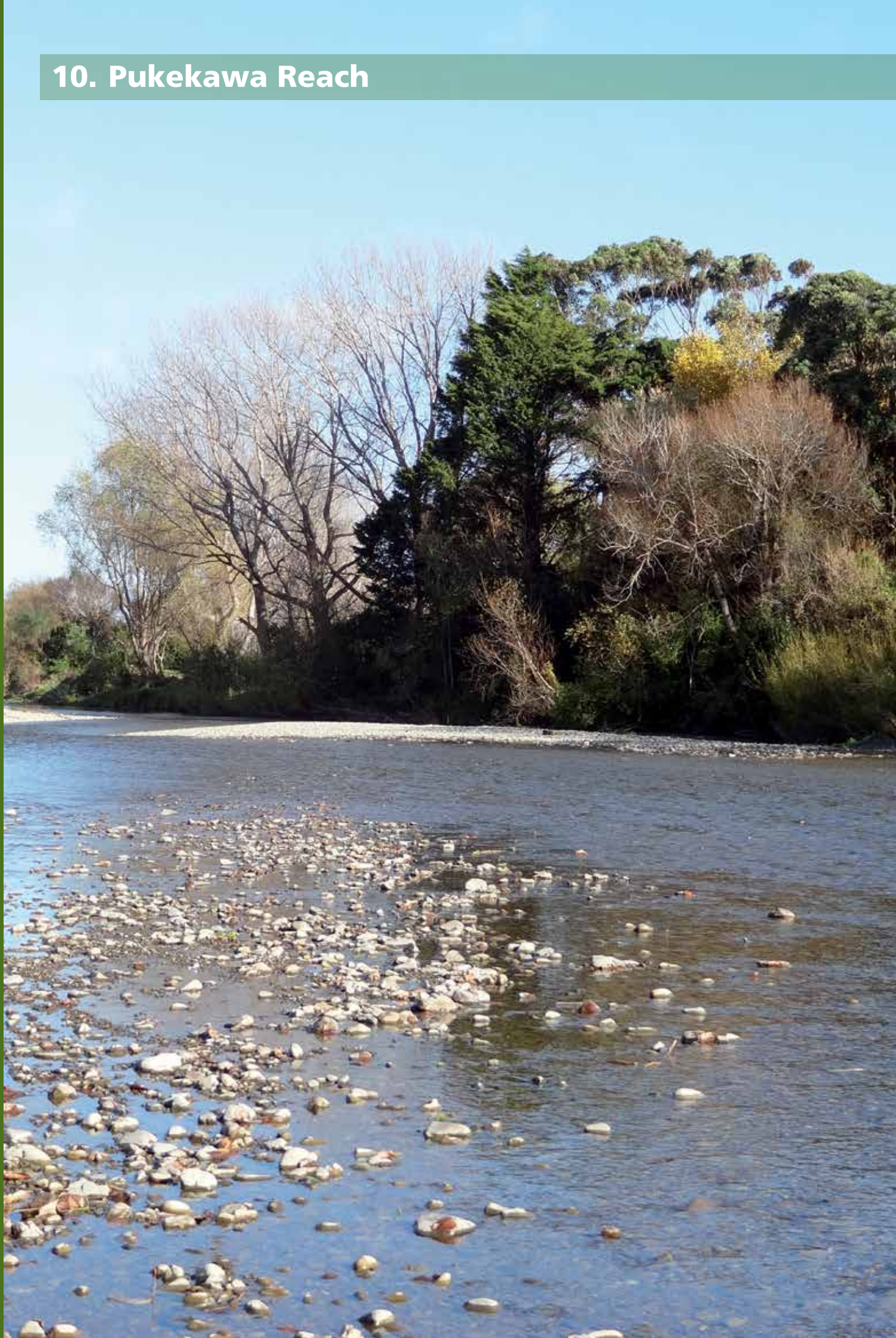
9.6.4 Interpretation

	Recommended Actions	Parties Involved
River cross section (XS)	**North bank**	
250	Provide interpretation explaining the significance of the privately owned kohekohe remnant as it is a visual feature of the River Corridor.	KCDC GWRC
All areas	Provide professional advice on interpretative signs.	DOC GWRC

9.6.5 Flood Risk Management

	Recommended Actions	Parties Involved
River cross section (XS)		
	Undertake consultation with KCDC and the community on the JCP stopbank upgrade	GWRC

10. Pukekawa Reach



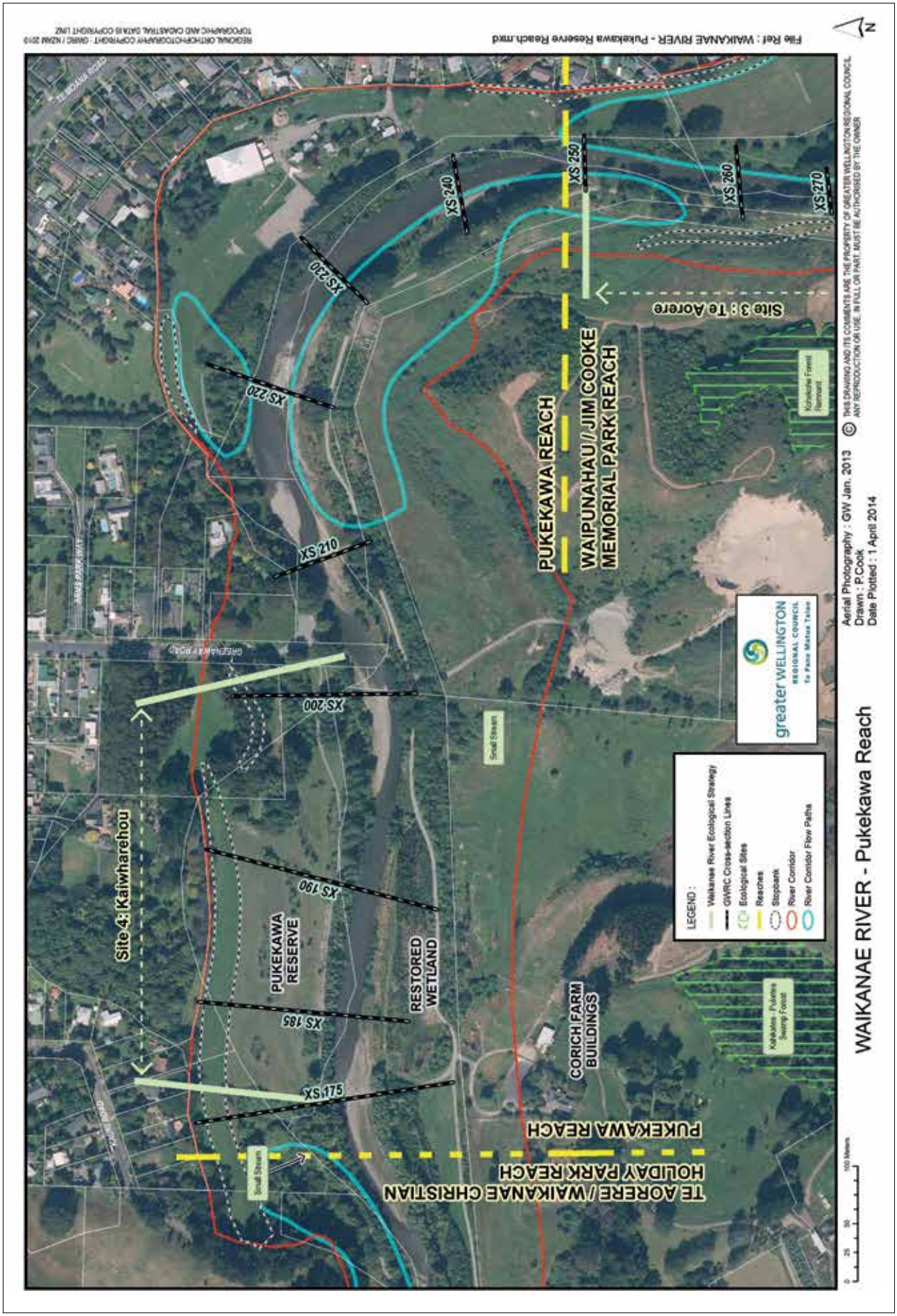


Figure 10: Pukekawa Reach

10.1 Situation

The north bank of this reach contains an attractive rural landscape enclosed by a low river terrace with mixed vegetation to the north and a narrow strip of willow and poplar along the river edge. This open character then passes into a narrow stretch. It is enclosed between dense garden plantings on adjacent private properties and tangled willow in a backwater formed by a former river channel. The upstream end of this reach is privately owned land (river cross section 230) which contains an equestrian facility.

The Ecological Strategy identified the area on the north bank between river cross section 175-202 as 'Kaiwharehou' and notes that it is the main opportunity to restore the indigenous wetland character found in this part of the river[68]. The Ecological Strategy notes that the low-lying nature and former wetland characteristics and potential for natural swampiness are part of the 'Kaiwharehou' site.

The Ecological Strategy also notes that the diverse mosaic of natural estuarine landforms in this area have indigenous ecological values which have been degraded by past pastoral land use. Chief amongst these in the River Corridor are the prominent high dune and a lagoon.

Downstream from Greenaway Road at Pukekawa Reserve, the corridor opens out on to a wider open area. Here there is opportunity for a picnic/parking area, screen planting and groves of larger native trees to be developed.

On the south bank, the river bends around a prominent sand dune (included in the Waipunahau Reach). On the east side, the River Corridor is a comparatively narrow strip, passing close below the dune with a line of poplar and cypress on the inland side and willow along the river. On the west side, low-lying paddocks lie between the river and the dune.

The kohekohe forest remnant on the east side of the dune is protected in the District Plan.[69] On the western side, there are scattered specimens of cabbage trees and kahikatea. Opportunities to protect and develop vegetative links to these remnants should be explored, along with restoration of wetland or low-lying areas.

Livestock grazing on the north bank

10.2 Progress

The recommended actions in the 1999 Strategy included land purchase, restoration planting and restoration of wetland areas. These actions continue to be important within this reach.

Land within the River Corridor (river cross section 215-250 in this reach) remains in private ownership.

The main significant remnants of native vegetation occur on the sand dune on private land (at river cross section 260, south bank; and at the western end of Pukekawa reach). The kohekohe forest remnant on the eastern side of the dune is identified in the Heritage Register of the Kāpiti Coast District Plan[70]. A Kahikatea-Puketea Swamp forest located at the western end of Pukekawa Reach is also identified in the Heritage Register[71].

So far, the proposed private stopbank in this reach has not been constructed (private property, south bank, river cross section 175). The fence around the triangular paddock near this property has been removed[72].

The poplar walkway on the south bank has been under-planted with natives.

GWRC and KCDC now own a large part of the land inside the River Corridor on the south bank within this reach (between river cross section 175-250).

Restoration has been undertaken on the wetland area opposite Pukekawa Reserve on the south bank.

[68] Park, G, 1999.
[69] Kapiti Coast District Council, 1999, Section I, Heritage Register, E82.
[70] Kapiti Coast District Council, 1999, Section I, Heritage Register, K083.
[71] Kapiti Coast District Council, 1999, Section I, Heritage Register, K082.
[72] Kapiti Coast District Council, 2001.

10.3 Vegetation Management

This reach is characterised primarily by rural land uses with associated exotic tree plantings such as poplar and pine. There are significant stretches of willow along both sides of the river in this reach, which have the potential to impact on access to the river. There are also opportunities to diversify and strengthen the amount of native vegetation via further restorative planting and by thinning and inter-planting willows with native trees on the south bank.

On the north bank, native vegetation is mainly in the form of isolated plots that have been planted by FWR - as well as vestiges, such as scattered cabbage trees.

The former river channel downstream from privately owned land (at river cross section 220) is valuable backwater habitat with some wetland species already evident.

On the south bank, there are scattered specimens of cabbage trees and kahikatea. Opportunities to protect and develop vegetative links to these remnants are being progressed.

There is considerable opportunity to diversify habitats in this reach, where areas of lower lying ground with a high water table present the conditions where former native wetlands and swamp forests would have occurred.

The Ecological Strategy suggests trialling harakeke (Phormium tenax flax) and ti kouka (cabbage tree) in this reach, as 'an alternative flood protection measure'.[73] However, experience has shown that the local variant of harakeke should not be used in this way as it tends to lever out large chunks of stream and riverbanks when subjected to high flood flows. It is best planted away from erodible banks.

