Waiwhakareke Natural Heritage Park

Operative Management Plan

2011

Prepared by Parks and Gardens Unit
Hamilton City Council

In conjunction with:

Centre for Biodiversity and Ecology Research
Department of Biological Sciences
The University of Waikato
Hamilton

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1.0 Overview

The overall goals for the Waiwhakareke Natural Heritage Park Management Plan are:

1.1 To provide a framework for the development and management of Waiwhakareke Natural Heritage Park

It is important that the Management Plan give clear direction to the development of the Heritage Park. A long-term project benefits from consistent policy to guide management decisions.

1.2 To provide a framework to conserve and enhance the natural, recreational, educational and cultural values of Waiwhakareke Natural Heritage Park for the benefit of the community

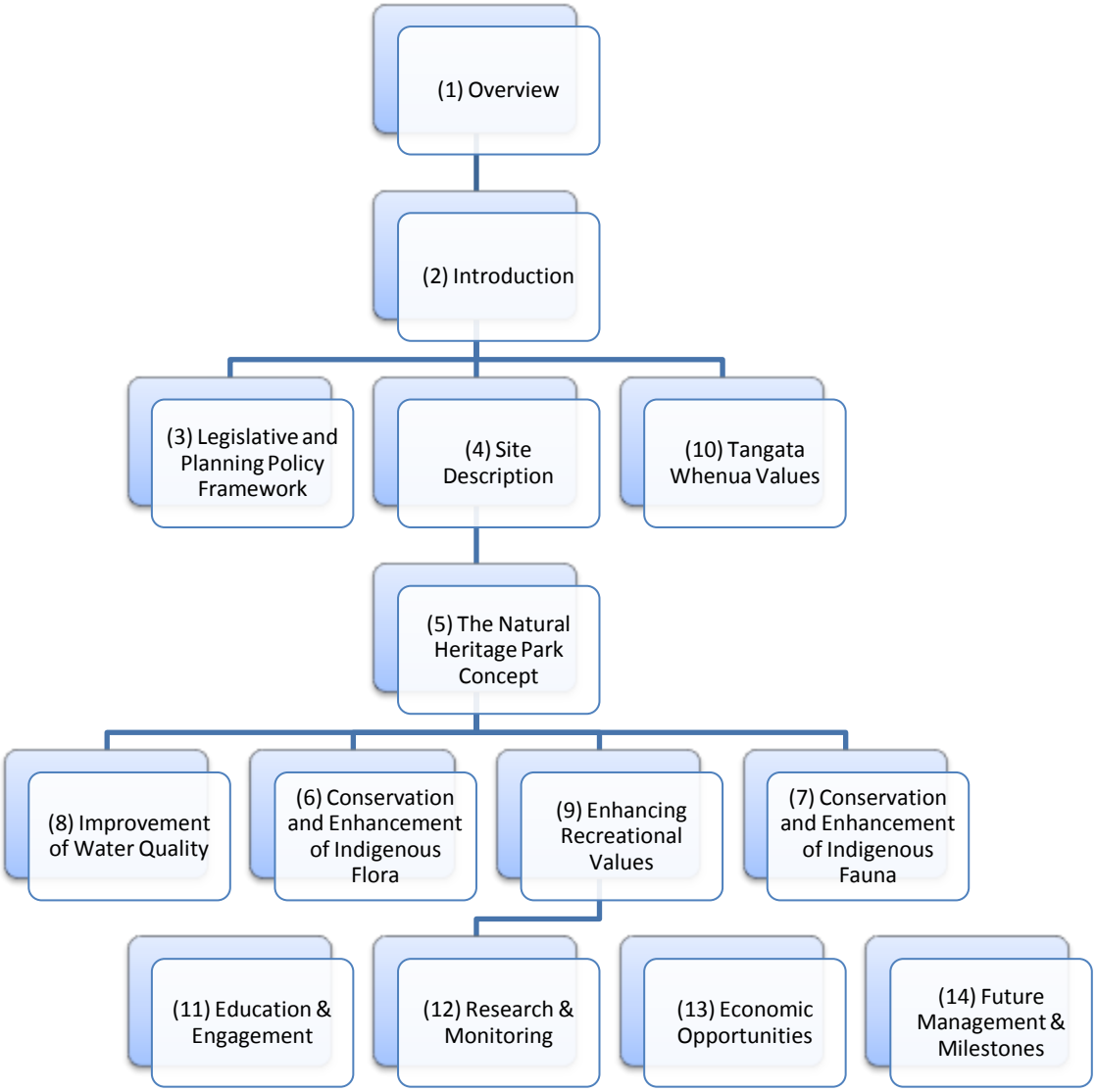
Sections 2-4 of the Management Plan provide a picture of the state of the Park before restoration began and during the early stages of that process. Sections 5-14 provide a detailed description of the way in which the park's ecology will be restored and its other aspects will be developed.