Shared path at Pukekawa Reserve

[73] Park, G, 1999.

10.4 Access

With the help of the Rotary Club, KCDC has developed a shared path along the north bank of this reach. Public access has been negotiated across private property (river cross section 220-250) on the north bank, on the condition that this will be pedestrian and cyclists only, with no horses or dogs (unless on a lead) permitted. The walkway has also been developed across the Pukekawa Reserve downstream.

Greenaway Road provides a central access point to the River Corridor, accessible from both the Waikanae and Waikanae Beach communities.

10.5 Recreation Facilities

Pukekawa Reserve has been developed as a passive recreation area with limited drive-on access. A picnic table is located in the reserve.

10.6 Interpretation

Interpretation of habitats in this reach would foster understanding of their significance and encourage support for their protection and restoration.

10.7 Land Ownership

Within this reach, the private property on the north bank between river cross sections 217-258 is significant because it occupies land in the River Corridor.

10.8 Flood Risk Management

In 1997, the former sharp bend at the lower end of this reach was realigned and protected with associated riprap and willow bank protection works. Two new stopbanks were also constructed. No further major capital works are planned, although gravel extraction has been a major activity in this reach. A localised stopbank has been proposed to protect the private property at river cross section 175 (south bank).

This reach is a key area of natural gravel deposition and is likely to be a focus for future gravel extraction.

On the north bank, River Corridor Flow Paths have been identified at XS 220 and between XS 250 and XS 320 (in the upstream reach). On the south bank a River Corridor Flow Path has been identified between XS 210 and 260. Any new planting in these areas should be restricted to low lying grasses and flaxes to prevent blockages to flood flows, and GWRC flood protection must be consulted during the planning stage. (See Appendix 1).

10.9 Recommendations

10.9.1 Vegetation Management

	Recommended Actions	Parties Involved
River cross section (XS)	**North bank**	
217-250	The private property (equestrian facility) occupies a former river meander. If this land comes in to public ownership, retain the natural character but investigate the potential for the lower lying ground near the river terrace to be restored as a wetland area.	GWRC KCDC Landowner
220, 250-320	Assist the development of a wetland habitat by thinning of the willows and planting with appropriate native species in the former river channel	KCDC GWRC
175-200	Monitor, maintain and interplant recent plantings in the Pukekawa Reserve with additional species as plantings become established.	GWRC
220	Ensure that River Corridor Flow Paths are preserved.	GWRC KCDC
All areas	Trial wetland riparian planting with appropriate natives as an alternative flood risk management measures for bank edge protection.	GWRC
	South bank	
185-250	Remove the poplars along the walkway over time and establish an avenue of native tree species.	KCDC GWRC
210-260	Ensure that River Corridor Flow Paths are preserved.	GWRC KCDC
All areas	Remove exotic tree species not needed for front line defence flood risk management between the haul road and the river and plant out in natives.	GWRC KCDC
190-240	Establish native plantings along the inland side of the walkway	KCDC GWRC
200	Revegetate the proposed walkway along the small stream (located across from river cross section 200) from the river to the proposed subdivision site on the east side of the dune, with native wetland/swamp forest species to tie in with the scattered remnants near the stream.	KCDC
210-220	Address weeds and prepare area for restoration with appropriate wetland species.	KCDC GWRC
All areas	Trail wetland riparian planting with appropriate natives as an alternative flood risk management measures for bank edge protection.	GWRC

10.9.2 Access

	Recommended Actions	Parties Involved
River cross section (XS)	**North bank**	
217-250	Maintain access across the private property. Liaise with the landowners to ensure that their needs are being met. This is crucial to achieving a continuous shared path on this side of the river.	KCDC GWRC
217-250	Develop and maintain the signs where the shared path enters the private property - stressing that the land is private property with restrictions on the type of pedestrian access permitted (see above). Enforce the restrictions as required to retain ongoing access.	KCDC

10.9.3 Recreation Facilities

Recommended Actions	Parties Involved
Consider providing public toilet facilities[74] outside the River Corridor on Greenaway Road. A potential site is adjacent to the turning circle on Greenaway Road, towards the northern end.	KCDC GWRC

10.9.4 Interpretation

	Recommended Actions	Parties Involved
River cross section (XS)	**North bank**	
165-200	Provide interpretative signage about the wetland habitat in Pukekawa Reserve with information about the former habitats that were common in the area and the objective of restoring a similar type of habitat[75]. Provide interpretation on the heritage values of the area.	KCDC GWRC DOC Tangata whenua
	South bank	
200	Provide interpretation of the kohekohe remnant on the sand dune.	KCDC GWRC DOC Tangata whenua

10.9.5 Land Ownership

Recommended Actions	Parties Involved
Purchase the private property between river cross sections 217-258 (north bank) for public ownership.	GWRC

10.9.6 Flood Risk Management

Recommended Actions	Parties Involved
Where gravel and silt build up is occurring, consider a broad range of flood risk management options.	GWRC

[74] Kapiti Coast District Council, 2001.

[75] Kapiti Coast District Council, 2001.

11. Te Aorere/Waikanae Christian Holiday Park

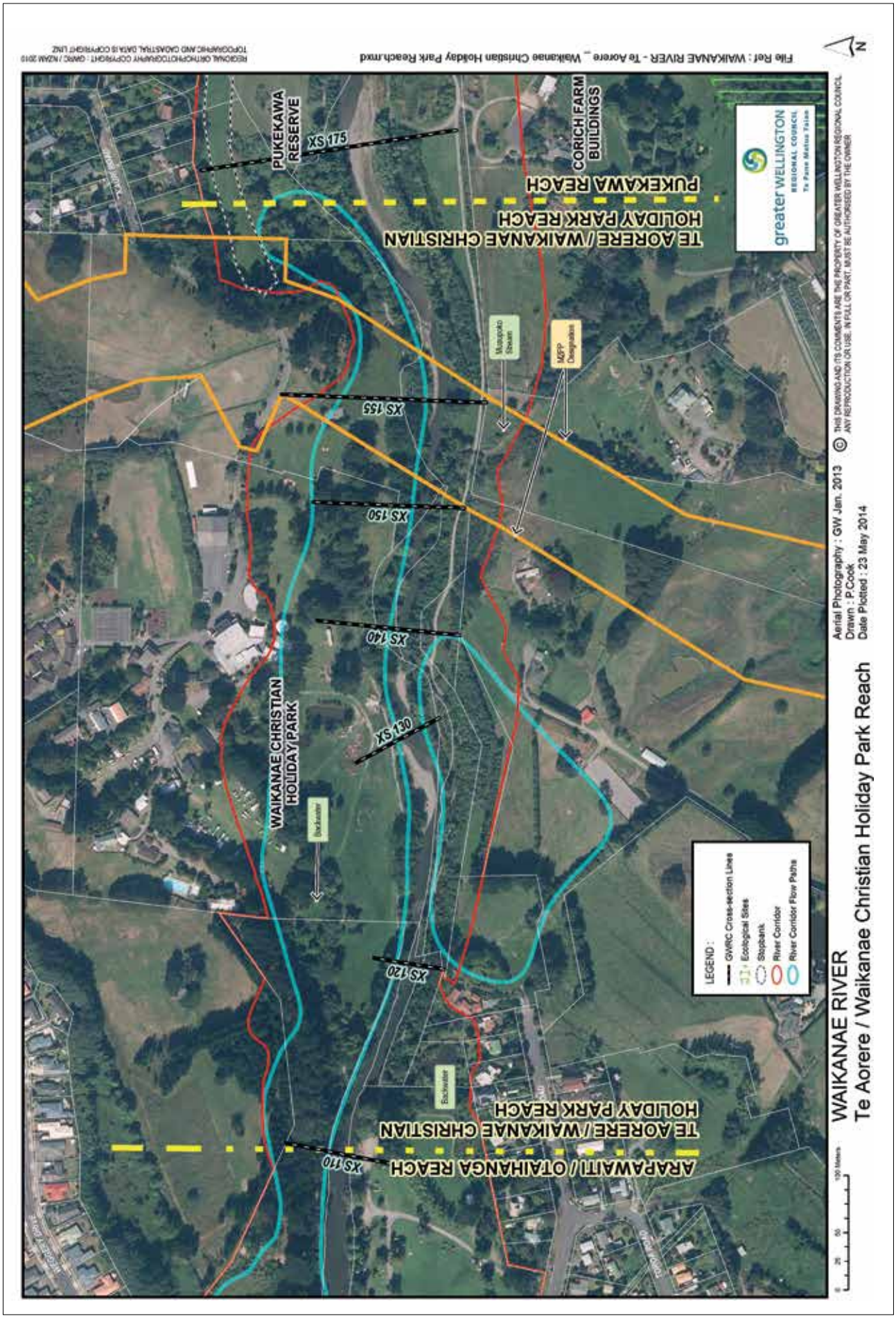


Figure 11: Te Aorere/Waikanae Christian Holiday Park Reach

11.1 Situation

This reach extends between the western end of Pukekawa Reserve on the north bank, downstream to residences at the eastern end of the settlement of Otaihanga on the south bank.

The majority of the north bank is set in a rural parkland landscape with mature poplar and macrocarpa trees and is occupied by the privately owned Waikanae Christian Holiday Park (El Rancho). A wetland area at the upstream end of the reach (XS 160) has been the subject of a significant community restoration project.

The lower end of the reach is defined by a stream that flows out round an old river meander to the river (located at river cross section 112). There is potential to enhance the wetland plant species in the stream.

The river, visually, is part of this rural landscape because its edge is much more open here than many stretches of the river. Rounded river boulder riprap permits a grassy edge close to the river and, further down, a line of poplars along the bank gives different visual access to and from the river.

On the south bank, a significant amount of effort has been directed at environmental restoration along the River Corridor. The majority of this restoration work has been implemented behind flood risk management (front-line defence plantings) on the south bank along this reach. These plantings are now maturing. Near XS 150, the Muapoko Stream enters the river. A pond/lagoon on private property is also featured at XS 115.

The MacKays to Peka Peka Expressway (M2PP) gained resource consent from the Environmental Protection Agency (EPA) in early 2013. The project involves construction of a bridge over the Waikanae River in this reach. The project is expected to be completed in 2017. As a condition of consent, NZTA will undertake restoration planting and other environmental enhancement in this reach. Further information is available in the Site Specific Management Plan, available from NZTA.

Construction of the Expressway bridge

11.2 Progress

Recommended actions in this reach included: Inter-planting natives and poplars amongst willows (where they were thinning naturally or not required for flood risk management purposes on the river[76]); encouraging the holiday park landowner to take part in restoration of wetland areas; retaining access across the holiday park land for public use[77]; increasing public land ownership in this part of the River Corridor; and providing signage identifying access points.

The interplanting of willows has been implemented, although GWRC preference is for interplanting with natives rather than exotic poplars. This continues to be an important action in this reach, as does the restoration of wetland areas on public and private land.

Access through this reach has been improved and signage is being developed by both KCDC and GWRC through this reach. Access through the Holiday Park has been retained.

Part of the River Corridor (in front of private property at river cross section 165, south bank) has been purchased by KCDC. This area is now available for public access.

[76] Kapiti Coast District Council, 2001.
[77] Kapiti Coast District Council, 2001

11.3 Vegetation Management

There is a potential to enhance the wetland plant species in the stream within the Holiday Park on the north bank. On the South bank, riparian planting along Muaupoko Stream would be beneficial.

The Makays to Peka Peka Expressway passes through this reach. As construction is likely to have a major impact on the vegetation, any enhancement of existing vegetation should be delayed until plans for the construction of the road and associated environmental enhancements are finalised.

The road will have significant buffer areas, and these provide an opportunity to develop a north-south greenbelt that links with the river.

This reach contains River Corridor Flow Paths,[78] on both the north and south banks of the river. Any new planting in these areas must be approved GWRC Flood Protection department.

The shared pathway runs through the established ecological restoration area on the south bank

11.4 Access

The new expressway bridge will cross the Waikanae River in this reach. As a result of this, there would be a number of potential access opportunities for River Corridor and its users.

On the north bank, The Waikanae Christian Holiday Park owners have agreed to permit the riverside walkway to pass along the river here provided that dogs and horses are kept under control. At the lower end, a stream impedes access beside the river. A small footbridge has been installed to give access across the stream. Further improvements are currently being made to the shared path adjacent to the holiday park.