1.3 To support Hamilton City Council's commitment to sustainable development as defined by Agenda 21 and required under the Resource Management Act 1991

In the long term the outcomes of the establishment of the Heritage Park will be significant across the spheres of ecology, education, research, engagement and tourism. The Park is a significant commitment by the key partners involved in the project - Hamilton City Council, University of Waikato, WINTEC and Tui 2000 (partners as at July 2010).

The diagram on the following page illustrates the layout of the plan and provides an overview of the elements it covers with relevant section numbers for ease of reference.

Picture 1 - Lake Waiwhakareke from Baverstock Road 2009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2.0 Introduction

2.1. Introduction

This management plan will provide the framework for the future management of Waiwhakareke Natural Heritage Park (Fig. 1), in its early stages of development at the time of writing this plan (2010). Thus this plan both describes the current assets and state of Waiwhakareke Natural Heritage Park and provides guidance for its future management and development. The Plan has been prepared in accordance with the process set out in the Reserves Act 1977. Other legislative and policy drivers of the plan are described in Section 3.

Waiwhakareke Natural Heritage Park is a 60 ha site containing a small Waikato peat lake (Waiwhakareke, also known as Horseshoe Lake). The land is adjacent to Hamilton Zoo and the Avalon Campus of the Waikato Institute of Technology (Fig. 2) and thus provides unique opportunities for research and education. It is also one of the last opportunities within city boundaries for a large open space project including a water body. The project will increase the biodiversity and environmental values of Hamilton City and provide residents and visitors with increased recreation and tourism opportunities.

Hamilton City Council purchased the land at Waiwhakareke in 1975 to help provide the recreational and green space required for a growing population. The land has remained in Council ownership since that time, and has been leased for farming. The Natural Heritage Park concept began as a proposed joint venture between Hamilton City Council and Waikato Polytechnic (now Waikato Institute of Technology, or Wintec). Initially conceived as a "Living Museum", the vision as it has evolved is to develop a natural heritage park that will restore and recreate the native plant and animal communities that once existed within Hamilton and more specifically at the park site. In time it is intended that most of the Park will be enclosed by a predator proof fence that will enhance ecological outcomes by protecting vulnerable species.

On 6 May 1998 the Council gave its initial endorsement of the project; this covered incorporation of the concept in the District Plan and re-vegetation round the lake. On 9 April 2003 Council resolved that:

"Council state its intention to devote its land holding in Horseshoe Lake, shown in the report before the committee, less an area to be subdivided off for residential development in the South East corner, for development as a Natural Heritage Park and the Strategic Planning and Policy Co-ordination Committee be requested to amend the proposed District Plan accordingly".

On 30 June 2004 Hamilton City Council approved the concept plans for Waiwhakareke Natural Heritage Park. Small scale lake margin planting began in the winter of 2004. The project's key partners include The University of Waikato, Waikato Institute of Technology (Wintec), Nga Mana Toopu O Kirikiriroa Limited Resource Management and Cultural Consultants (NAMTOK), Tui 2000 and Hamilton City Council.