Bridge at El Rancho

A vehicle track (haul road) on the south bank provides a wilderness standard access along the upper part but further down it narrows to an undulating path. The different character of this path adds to the character of the river walkway and should be kept unchanged.

Alternative paths have been developed and their use should be encouraged.

Access to the river is impeded where dense willow breaks extend for significant distances.

11.5 Recreational Facilities

Visitors to the holiday park use the river for picnics, swimming, canoeing, tubing, and rafting.

11.6 Land Ownership

Within this reach, the holiday parkland is significant because it occupies a large part of the land in the River Corridor. On the south side, the corridor has potential to be restored (Muaupoko Stream has particular ecological value).
Public ownership of this land would increase opportunities to carry out planting.

[78] See Appendix 1.

11.7 Flood Risk Management

The sharp meander at the upper end of this reach has been realigned with associated riprap and willow bank protection works. This realignment has cut a new river channel across the tip of the paddock in the bend on the south side.

The realignment has had a significant effect by straightening the river from its natural meander pattern and, on the south side, introducing a long stretch of willows along the new alignment. This significantly reduces the visual interest of the river here. It has required re-routing the walkway for a short distance.

Although additional bank edge protection is not indicated here, river dynamics may change. If more bank edge protection is required in the future, methods other than willow planting such as rock groynes may be used.

The Waikanae Christian Holiday Park (private property) buildings are set well back from the river. However, these buildings can still flood as they are within the River Corridor.

On the north bank, a River Corridor Flow Path has been identified between XS 175 and XS 90 (in the downstream reach). On the south bank, a River Corridor Flow path has been identified between XS 120 and XS 140. Any new planting in these areas should be restricted to low lying grasses and flaxes to prevent blockages to flood flows, and GWRC flood protection must be consulted during the planning stage. (See Appendix 1).

11.8 Recommended Actions

11.8.1 Vegetation Management

	Recommended Actions	Parties Involved
River cross section (XS)	**North bank**	
140-155	Replace the exotic species not required for flood risk management purposes with suitable native species. Plant species far enough back off the tracks to ensure horse riders and cyclists have clear vision ahead.	KCDC GWRC
140-155	When the MK2PP road is constructed, identify the buffer zones as a greenbelt.	KCDC GWRC
110-170	The recreational use of the River Corridor (rather than increased density through residential use) at the holiday park should be supported.	GWRC KCDC
112	Introduce more local native wetland plant species into the margins of the backwater located here to diversify this habitat and to act as a suitable medium for Inanga spawning habitat.	GWRC KCDC
130	Encourage the owners of the holiday park to restore/enhance the wetland habitat around the stream on their property and provide assistance where possible.	GWRC KCDC
110 - 170	Ensure that River Corridor Flow Paths are preserved.	GWRC KCDC
River cross section (XS)	**South bank**	
175	If it happens, ensure that there is landscape design input to the private property stopbank design. The structure should be visually integrated in its setting through contoured mounding rather than being an angular engineered embankment.	GWRC
120-140	Ensure that River Corridor Flow Paths are preserved.	GWRC KCDC
115	Introduce more local native wetland plant species into the margins of the backwater located here, to diversify this habitat and to act as a suitable medium for Inanga spawning habitat.	GWRC KCDC
All areas	Support community groups by removing willows where they are no longer needed for flood risk management purposes and either inter-planting or replacing with natives.	GWRC

11.8.2 Access

	Recommended Actions	Parties Involved
River cross section (XS)	**North bank**	
110-155	Ensure that access across the holiday camp land is retained and the rights and wishes of the property owners are protected. It is crucial for achieving a continuous shared path on the north side of the river.	KCDC
	South bank	
	Provide signage identifying access points to the south bank.	GWRC KCDC
All areas	Limit maintenance to keeping vegetation clear of the haul road and path. Add gravel where muddy conditions are forcing people to seek alternative routes at the expense of vegetation.	GWRC KCDC

11.8.3 Public Ownership

Recommended Actions	Parties Involved
Aim to eventually bring the privately owned land in the River Corridor into public ownership.	GWRC KCDC

12. Arapawaiti/Otaihanga Reach

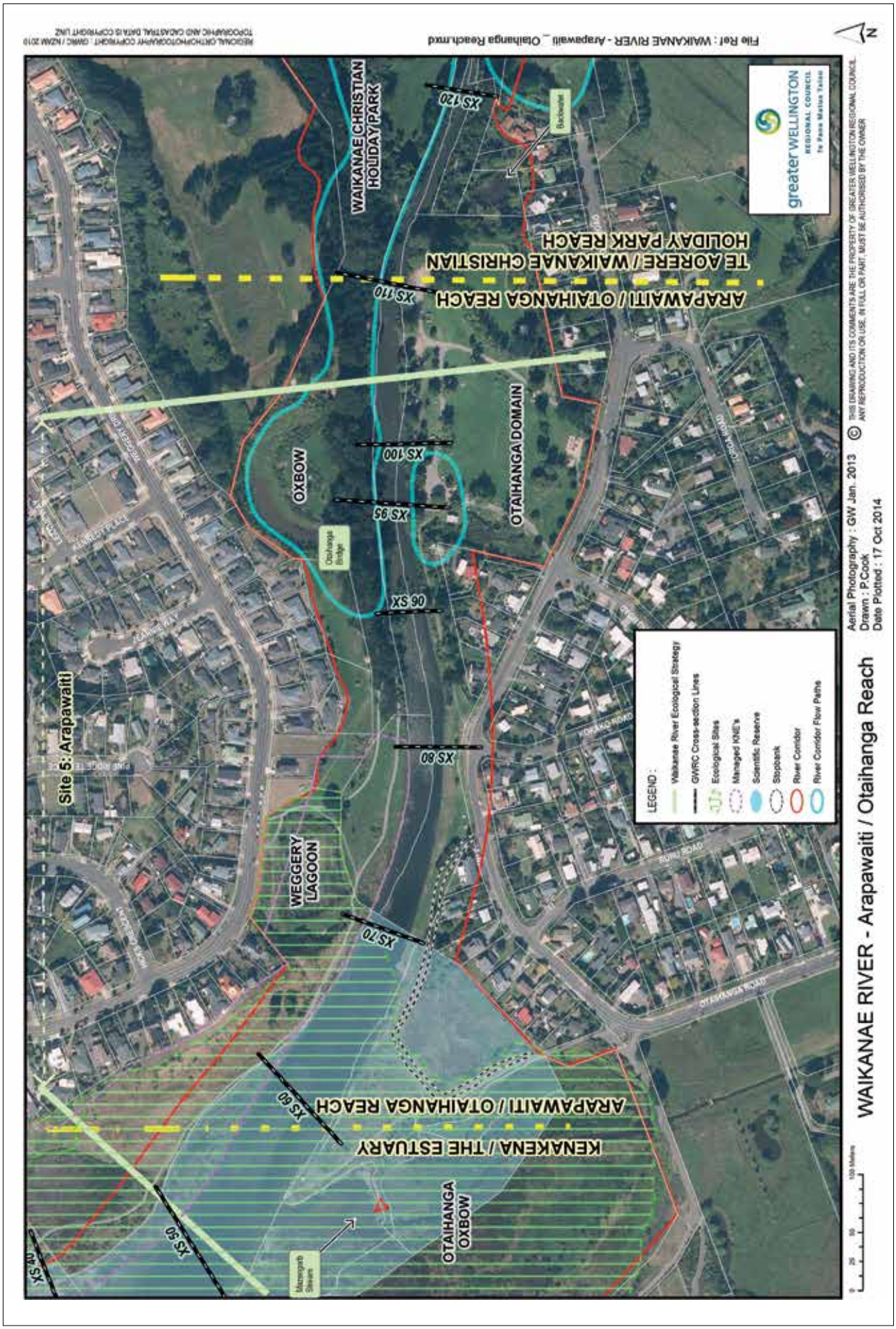


Figure 12: Arapawaiti/Otaihanga Reach

12.1 Situation

On the north bank, this reach extends from Te Aorere Reach to the point where the dune comes close to the river (river cross section 50). This dune defines the inland part of the river, from the open estuary landscape. This area, from the channel that runs in from El Rancho is part of the Waikanae Estuary Key Native Ecosystem (KNE). GWRC is working in partnership with KCDC and DOC to protect the biodiversity values inherent in this area.

There is a backwater area with some wetland plants - this is an oxbow in a former river meander (XS 95, north bank). A significant restoration project has been undertaken to restore the area's ecological values and enhance habitat for whitebait spawning.

Weed control on the northern bank has not only included protecting the estuarine edge, but KCDC in partnership with GWRC has also extended ecological weed control well beyond this area to include the riparian margins, dune faces, and dune slope buffers in this area. In addition, the KCDC have been working with FWR and KERMT in controlling ecological weeds and restoration planting around the Northern Oxbow with assistance of the Ministry of Environment funding.

On the south bank, the river berm is bounded at the upstream end of the reach by Otaihanga Domain, which has a parkland character. Further downstream, the river berm is narrow and is bounded by the main residential area of Otaihanga. At the lower end of the reach the tidal influence in the river marks the end of riverbank willow plantings.

The Otaihanga oxbow (south bank) and surrounding land has high conservation values, as well as playing an essential role in flood risk management as a water storage area.

Te Atiawa ki Whakarongotai note that this reach is of particular cultural significance as there are various mahinga kai sites and taonga species populations. There are also several wahi tapu sites in this area.

The riverbanks and the oxbow in this reach of the river are spawning grounds for Inanga (whitebait). Therefore, it is important that suitable conditions for spawning are maintained or enhanced.

The Ecological Strategy identifies the 'Arapawaiti' site in this reach. The Arapawaiti site comprises both banks, but mainly the northern bank between the old cut-off meander downriver to the high dune. The Ecological Strategy notes that the diverse mosaic of natural estuarine landforms (namely the prominent high dune and two unique wetland habitats being the lagoon and an oxbow) have potential for ecological restoration.[79]

12.2 Progress

Recommended actions included the protection of the Oxbow as an ecological area, rather than a recreational area.

In 2009, the FWR obtained funding from the DOC's Community Conservation Fund for the restoration of the Oxbow. This has contributed to achieving the recommendations from the Ecological Strategy regarding protection and the 2009 Strategy regarding restoration initiatives in this location. Kāpiti Coast District Council and KERMT have since also become involved in the restoration of the Oxbow. GWRC have upgraded the culverts between the river and the oxbow, to increase water levels.

The Management Plan for Otaihanga Domain was reviewed by KCDC in 2004. The Otaihanga Local Outcomes Statement was published in 2004 and updated in 2009. This contains recommendations relating to the Otaihanga domain and boating club, as well as recommendations relating to other sections of the river.

North bank oxbow has recently been restored

[79] Park, G, 1999, p. 27.

12.3 Vegetation Management

On the north bank the oxbow at XS 95-105 has high ecological values and is being restored by KCDC and community groups.

The local residents value the pines alongside the riverbank for their visual quality, shelter, and roosting habitat for birds. The pines do, however, affect visual access between the oxbow and the River Corridor. This in turn masks the oxbow's role as part of the river system. As part of the Oxbow restoration project, some of these pines have been removed as part of preparation for planting of species native to the area.

The semi-rural parkland character of Otaihanga Domain on the South bank is to be maintained.

12.4 Access

The shared path on the north bank links Weggery Drive with Makora Road on the south bank via the suspension bridge across the river at Otaihanga Domain. The oxbow area on the north bank has a service vehicle bridge near the western end and a concrete pipe on the eastern side. Pedestrian only access on the south bank links the Otaihanga Domain with the Otaihanga Boat Club, which will eventually connect up to the Waikanae Estuary walkways.

Horse riding is prohibited within Otaihanga Domain. Signage at the Domain directs horse riders to the end of Makora Road and around the eastern perimeter of the Domain to Makora Road. Access to the river over private land from there has been formalised with signage in consultation with the landowner. Horse access to the south bank bridleway is now via the official bridleway link from Makora Road at the eastern boundary of the Otaihanga Domain.

Otaihanga Domain and oxbow

12.5 Recreation Facilities

The Otaihanga Domain Management Plan (2004) covers management of Otaihanga Domain. Additional recreation facilities are not envisaged on the north bank, as the Waimanu Lagoon and beach in the next reach are the principal focus of recreation on this side. This side of the river should be kept principally as a walking area with natural values.

12.6 Interpretation

Interpretation of the wetland habitats and restoration project at the Oxbow has been erected on the north bank.

12.7 Flood Risk Management

A floodwall has been constructed at Otaihanga Domain, along its southern edge. Bank edge protection using rock rip rap was used on the south bank near the boating club, along with some river realignment works.

On the north bank, a River Corridor Flow Path has been identified between XS 175 (in the upstream reach) and XS 90. On the south bank, a River Corridor Flow Path has been identified between XS 90 and XS 100. Any new planting in these areas should be restricted to low lying grasses and flaxes to prevent blockages to flood flows, and GWRC Flood Protection must be consulted during the planning stage. (See Appendix 1).

12.8 Recommended Actions for This Reach

12.8.1 Vegetation Management

River cross section (XS)	Recommended Actions[80]	Parties Involved
	North bank	
95	Protect the oxbow as an area of ecological significance, not a recreational area.	KCDC GWRC
All areas	Investigate, and where suitable, implement methods to improve whitebait spawning habitat	GWRC
95	When the pines come to the end of their life, do not replant so that the oxbow has a more evident relationship to the river. Gradually replace the pines around the oxbow with suitable large natives.	KCDC GWRC
90-175	Ensure that River Corridor Flow Paths are preserved.	GWRC KCDC
All areas	Recognise the particular significance of this area for tangata whenua and their interest in the in the management of this reach (see Section 2 of this Strategy)	GWRC KCDC
River cross section (XS)	**South bank**	
All areas	Foster an understanding of revegetation objectives and weed problems that can arise from garden rubbish and garden escapes for private landowners.	GWRC KCDC Private Landowners
All areas	Investigate and where suitable implement methods to improve whitebait spawning habitat.	GWRC
90-100	Ensure that River Corridor Flow Paths are preserved.	GWRC KCDC
All areas	Recognise the particular significance of this area for tangata whenua and their interest in the in the management of this reach (see Section 2 of this Strategy)	GWRC KCDC
105	Investigate methods for reducing the contaminant loading in water discharging from the holiday park duck pond and 'Bridge Pond' (located immediately north of the Otaihanga bridge).	GWRC

12.8.2 Access

River cross section (XS)	Recommended Actions	Parties Involved
70-90	Upgrade shared path on north bank to commuter standard between Weggery Drive and the suspension bridge to asphalt or concrete surface	KCDC

[80] Both the Environmental Strategy and Ecological Strategy support these recommendations.

13. Kenakena/The Estuary Reach

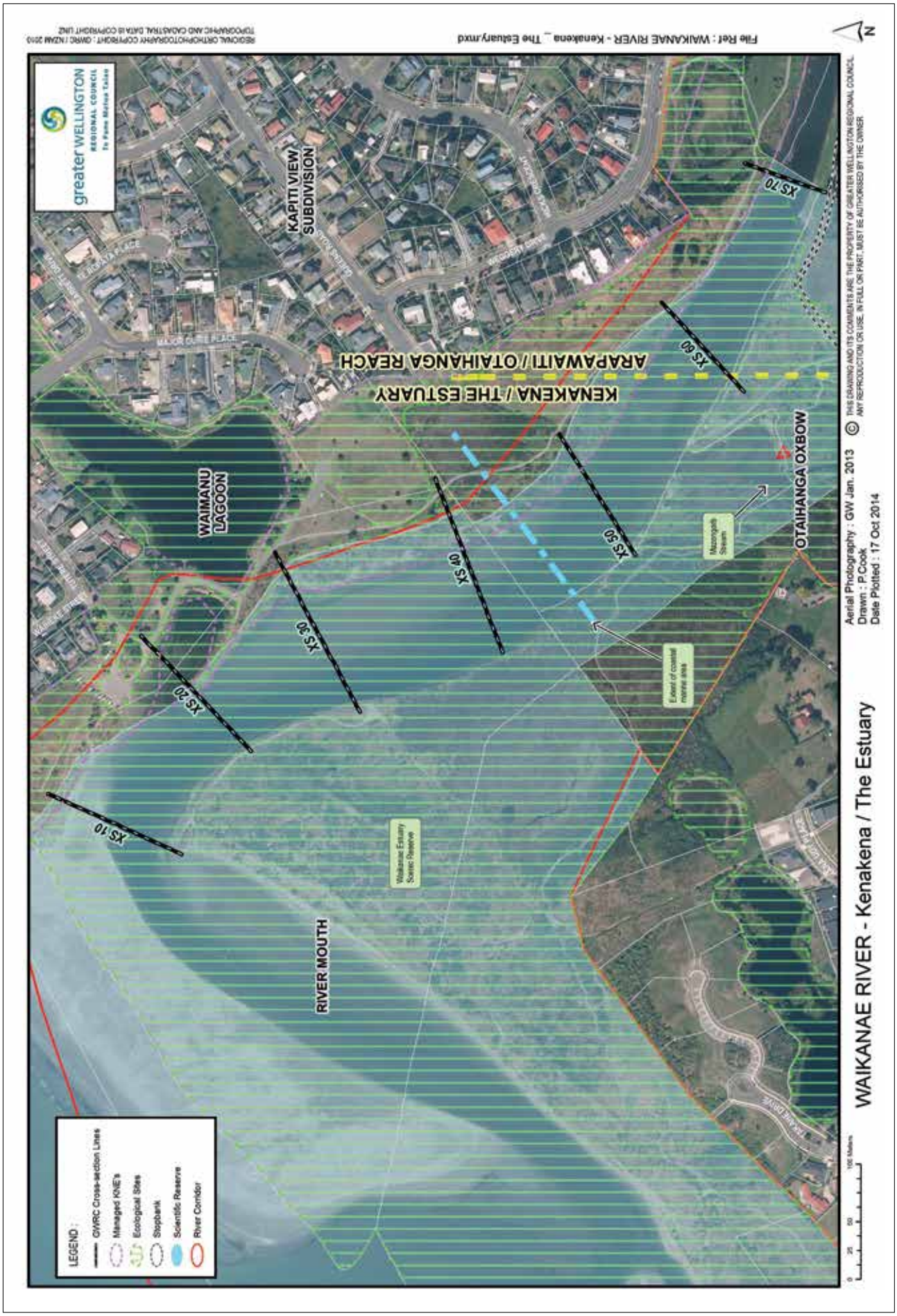


Figure 13: Kenakena/the Estuary

13.1 Situation

This reach extends from the Mazengarb Stream on the south bank to the river mouth. Much of the estuary environment is a DOC managed Scientific Reserve. The unique qualities of this environment derive from the combination of tidal sand flats, sand dunes, salt marshes, and lakelets. At Waikanae Estuary, freshwater from the Tararua Ranges meets the saltwater of the Kāpiti coast. This mixing of the waters and the ever shifting river mouth create an environment of rich plant and animal communities.

The Waikanae Estuary and associated wetlands are of national significance, with the Scientific Reserve supporting the only substantial population of the nationally vulnerable plant shore leptinella *(Leptinella dioica monoica)* and the at risk and threatened sea sedge Carex litorosa. The estuary has also been identified in GWRC's Key Native Ecosystem (KNE) programme as being one of the highest value biodiversity sites in the region . As part of the biodiversity programme, a KNE Plan will be written for the estuary in 2014.

More species of coastal and aquatic birds visit Waikanae Estuary than any other site on the Wellington coast. Nationally vulnerable dabchick *(Poliocephalus rufopectus)* and banded dotterel *(Charadrias bicinctus)* are present along with at risk species white fronted tern *(Sterna striata)* and the north island fernbird *(Megalurus punctatus)*. More than 60 species of birds breed in the estuary, with many seeking out areas which offer relative protection from mammalian predators, such as the sandspit, where the river affords some protection from the increasing numbers of cats, ferrets, dogs, and trail bikes, and the Puketewhainoa lakelet which is surrounded by a dense fringe of blackberry and scrub.

The Department of Conservation is undertaking ecological restoration in the southern part of the estuary within the scientific reserve, complemented by the restoration work being undertaken by Waikanae Estuary Care Group (WECG). The Waikanae Estuary Restoration Plan[81] provides a vision, objectives, and detailed plans for restoration work in the scientific estuary and in the northern estuary.

On the north bank, the river flows close to sand dunes where there is a narrow strip of ecologically significant estuarine vegetation. In the area of the northern bank administered by Kāpiti Coast District Council, KCDC, and GWRC biodiversity advisors work alongside community groups to support pest control operations and restoration planting.

Banded Dotterel

The Otaihanga Oxbow, located at the eastern end of the Scientific Reserve (on the south bank), has high conservation values and importance for flood management as a water storage area. This Oxbow is bisected by an extension of the Mazengarb Stream, which has altered the hydrology of the area.

A feature of note on the northern side of the river is the Waimanu Lagoon. This is registered in the Kāpiti Coast District Plan Heritage Register (K175). Even though the site is highly modified, it has linkages to the Waikanae River mouth and provides continuation of open water habitat.[82] It has high use by water bird species. The Waimeha Lagoon is located further north and is also identified in the Heritage Register (K112), as wetland habitat. The river berm near the Waimanu Lagoon is maintained as mown grass for passive recreation and boat launching.

The Scientific reserve is located on the south bank, where the river opens out to a wide flat landscape in which estuarine flats and swamplands are the dominant features. Kāpiti Island provides a prominent backdrop in the distance.

On both sides of the river, on-going housing development has the potential to compromise the area's visual and ecological integrity. To the north of the River Corridor, housing has advanced on the remaining undeveloped sand dunes by the river and around the Waimanu Lagoon.

This reach has particular significance for tangata whenua. There are various mahinga kai sites and extremely significant taonga species populations. There are also wahi tapu sites in this area.

[81] Gabites, I (2010).
[82] Kapiti Coast District Council, 1999, Section I, Heritage Register.

13.2 Progress

Recommendations from the 1999 Strategy for this reach included providing for a high standard of recreational and interpretation facilities.[83] As such, a walking track with associated bridges and boardwalks has been built from the Otaihanga Oxbow through to Manly Street, on the south-western side of the Estuary. Various interpretative signs have also been installed by the Department of Conservation (DOC).

Recommendations also included requirements for where the river mouth was being cut. This included leaving a high level of sand on the spit to maintain bird habitat. This has been achieved.

In the more stable areas of the Estuary, DOC are replacing the marram grass with more appropriate species such as pingao and spinifex, as these are native to the area and create a more natural dune profile. KCDC and GWRC have been working on the northern side and achieved good results.

Since the 1999 WRES much positive ecological change has occurred on both sides of the estuary, in some cases going well beyond the recommendations of the Strategy. Large areas of the estuary are experiencing ecological transformation because of the pest control and restoration work carried out by restoration groups, KCDC, GWRC and DOC.

Further screen planting has been implemented around the Kotuku Park subdivision to reduce its visual impact within the River Corridor.

There were recommendations in the WRES of 1999 about vegetation management. These included removing taller growing introduced woody species from the river berm below the Otaihanga oxbow (south bank) and introducing buffer planting of local native species. This has not been done rather woody weed control and planting efforts have been within the scientific reserve to the west. Another recommendation in several areas was the protection of the estuary vegetation on the north bank. This has been achieved including the planting of buffer areas.

Recommendations from the 1999 WRES for the Waimanu Lagoon have largely not been achieved. Rather this area remains an amenity area with strong residential mandate for keeping the water edges cleared and mowed.

With regards to Mazengarb Stream, a particular recommended action from the 1999 Strategy was to advocate for improved water quality in the Mazengarb stream to enhance habitat. GWRC Environment have been active in this area but it remains an important recommendation.

13.3 Vegetation Management

On the south bank, the low grass and shrub cover should be retained as it is in character with the Estuary environment. There is, however, potential to introduce buffer planting between the Otaihanga oxbow (south bank, river cross section 50-60) and nearby housing.

On the north bank, a strip of estuarine vegetation at the river's edge has conservation value. Restoration and revegetation of the river face of the dune (river cross section 50) has begun and there is the potential to increase planting on the berm near Waimanu Lagoon, to diversify habitats and provide buffer screening between the river and new housing.

The Scientific Reserve is currently being restored in a joint project with DOC, KCDC and WECG. Integrated pest animal control occurs in the estuary on both sides of the river with the key target of mustelids (Stoats, ferrets and weasels), rats and hedgehogs.