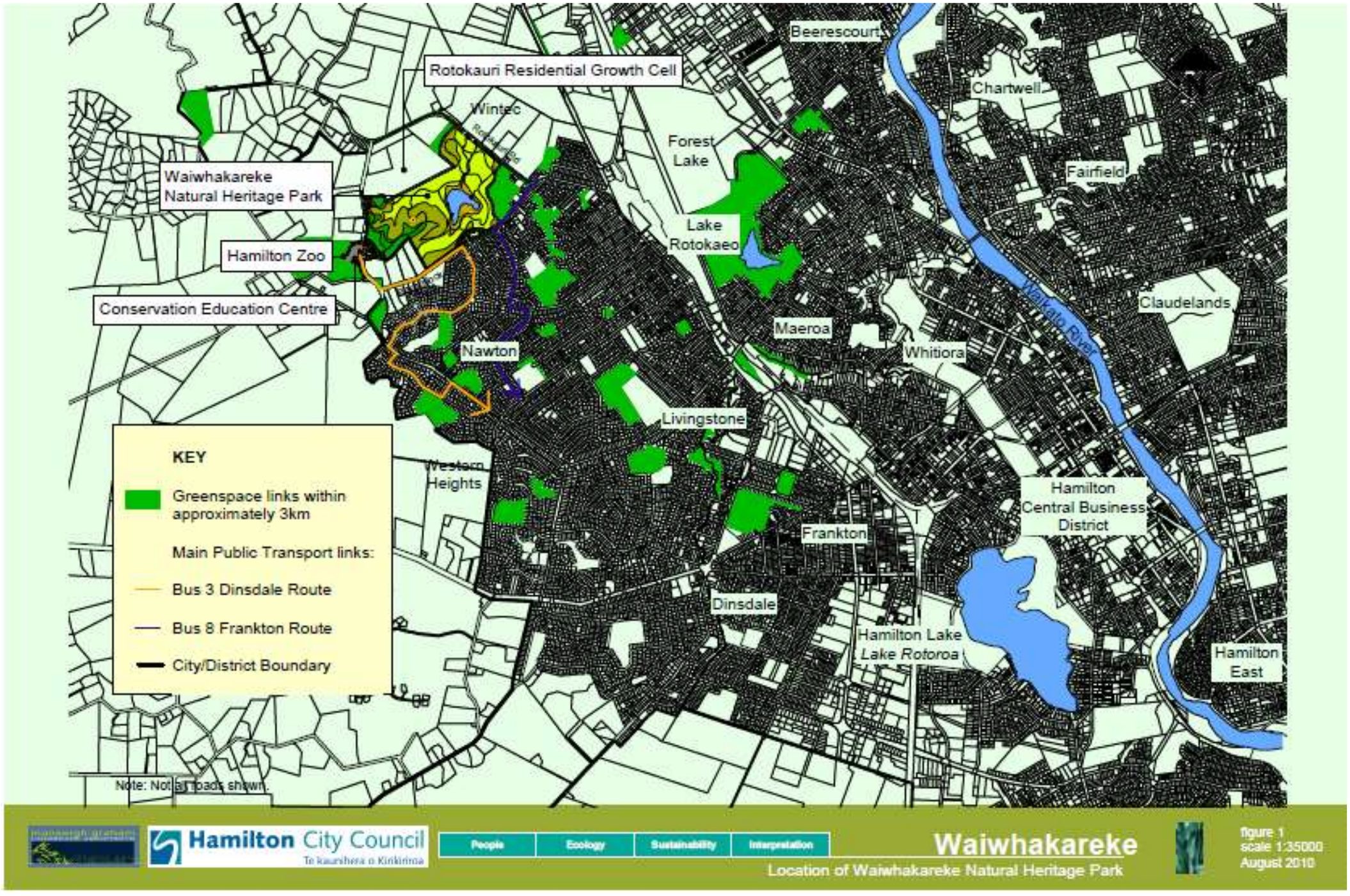


Figure 1 - Location

2.2. Site definition

Waiwhakareke is held in a single legal lot:

Legal Description	Area (ha)	Notes
Lot 1 DP 425316	59.7694	This lot was created through amalgamation and subdivision and the title was issued on 24 December 2009.