13.4 Mazengarb Stream

Pollution of the Mazengarb Stream is a major issue of concern because of its impact on recreational activities and ecology. Extension of the stream via a drain cut through the middle of the Otaihanga oxbow has also altered the hydrology in the oxbow with potential adverse effects on the habitats there.[84]

[83] Department of Conservation, 1996.
[84] Boffa Miskell Ltd, 1992, p.11.

13.5 Recreation and Access

The Scientific Reserve has high recreational use and already has tracks to direct public access. Whitebait fishing from the mouth of the Waikanae River is traditional and has been allowed by gazette notice. Other fishing at the Waikanae River mouth, within the Scientific Reserve, is in conflict with its classification as a Scientific Reserve.

There have been problems with vehicular damage to dune and saltmarsh environments and with dogs disturbing bird life. This disturbance of wildlife could potentially increase with the encroachment of new housing around the Estuary. People are encouraged to use leads for dogs within the Estuary area.

The Local Government Act (LGA) only provides for enforcement of the KCDC Beach Bylaw 2009 through prosecution. As this is not a cost effective method, KCDC has implemented a permit system, whereby whitebaiters apply to KCDC for a permit to use a vehicle on the beach. The system has been working well over the last two years and has resulted in self-regulation (e.g. Whitebaiters telling others to get a permit), which is a positive outcome.

Facilities for recreation are currently confined to a boat-launching ramp near the Otaihanga Boat Club and Waimanu Lagoon, and picnic tables and toilets at Waimanu Lagoon. Facilities appear to meet current demand so further provision is not recommended at this stage, with the exception of extending the pedestrian network from the Estuary wakways to the Otaihanga Boat club on the south side of the river. The bridge across the river at Otaihanga Domain has recently been upgraded and now caters for wheel chair access.

13.6 Interpretation

DOC aims to encourage greater public appreciation of the conservation values of the Scientific Reserve through high quality interpretation signs. There is also the potential to foster a general understanding of the natural values of the area on the north side of the Estuary even though the main focus of interpretation opportunity lies within the Scientific Reserve.

13.7 Land ownership

The possible extension of the Scientific Reserve is the main land ownership opportunity in the estuary reach. Opportunities to further protect the estuary area from housing development have already been significantly reduced. There is very little extension possible given the adjacent residential development.

However, there remains undeveloped land with ecological value along the south side of the river outside the Scientific Reserve. This includes a small area of estuarine vegetation.

To date, sections at the south eastern end of the reserve have been purchased by DOC. This land is located in the River Corridor between river cross sections 45-70. Additionally, a smaller area has been purchased at the western end of the reserve. The Otaihanga oxbow is currently in private ownership.

For consistent ecological management, it would make sense for all of the estuarine habitats to be included in the Scientific Reserve. The Otaihanga Oxbow is important as an overflow area for the river, is a probable whitebait spawning site and is habitat for some rare plants.

Whitebaiting

13.8 Flood Risk Management

13.8.1 River bank edge protection

The fine sandy material which makes up the riverbed and banks is highly mobile and easily eroded. Consequently, large movements in the river channel are possible in a major flood. GWRC intends to keep the river within a preferred alignment/pattern, by considering options contained in the outcomes of the Gravel Analysis Report in 2010. These options will be heavily influenced by the current regime of management administered by the DOC in the Scientific Reserve.

13.8.2 Cutting the river mouth

Longshore drift causes a build up of material that, in turn, causes the river mouth to move gradually southward. GWRC intends to keep the river mouth from progressing too far southward by periodic cutting of the mouth. The current trigger point for cutting the mouth is when the exit to the sea has migrated more than 500m to the south, or 200m to the north of the groyne.

Cutting the river mouth affects the flow of water through the estuary and the periodic flushing that is considered beneficial for it[85]. The main lagoon in the estuary holds water while the river mouth is closer to the north (through river backwash), then becomes drier and stagnant when the river is in the mid part of its southward migration. As the river flows further to the south, the lagoon receives more water again by tidal flushing.

13.8.3 Management at the mouth

As the dynamics of the river and coastal influence are constantly changing, continued monitoring and consultation is required. Restoration of the Scientific Reserve under DOC's management is ongoing.

DOC sees the current management practice and the current regime as something of a compromise because it would prefer the natural estuarine dynamics to be maintained. However, existing property development has affected the implementation of this option.

The build up of gravel in the middle reaches (upstream of cross section 60-70) is influencing the amount of gravel in the Estuary. An increase in gravel in the reserve may 'stabilise' the river mouth and its interaction with the Estuary - or its estuarine influence. This would have a negative impact on the estuary's ecology.

Additionally, DOC have indicated that hard edge protection in the mouth reach is not appropriate for the Estuary's function and relationship with the Waikanae River, in terms of dynamic processes.

Any stabilisation of the current dynamic processes would work to 'divorce' the river from the Estuary itself. DOC's position is supported by research carried out by Dr Gibb which states that:

"recognition should be given by [GWRC] to allow for the migration cycle of the river mouth to continue as a natural process …as it rejuvenates the Waikanae Estuary, and not attempt to constrain such migration by constructing training works at the mouth"[86].

It is essential that the natural wetlands in this and, other areas of the River Corridor (and floodplain) are maintained in their natural state to perform the function of water storage in times of peak flow[87]. It is also important that any new stopbanks do not prevent floodwaters from inundating the wetlands associated with the Otaihanga oxbow and the Estuary.

The beach at Waikanae

[85] Boffa Miskell Ltd, 1992, p. 50.
[86] Gibbs, 2002, p. 22.
[87] Boffa Miskell Ltd, 1992, p. 50.

13.9 Recommended actions

13.9.1 Vegetation management

	Recommended Actions	Parties Involved
River cross section (XS)	**North bank**	
30-40	Revegetate the river face of the dune inland of Waimanu Lagoon with local native species typical of the dune environment. Consult with Tangata Whenua about this first, as this may affect the site of the former Waimeha Pa.	KCDC Tangata whenua
35	Plant a buffer of local coastal species near the riverside boundaries of new houses currently being developed beside Waimanu Lagoon (northeastern side of lagoon).	KCDC
25	Introduce more groups of flax and cabbage trees around the margins of Waimanu Lagoon to provide more bird habitat (northwestern side of lagoon).	KCDC
All areas	Recognise the particular significance of this area for tangata whenua and their interest in the in the management of this reach (see section 2)	GWRC KCDC Tangata whenua
River cross section (XS)	**South bank**	
20-50	Remove exotic woody species from the river berm below the Otaihanga oxbow, south bank).	DOC
55	Introduce buffer planting of local native species on the wider berm adjacent to the Otaihanga oxbow (river cross section 55)	DOC GWRC KCDC
All areas	Recognise the particular significance of this area for tangata whenua and their interest in the in the management of this reach (see section 2)	GWRC KCDC Tangata whenua
All areas	Protect the estuarine vegetation on the north bank and control weeds.	KCDC GWRC

13.9.2 Mazengarb Stream

Recommended Actions	Parties Involved
Advocate for improved water quality in the Mazengarb Stream to enhance the habitat for freshwater fish, birds and indigenous plant communities.[88]	DOC GWRC
Any discharge of treated wastewater from the KCDC treatment plant complies with resource consents issued by GWRC.	KCDC

[88] Department of Conservation, 1996, p. 88.

13.9.3 Recreation and Access

	Recommended Actions	Parties Involved
River cross section (XS)	**South bank**	
10-70	Prepare a site plan for the Scientific Reserve to minimise visitor impacts.[89]	DOC
10-70	Enforce bylaws under the Local Government Act or Reserves Act to restrict vehicle access on the beach and in the Scientific Reserve and allow dogs on leash only.[90]	KCDC DOC
10-70	Investigate and consult with the public over the appropriateness of allowing fishing within the Scientific Reserve.	DOC
60-90	Formalize pedestrian access between the Estuary walkway and the Otaihanga Boat Club	KCDC DOC
All areas	Outside the Scientific Reserve, any future development of recreational facilities should be confined to the Waimanu Lagoon and Otaihanga Boat Club areas and the rest of this reach kept undeveloped in keeping with the natural character of the setting.	KCDC DOC

13.9.4 Interpretation

	Recommended Actions	Parties Involved
River cross section (XS)	**North bank**	
30	Maintain the viewing point near the Waimanu Lagoon including general interpretation and map of the local habitats and their significance. This includes the Estuary and river, the Waimanu and Waimeha Lagoons and the Kāpiti Marine Reserve.	KCDC GWRC
30	Consult with tangata whenua about possible interpretation of the Waimeha Pa site.	KCDC Tangata Whenua
River cross section (XS)	**South bank**	
10-70	Within the site plan for the Scientific Reserve provide for a high standard of recreational and interpretation facilities[91].	DOC
10-70	Consult with tangata whenua on management of the Scientific Reserve, in particular on interpretation and management of historic resources.[92]	DOC

[89] Department of Conservation, 1996, p. 89.
[90] Department of Conservation, 1996, p. 89.
[91] Department of Conservation, 1996, p. 89.
[92] Department of Conservation, 1996, p. 88.

13.9.5 Land ownership

Recommended Actions	Parties Involved
Investigate and negotiate the extension of the reserve boundaries or management of adjacent area to establish buffers for the reserve, for example through covenants.[93]	DOC KCDC
Discuss management responsibilities with KCDC regarding the land that it owns.	KCDC
Investigate and negotiate the inclusion of the Otaihanga oxbow area in the Scientific Reserve for management purposes.	Private landowner DOC

13.9.6 Flood risk management

	Recommended Actions	Parties Involved
River cross section (XS)	**North bank**	
All areas	Develop a Memorandum of Understanding with DOC based on ensuring flood risk management is integrated with the existing Management Strategy at the Scientific Reserve.	GWRC DOC
10-30	Continue ongoing liaison between GWRC and DOC regarding the ecological effects of the river mouth management regime.	GWRC DOC
10	Balance the need to maintain a flat fore dune for flood risk management purposes with the need to leave a sufficient level of sand on this spit to maintain bird habitat.	GWRC
10	Manage the Scientific Reserve to allow water to flow through the lagoon, which lies in part of the old river course. The river mouth can still be cut straight through to the sea periodically as required for flood risk management purposes.	GWRC DOC
All areas	In the first instance, consider the use of vegetation to ensure bank edge stabilisation.	GWRC

[93] Department of Conservation, 1996, p. 88.

APPENDICES

14. Appendix 1

14.1 Restoration Guidelines

14.1.1 Purpose

These guidelines are intended to provide community groups and private landowners with information that supports the restoration of native vegetation and associated habitats within the Waikanae River Corridor without disrupting important flood management functions.

These guidelines are not intended to be comprehensive but to provide a set of guidelines that help focus efforts on enhancing the Waikanae River as a mountains-to-sea ecological corridor. Please refer to GWRC's publications on restoration planting, riparian management and wetland restoration listed in the Further Reading section.

14.1.2 Background

Throughout the Strategy various opportunities are identified to restore habitats or diversify vegetation types, both within the River Corridor itself and in adjacent areas. These can include riparian reserves and potential ecological corridors, both along the river and between important sites for biodiversity.

The Waikanae River naturally forms a link from the Tararua ranges to the sea but its ecological functioning has been affected by historic clearance of indigenous vegetation and modifications to the river's course. Over time, advances have been made in the protection and replanting of some areas, with effort contributed by community groups and a range of agencies.

In line with the vision and objectives of the Environmental Strategy, there are areas in the River Corridor that could be further linked and restored in order to recreate a fully functioning ecosystem.

14.2 Restoration Planting

14.2.1 Planning

Good planning is the key to successful restoration projects. Writing a restoration plan before beginning work on a project can provide a means for collaboration between councils and community groups on planting. It helps those involved in restoration to consider preparation, procurement of plants, and maintenance requirements for each site before it is established. Setting clear, measurable objectives will help to guide the project and reach agreement.

Each planting site within the River Corridor will be assessed by the GWRC Flood Protection department on a case by case basis in order to ensure that plant configuration and species are appropriate, given presence of flood risk management assets, overflow paths and operational activities. Aerial images showing the location of flood protection assets, sightlines, River Corridor flow paths and overflow paths are available from GWRC.

Plans should cover at least 3-5 years to ensure that the new planting does not fail and to achieve the creation of valuable habitat. Time will need to be factored in for various tasks outlined below in the Methods section. Weed control and sourcing of plants, in particular, are best done at certain times of the year (see Site Preparation and Plant Species below).

Every restoration project requires specific planning according to the site conditions, objectives of the project, budget and other available resources. In particular, when setting restoration objectives it is important recognise that the river now flows through a modern landscape and that establishing pristine pre-human forest is unrealistic. However, a great deal can and has been achieved in restoring native ecosystems that would contribute to the overall vision of the Waikanae River Environmental Strategy. For further information please refer to 'Restoration Planting' or other publications referred to in the Further Reading section.

14.2.2 Site Preparation

Weed control is essential to the success of native revegetation and will require ongoing management to maintain existing and newly established areas of vegetation. It can involve chemical herbicide sprays or physical methods, such as hand weeding, to remove or kill the plant. Each technique has its strengths and weaknesses depending on the situation.

Lack of weed control is the most common cause of restoration failure. The weed burden at a site may require between one and three years to address. If weed control and site preparation result in delays to planting, this time can be used as an opportunity to establish eco-sourced plants.

Throughout the River Corridor weed infestation is a serious problem. Species such as *Tradescantia* (wandering willy) are widespread beneath the cover of existing vegetation and this prevents the regeneration of native vegetation that would otherwise occur. Because of the necessity for weed control, planting should be carried out in small, manageable areas so that these can be readily maintained and monitored.

For further information, refer to 'Pest Plants of the Wellington Region' (see Further Reading section) or contact GWRC Biosecurity department.

14.2.3 Planting Techniques

Summarised below are a number of techniques that can be used to improve the success of planting:

- *Natural regeneration* may be possible in some areas if there is evidence of seedlings and/or a source of seeds from nearby mature trees or vegetation
- *Nurse planting* greatly assists the establishment of native vegetation by sheltering young plants helping them to establish. These fast growing, hardy "pioneer" species quickly establish vegetation cover that supports the growth of slower and more sensitive plants. Eventually, these "secondary" species will become established and overtop the pioneers.. There are a number of native pioneer species that can be used as nurse crops recommended as the 'first fifteen' in Restoration Planting (see Further Reading). The use of exotic nurse crops is not recommended unless using existing mature trees
- *Underplanting* where some tree cover is already established with desirable long-lived woody species is a common recommendation in the Strategy. This provides advantageous conditions for many native species and reduces the chance of theft or vandalism because underplanting is less obvious than new plantings on open ground. It also adds to the diversity of existing vegetation
- *Willow replacement* is the process of gradually clearing areas of planted willow where erosion control is no longer needed and using this as new ground for planting. In some areas, underplanting or thinning and planting may be more appropriate. Where willows are being used as a front-line defence for flood risk management (closest to the riverbank), there may be an opportunity to interplant with natives. Depending on the level of flood risk, willows can be removed (behind the front-line of defence) and replaced with natives
- *Node planting* focuses efforts on a small manageable area to ensure successful establishment. These nodes can then expand over time either by planting or natural regeneration and join together. Alternatively, if they remain separated they could be used as stepping stones for species moving along the River Corridor
- *Dense planting* is recommended to ensure growth quickly blocks out light to the ground, supressing weed growth. This may need thinning later on for additional planting to increase species diversity
- *Mulching and tree collars* are useful non-chemical methods to help new planting establish whilst keeping weeds at bay. Mulching keeps the soil moist around new plants, while tree collars prevent the growth of weeds close to the plant
- *Guards* are important for protection against browsing and bark stripping by rabbits which are prevalent along the river, particularly on the south side. These are simple plastic or netting sleeves that can be placed over young plants and secured with small stakes
- *Ground conditions* such as soil type can often affect the success of planting. You may need to take account of this when planning how to plant. For example, stony soils can be difficult to dig, dry soils will have an effect on the need to create water depressions around plants or apply aqua gel and poor soils may need fertiliser
- *Planting seasons* can differ depending on the location and type of revegetation. Most planting sites should be planted in autumn or winter when slow growth and moist soil allows plants to get established. However, on wet sites close to the water, or where a new wetland is being created, it may be more appropriate to plant in summer when water levels are lower. In this situation see 'A beginner's guide to wetland restoration' in Further Reading

- *Eco-siting* recognises that within any one planting site, there might be a range of site conditions for which plants should be selectively located. Examples include damp hollows below a well-drained slope, permanently wet margins in a wetland with drier edges, and areas that are more or less exposed to wind
- *Ease of maintenance* should be taken into account when planning a site. GWRC and KCDC officers can provide advice on a site by site basis
- *Shared paths* When planting near a shared path, it is important to be sensitive to the needs of all users of the path, including walkers, runners, cyclists, and horse riders. Cyclists and horse riders in particular need to be able to see what is ahead of them, so planting which will create blind corners or is undesirable. Planting areas should be set back from the shared path so that the plants do not grow over and block the path. Flaxes should be set at least two metres back from the path, and trees and shrubs at least one metre back.

More detail on some of these techniques can be found in other GWRC publications (see Further Reading section).

14.3 Plant Species

A range of site conditions occur which influence the species that should be selected for restoration planting. Within the Waikanae River Corridor, the main environmental factors that influence vegetation types appear to be the level of the water table and tidal influence. GWRC and KCDC Biodiversity staff can provide advice to assist in planning your planting site, selecting appropriate species and finding local suppliers of eco-sourced plants in order to get the best results.

Plants used in restoration planting in the Waikanae River Corridor should come from seed that has been eco-sourced. For the Waikanae River Corridor they should be species that are native to the Foxton Ecological District and appropriate for the particular site.

Where possible, plants should be grown from seed gathered from plants growing near the restoration site. Ensure that the original source of these plants is local and bear in mind that a permit is required from the Department of Conservation if collecting from public conservation land.

Some non-local native species such as karo have become invasive and should be avoided. Appendix 2 provides suggested planting in four themes covering all of the reaches.

14.4 Ongoing management

After investing time, money and effort in planting it is essential in the first five years to follow this up and tackle the threats which young plants face.

Releasing plants from competing weeds will be needed for the first two or three years. It is always better to tackle weeds at an early stage when they are small than to allow them to smother young plants when treatment will be much more difficult. Care needs to be taken when applying chemical control to avoid killing the native plants you are trying to protect.

To prevent guards from contributing to litter problems, it will be necessary to remove these as plants outgrow. If no guards were used it may be necessary to carry out pest control if rabbits continue to browse the plants.

In general, restoration is a long-term undertaking that involves monitoring and successive planting as early 'nurse' plantings become established. Thinning may be beneficial after five years to avoid overcrowding, increase structure in the canopy and provide spaces for new planting. This may be the opportunity to include special slower-growing forest species.

It may be helpful and rewarding to take use photo points to show progress over time. Keen birders may also be interested in undertaking five-minute bird counts to track changes in the avian biodiversity visiting your site.

For further information, see "Controlling problem weeds" in Further Reading or contact GWRC's Biodiversity team.

14.5 Aligning Restoration and Flood Risk Management Activities

Restoration activities in the River Corridor need to be aligned with flood risk management activities, to prevent an increase in flood risk to the Waikanae and Otaihanga communities. For this reason any new planting sites need to be assessed and approved by GWRC Flood Protection staff before site preparation commences.

The following factors should be taken into account when planning restoration planting in the River Corridor.

14.5.1 River Corridor Flow Paths and Overflow paths

Overflow paths are the areas where water will spill out from the river and over the surrounding floodplain in a large flood event. These are shown in the District Plan.

River Corridor Flow Paths are areas within the river corridor that have been identified as carrying a significant proportion of the flow in a major flood. If they become blocked, the risk of flood waters overtopping flood defences increases. Note that the XS references in this Strategy are approximate, The GWRC Flood Protection Department can provide maps to show the locations of River Corridor Flow Paths.

The risks associated with blockages of both overflow paths and River Corridor Flow Paths mean that planting restrictions are necessary. Grasses and flaxes are generally suitable in these areas, however planting trees and shrubs should generally be avoided.[94]

14.5.2 Risks of undertaking restoration in the river corridor.

The river corridor is a dynamic environment and there is a risk that flooding events and erosion may damage restoration plantings. In these situations GWRC Flood Protection bears no responsibility for reinstatement or protection of any restoration plantings.

In addition, there is a risk that currently unforeseen future flood protection measures may require the removal or alteration of restoration sites. If such measures are proposed, GWRC will consult with the relevant restoration groups before final decisions are made.

14.5.3 Stopbanks

No planting is allowed on or within 5 metres of stopbanks as tree roots can damage the stopbank.

14.5.4 River cross sections

River cross sections or sight lines (see Diagram 2) are required so that the river channel can be surveyed for hydraulic modelling purposes and to monitor gravel movement in the river bed. Surveyors need to be able to see from one marker to the other marker on the opposite bank of the river. In order for accurate readings to be taken, a clear space of two metres is needed on either side of the cross section/sight line.

It is important that planting does not block survey sightlines

[94] River Corridor Flow Paths were modelled by GWRC in 2014. Some planting has been undertaken or approved in these areas prior to the definition of these Flow Paths. This planting can remain, however the management of the planting is under discussion and low branches may have to be cleared once the planting is mature to allow flood waters to flow through.

Sight lines are cleared periodically and any vegetation that will get in the way of the survey removed. Only low grasses can be planted in these areas.

14.5.5 Rock lining/rip-rap

This technique involves use of rocks to line the riverbank to prevent erosion. Where rip-rap is installed, a level area, set into the bank, is needed for machinery to access the rock lining to carry out repairs. Although this may only happen after flood damage, or on a very infrequent basis, any restoration planting in this area may be lost when machinery access is required.

14.5.6 Access points

At times Flood Protection staff need to access the river at designated access points. These areas need to be wide enough for heavy machinery and vehicles to carry out their activities. A stockpile area may also be required. These areas should either be kept as short grass or have a metal surface. Any native plantings in these areas should be kept well back from the work area to avoid being damaged.

14.5.7 Haul road

The haul road on the south bank of the Waikanae River is an operational area used for maintenance and, in places, for extraction of gravel from the river. The haul road needs to be five metres wide meaning in some places plantings may need to be set back.

14.6 Further Reading

Greater Wellington Regional Council produces the following publications:

- Restoration planting (2014)
- A beginner's guide to wetland restoration (2009)
- Wellington regional native plant guide (2010)
- Pest plants of the wellington region.

These are all available to download from our website at www.gw.govt.nz.

Also available is Growing Natives in Kāpiti (Kāpiti Coast District Council, 1999), available from www.Kāpiticoast.govt.nz.