Note that additional land may be incorporated into the park should neighbours wish to subdivide their land.

2.3. The Concept

Waiwhakareke will be developed as a natural heritage park representing the original ecosystem diversity of the Hamilton Basin. It will take its place as one of Hamilton's most important parks, alongside Hamilton Gardens and Hamilton Lake Domain. The Heritage Park will serve as a focus for Hamilton's biodiversity restoration, in and beside our lakes, along the river banks and in the gullies and other parks with current or potential natural values.

Biodiversity loss in New Zealand has been greatest in or near our cities and settlements, where development has often resulted in total landscape transformations. For example, in Hamilton City only 0.1% of the past natural vegetation remains (Leathwick et al. 1995). This is illustrated in Picture 2, Section 4.0below. The extent and magnitude of this loss in terms of species, ecosystems, ecosystem services and heritage value has only been recognised in recent years.

The Heritage Park concept involves the retirement and ecological restoration of the land surrounding Lake Waiwhakareke, through restoration planting, pest control and the introduction of pest-proof fencing. Three forest ecosystems will be completely reconstructed (kauri, tanekaha, rewarewa conifer-broadleaved forest; tawa, rimu broadleaved-podocarp forest; kahikatea, pukatea semi-swamp forest) and two ecosystems will be restored (peat lake margin including a Restiad bog, and swamp wetland; peat lake/aquatic ecosystem).

There is an opportunity to create a significant link between the site and Hamilton Zoo. It is intended that facilities fundamental to the Heritage Park's development and operation will be developed on the eastern side of Brymer Road, and those fundamental to the Zoo's operation, or shared between the Heritage Park and Zoo, will be developed on the western side.

A number of important secondary nodes and potential access points have also been identified. These are located along Baverstock Road and Rotokauri Roads, indicating potential linkages for the community and Wintec. These nodes are important when considering the location requirements for community parks for Nawton and for future communities that will establish as a result of growth guided by the Rotokauri Structure Plan.

A Conservation Education Centre will be constructed in association with Hamilton Zoo. Indigenous flora and fauna will be introduced to the park and further infrastructure will be developed including a publicly accessible walkway network, two community parks and a cycleway outside the pest-proof fence around the perimeter of the park. The park will be a strong draw for visitors locally, regionally and nationally, complementing substantial natural remnants

such as Pirongia Forest Park and Maungatautari Ecological Island. It will place aspects of our natural heritage within ready reach of the people of Hamilton.

3.0 Legislative and Planning Policy Framework

3.1. Introduction

A hierarchy of legislation, planning documents and associated policies sets the framework for this Management Plan. Waiwhakareke Natural Heritage Park was made subject to the Reserves Act 1977 after its boundaries were defined by legal survey in 2009, and was subsequently classified Local Purpose (Natural Heritage Park) Reserve. Though the Reserves Act does not require the production of a management plan for local purpose reserves this reserve needs such a plan.

Other functions of Hamilton City Council under the Reserves Act that are relevant to this Management Plan include, but are not limited to:

- Issuing leases, licences and concessions for short term use of reserves,
- Statutory land management.

Some internal documents that help to guide the plan are derived from the Local Government Act 2002 and Resource Management Act 1991. Associated legislation such as the Historic Places Act 1993 also contributes to the policy framework of the Plan.