15. Appendix 2

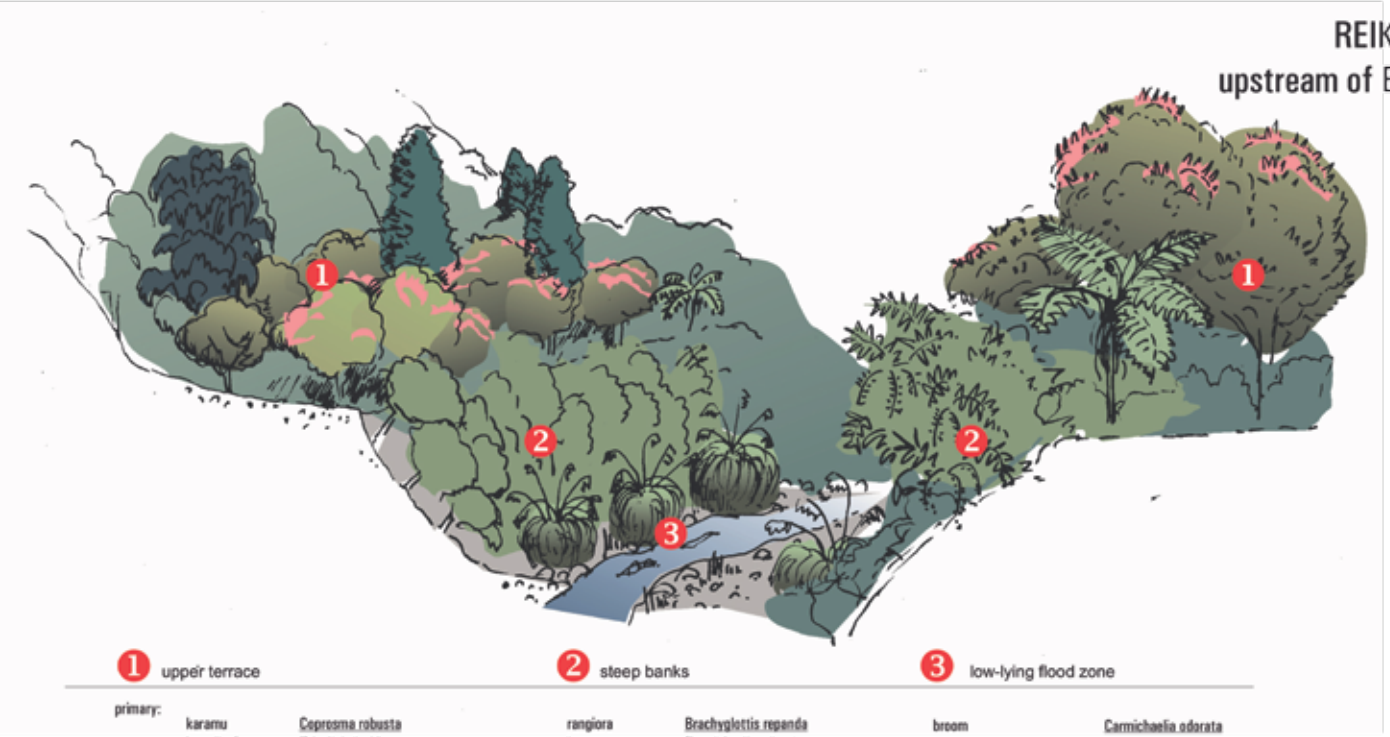
15.1 Appropriate Plant Species by Reach

This is intended to be used as a guide, it is not an exhaustive list of all species that are appropriate for restoration planting in the Waikanae River Corridor. A more comprehensive list of species suitable for planting in river margin environments in the Foxton Ecological District can be found in Ward, 2102, Kāpiti District Endemic Floral Species List[95]. In addition, GWRC and KCDC officers can provide advice on selecting species that are suitable for a particular site.

[95] Ward, 2012.

RESTORATION BY REACH: APPROPRIATE PLANT SPECIES AND LOCATION

REIKORANGI BASIN
upstream of Burnard Gardens



1 upper terrace

primary:

karamu	**Coprosma robusta**
broadleaf	Griselinia lucida
koromiko	Hebe stricta var atkinsonii
mahoe	Melicytus ramiflorus
mapou	Myrsine australis
akiraho	Nestigis lanceolata
white maire	Olearia paniculata
lemonwood	Pittosporum eugenioides
kohuhu	Pittosporum tenuifolium
five finger	Pseudopanax arboreus
kamahi	Weinmannia racemosa

secondary (once full cover by primary plantings is established):

tawa	Beilschmedia tawa
putaputaweta	Carpodetus serratus
kanono	Coprosma grandifolia
shrubby coprosma	Coprosma rhamnoides
silver fern	Cyathea dealbata
mamaku	Cyathea medullaris
rimu (few)	Dacrydium cupressinum
hinau (few)	Elaeocarpus dentatus
hangehange	Geniostoma ligustrifolium
rewarewa	Knightia excelsa
northern rata (few)	Metrosideros robusta
lancewood	Pseudopanax crassifolius

2 steep banks

rangiora	**Brachyglottis repanda**
broom	Carmichaelia odorata
karamu	Coprosma robusta
tutu	Coraria arborea
toetoe	Cortaderia fulvida
cutting sedge	Gahnia pauciflora
broadleaf	Griselinia lucida
koromiko	Hebe stricta
akiraho	Olearia paniculata
hard fern	Paesia scaberula
five finger	Pseudopanax arboreus
climbing rata	Metrosideros perforata
climbing rata	Metrosideros diffusa
mapou	Myrsine australis
pate	Schefflera digitata

3 low-lying flood zone

broom	**Carmichaelia odorata**
toetoe	Cortaderia toetoe
giant umbrella sedge	Cyperus ustulatus
kotukutuku (in damp shade)	Fuchsia exorticata

Drawings and species lists are indicative only

RESTORATION BY REACH: APPROPRIATE PLANT SPECIES AND LOCATION

REIKORANGI / WTP
PARIKAWAU / EDGEWATER
WAIPUNAHAU / JIM COOKE

stony ground with silts

1 upper level - exposed/sunny

primary:

karamu	Coprosma robusta
shrubby coprosma	Coprosma propinqua
thin leaved coprosma	Coprosma areolata
tutu	Coriaria arborea
koromiko	Hebe stricta
kanuka	Kunzia ericoides
mapou	Myrsine australis
kohuhu	Pittosporum tenuifolium
lancewood	Pseudopanax crassifolius

secondary (once full cover by primary plantings is established):

titoki	Alectryon excelsus
totara (few)	Podocarpus totara
rewarewa	Knightia excelsa
kowhai	Sophora microphylla
mahoe	Melicytus ramiflorus
wineberry	Aristotelia serrata

1 upper level - semi shade/shade

kanono	Coprosma grandifolia
shrubby coprosma	Coprosma rhamnoides
hangehange	Geniostoma ligustrifolium
mahoe	Melicytus ramiflorus
white maire	Nestegis lanceolata
kaikomako	Pennantia corymbosa
five finger	Pseudopanax arboreus
lancewood	Pseudopanax crassifolius

tawa	Beilschmedia tawa
kohekohe	Dysoxylum spectabile
hinau (few)	Elaeocarpus dentatus
kawakawa	Macropiper excelsum
wharangi	Melicope ternata
totara	Podocarpus totara
matai (few)	Prumnopitys taxifolia
nikau	Rhopalostylis sapida
towai	Streblus banksii

2 sloping banks

shrubby coprosma	Coprosma propinqua
toetoe	Cortaderia fulvida
kanuka	Kunzia ericoides
coastal shrub daisy	Olearia solandri
tauhinu	Ozothamnus leptophylla
kowhai	Sophora microphylla

3 low-lying flood zone

primary:

ti kouka / cabbage tree	Cordyline australis
toetoe	Cortaderia toetoe
giant umbrella sedge	Cyperus ustuletus
kotukutuku (in damp shade)	Fuchsia excorticata
manuka	Leptospermum scoparium
twiggy tree daisy	Olearia virgata
harakeke	Phormium tenax

secondary (once full cover by primary plantings is established):

kahikatea	Dacrycarpus dacrydioides
rimu (few)	Dacrycarpus cupressinum
hinau (few)	Elaeocarpus dentatus
pokaka	Elaeocarpus hookerianus
mapere / gahnia	Gahnia xanthocarpa
pukatea	Laurelia novae-zelandiae
swamp maire	Syzygium maire

4 back-eddy edges

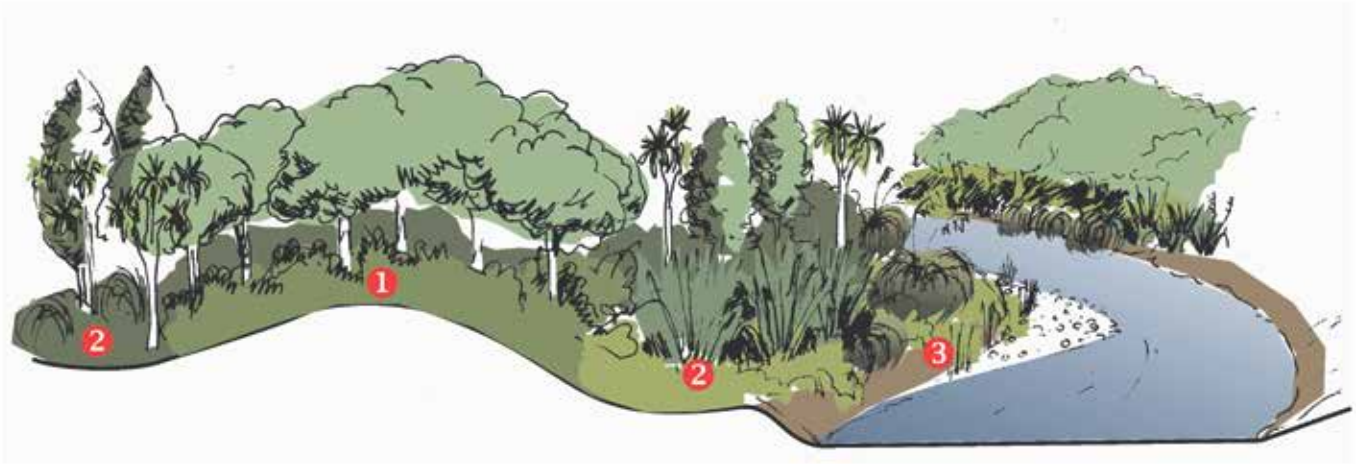
ruatahi	Carex geminata
purei	Carex secta
carex	Carex virgata
toetoe	Cortaderia toetoe
giant umbrella sedge	Cyperus ustulatus
harakeke	Phormium tenax
kapungawha	Schoenoplectus tabernaem
raupo	Typha orientalis

Drawings and species lists are indicative only

RESTORATION BY REACH: APPROPRIATE PLANT SPECIES AND LOCATION

TE AORERE / HOLIDAY PARK
PUKEKAWA

sandy



1 dry slopes

primary:

taupata	Coprosma repens
corokia	Corokia cotoneaster
akeake	Dodonaea viscosa
koromiko	Hebe stricta var atkinsonii
kanuka	Kunzia ericoides
mapou	Myrsine australis
coastal shrub daisy	Olearia solandri
akiraho	Olearia paniculata
tauhinu	Ozothamnus leptophyllus

secondary (once full cover by primary plantings is established):

thin leaved coprosma	Coprosma areolata
shrubby coprosma	Coprosma rhamnoides
mahoe	Melicytus ramiflorus
NZ jasmine	Parsonsia heterophylla
kaikomako	Pennantia corymbosa
totara	Podocarpus totara
five finger	Pseudopanax arboreus
lancewood	Pseudopanax crassifolius
kowhai	Sophora microphylla

2 low-lying flood / swamp zone

primary:

Glen Murray tussock	Carex flagellifera
rautahi	Carex geminata
shrubby coprosma	Coprosma propinqua
ti kouka / cabbage tree	Cordyline australis
toetoe	Cortaderia toetoe
giant umbrella sedge	Cyperus ustulatus
manuka	Leptospermum scoparium
twiggy tree daisy	Olearia virgata
harakeke	Phormium tenax

secondary (once full cover by primary plantings is established):

kahikatea	Dacrycarpus dacrydioides
rimu (few)	Dacrycarpus cupressinum
hinau	Elaeocarpus dentatus
pokaka	Elaeocarpus hookerianus
kotukutuku (in damp shade)	Fuchsia exorticata
mapere / gahnia	Gahnia xanthocarpa
pukatea	Laurelia novae-zelandiae
swamp maire	Syzygium maire

3 soft banks and backwaters

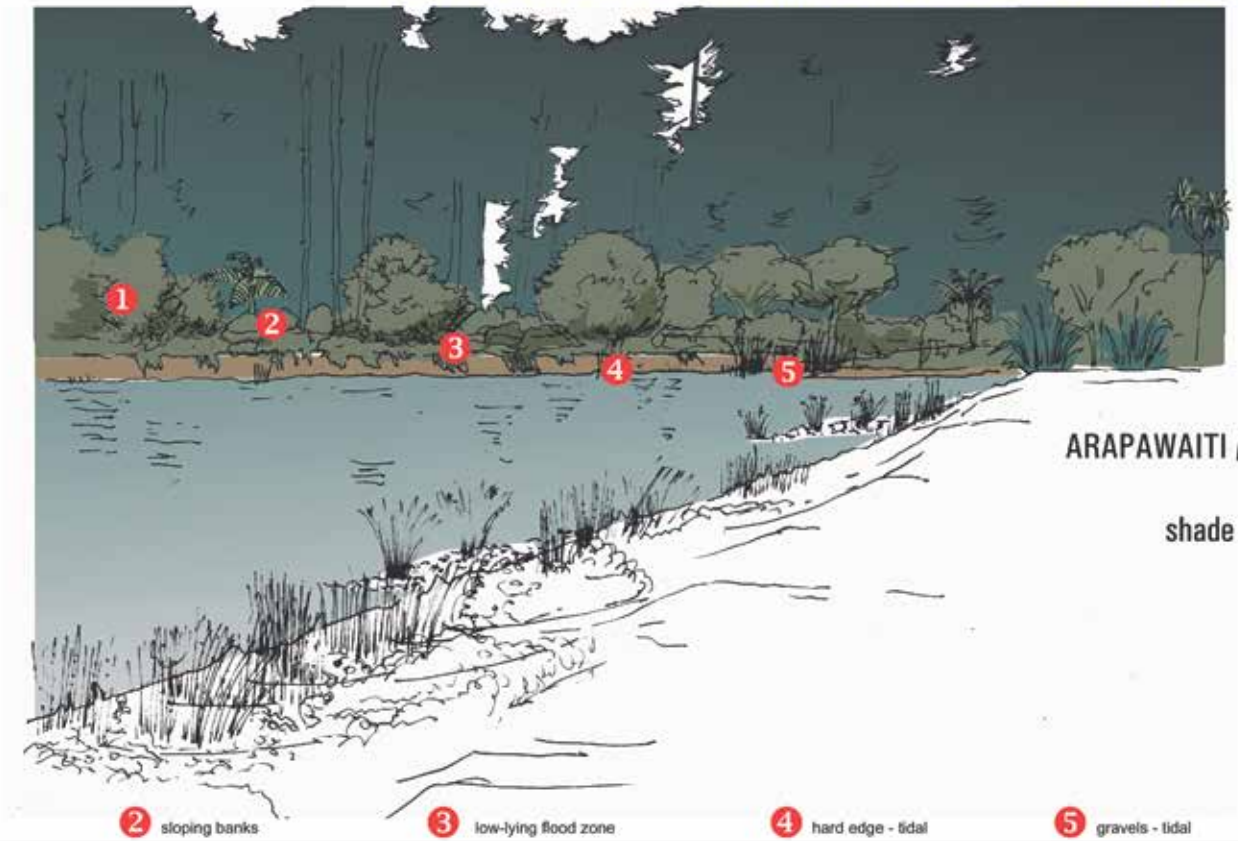
Glen Murray tussock	Carex flagellifera
rautahi	Carex geminata
purei	Carex secta
carex	Carex virgata
toetoe	Cortaderia toetoe
giant umbrella sedge	Cyperus ustulatus
harakeke	Phormium tenax
kupungawha	Schoenoplectus tabernaemontani
raupo	Typha orientalis

hard banks

knobby clubrush	Ficinia nodosa
small leaved pohuehue	Muehlenbeckia complexa
NZ spinach	Tetragonia implexicoma

Drawings and species lists are indicative only

RESTORATION BY REACH: APPROPRIATE PLANT SPECIES AND LOCATION



ARAPAWAITI / KENAKENA

shade / semi-shade

1 upper level

speckled sedge	Carex testacea
taupata	Coprosma repens
karamu	Coprosma robusta
silver fern	Cyathea dealbata
mahoe	Melicytus ramiflorus
mapou	Myrsine australis
five finger	Pseudopanax arboreus

2 sloping banks

speckled sedge	Carex testacea
shrubby coprosma	Coprosma propinqua
shrubby coprosma	Coprosma rhamnoides

3 low-lying flood zone

kiokio	Blechnum novae-zelandiae
ti kouka / cabbage tree (few)	Cordyline australis
small leaved pohuehue	Muehlenbeckia complexa
twiggy tree daisy	Olearia virgata
saltmarsh ribbonwood (damp)	Plagianthus divaricatus
bracken	Pteridium esculentum
NZ spinach	Tetragonia implexicoma

4 hard edge - tidal

sea primrose	Samolus repens
NZ spinach	Tetragonia implexicoma

soft edge - tidal

oioi / jointed wire rush	Apodasmia similis
marsh flower	Cotula coronopifolia
shore cotula	Leptinella dioica
sea primrose	Samolus repens
selliera	Selliera radicans
NZ spinach (uppermost)	Tetragonia implexicoma

5 gravels - tidal

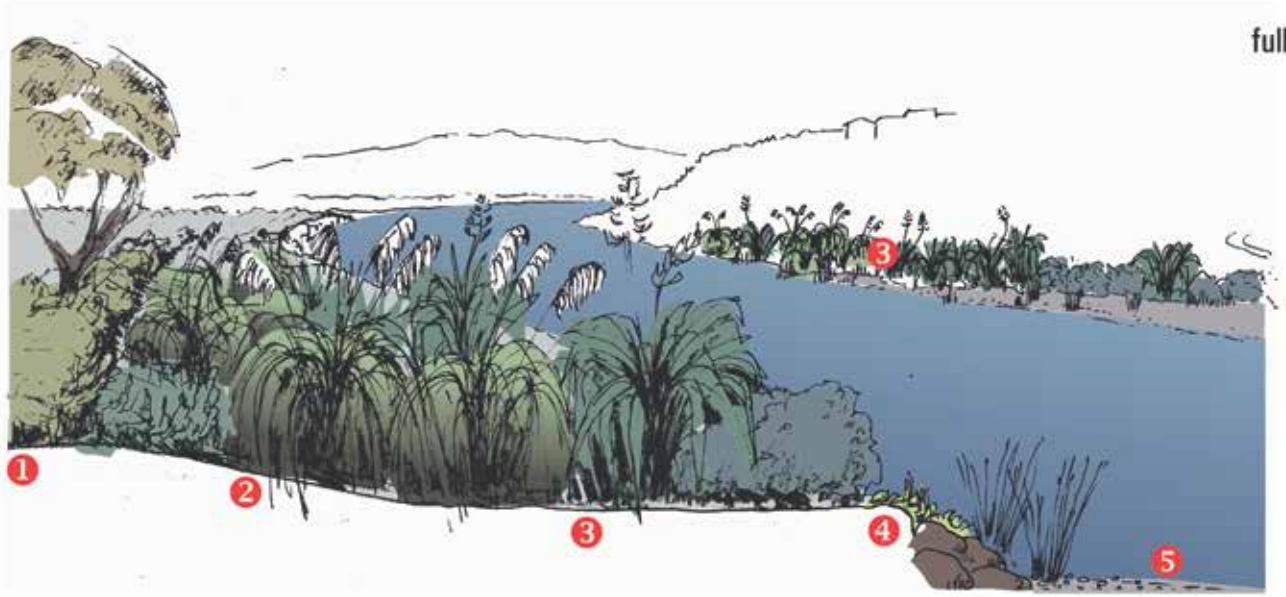
oioi / jointed wire rush	Apodasmia similis
sea rush (lowermost)	Juncus maritimus var australiensis
kapungawha	Schoenoplectus tabernaemontani

Drawings and species lists are indicative only

RESTORATION BY REACH: APPROPRIATE PLANT SPECIES AND LOCATION

ARAPAWAITI / KENAKENA

full exposure / sun



1 upper level

speckled sedge	Carex testacea
taupata	Coprosma repens
shrubby coprosma	C. propinqua
shrubby coprosma (shade)	C. rhamnoides
ti kouka / cabbage tree	Cordyline australis
corokia	Corokia cotoneaster
kanuka	Kunzia ericoides
manuka	Leptospermum scoparium

2 sloping banks

speckled sedge	Carex testacea
shrubby coprosma	Coprosma propinqua
corokia	Corokia cotoneaster
toetoe (along base)	Cortaderia toetoe
coastal shrub daisy	Olearia solandri
tauhinu	Ozothamnus leptophylla

3 low-lying flood zone

ti kouka / cabbage tree (few)	Cordyline australis
toetoe	Cortaderia toetoe
twiggy tree daisy	Olearia virgata
harakeke	Phormium tenax
NZ spinach	Tetragonia implexicoma

edges, clear of larger plants:

shore carex	Carex litorosa
sand sedge	Carex pumila
small leaved pohuehue	Muehlenbeckia complexa
sand daphne (sandy, sunny)	Pimelea arenaria
saltmarsh ribbonwood (damp)	Plagianthus divaricatus

4 hard edge - tidal

shore carex	Carex litorosa
sea primrose	Samolus repens
NZ spinach	Tetragonia implexicoma

soft edge - tidal

oioi / jointed wire rush	Apodasmia similis
marsh flower	Cotula coronopifolia
selliera	Leptinella dioica
sea primrose	Samolus repens
shore cotula	Selliera radicans
NZ spinach (uppermost)	Tetragonia implexicoma

5 gravels - tidal

oioi / jointed wire rush	Apodasmia similis
sea rush (lowermost)	Juncus maritimus var australiensis
kapungawha	Schoenoplectus tabernaemontani

Drawings and species lists are indicative only

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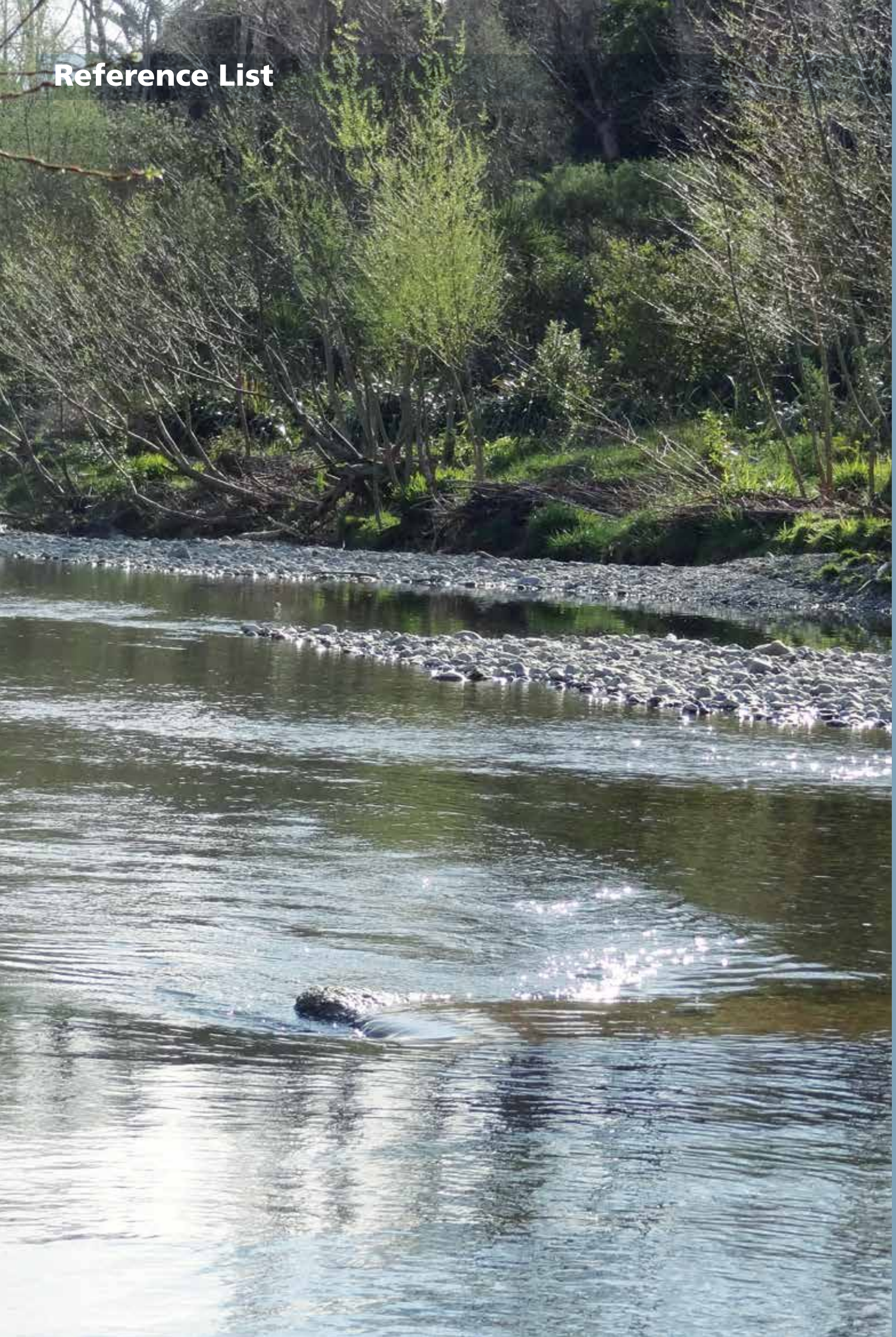

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The Greater Wellington Regional Council promotes **Quality for Life** by ensuring our environment is protected while meeting the economic, social and cultural needs of the community

FOR FURTHER INFORMATION

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