Documents that help Council guide the protection, use and development of reserves in the City include, but are not limited to, the following:

- 2009-19 Long Term Council Community Plan and succeeding documents
- Proposed District Plan including:
    - Recreation Major Zone
    - Environmental Protection Overlay
    - Rotokauri Structure Plan

Regional Statutory Documents:

- Waikato Regional Plan and Waikato Regional Policy Statement
- Waikato River Deed of Settlement

National Strategies:

- New Zealand Biodiversity Strategy
- National Guidelines for Crime Prevention Through Environmental Design (CPTED)

Regional Strategies:

- Regional Pest Management Strategy 2008-2013/Regional Pest Management Strategy Operational Plan 2009/10
- Draft Walking and Cycling Strategy for the Waikato Region 2009-2015

Council Strategies:

- Environmental Sustainability Strategy
- City Scope Strategy
- Active Communities Strategy
- Access Hamilton Strategy
- Creativity and Identity Strategy

Several other documents produced by Council and external organisations relate specifically to the management of Waiwhakareke Natural Heritage Park and/or its facilities:

- International and national agreements and treaties:
  - Convention on Biological Diversity
  - Agenda 21
  - United Nations Framework Convention on Climate Change
  - Convention on International Wetlands of Significance ("Ramsar")
- Parks, Domains and Reserves Bylaw 2007
- Hamilton City Stormwater Management Plan and Rotokauri Catchment Management Plan (both under development)
- Other Reserves Act Management Plans
- Hamilton Zoo Documents

The relevance of the above documents to the Waiwhakareke Natural Heritage Park Management Plan is discussed in the following section.

3.2. Reserves Act 1977

The Reserves Act 1977 requires all reserves except Local Purpose Reserves to have a Management Plan but as noted above this park needs a management plan. Section 41 of the Act describes the general form of Management Plans and sets out the process of public participation required for their development.

Section 3 of the Reserves Act states the general purpose of the Act as:

"(a) Providing, for the preservation and management for the benefit and enjoyment of the public, areas of New Zealand possessing:

(i) Recreational use or potential, whether active or passive; or wildlife; or

(ii) Indigenous flora or fauna; or

(iii) Environmental and landscape amenity or interest; or

(iv) Natural, scenic, historic, cultural, archaeological, biological, geological, scientific, educational, community, or other special features or value;

(b) Ensuring, as far as possible, the survival of all indigenous species of flora and fauna, both rare and common place, in their natural communities and habitats, and the preservation of representative samples of all classes of natural ecosystems and landscape which in the aggregate originally gave New Zealand its own recognisable character.

(c) Ensuring, as far as possible, the preservation of access for the public to and along the sea coast, its bays and inlets and offshore islands, lakeshores, and riverbanks, and fostering and promoting the preservation of the natural character of the coastal environment and of the margins of lakes and rivers and the protection of them from unnecessary subdivision and development."

Part III of the Act also requires the classification of all reserves to ensure management and development appropriate to each reserve's principal purpose. The Act provides for Recreation, Historic, Nature, Scenic, Scientific Reserves, and a defined Government or Local Purpose Reserve (Reserves Act 1977, sections 16-23 inclusive). The classification closest to the proposed purpose of Waiwhakareke Natural Heritage Park is probably Natural Reserve, but each of

the specific classifications mentioned above focuses on the preservation of existing values, whereas the purpose of this park is the restoration of values that were once present. The park has therefore been classified as a Local Purpose (Natural Heritage Park) Reserve. The purpose of such a classification is able to be defined by the governing body of the reserve, in this case Hamilton City Council. The purpose is as follows:

An area of land and water devoted to the restoration of ecosystems characteristic of the Waikato before the area was altered by human activity, developed in a manner suitable for scientific study, research, education and recreation and that will provide for the general benefit and enjoyment of the local and regional communities as well as tourists.

The Reserves Act 1977 requires Management Plans to be kept under continuous review so that the plan can be adapted to changing circumstances or increased knowledge. Monitoring the effectiveness of measures implemented to meet the objectives of the Plan will therefore be important.

3.3. Local Government Act 2002

Section 3: "The purpose of this act is to provide for democratic and effective local government that recognises the diversity of New Zealand communities; and, to that end this act —

- *a) states the purpose of local government; and*
- *b) provides a framework and powers for local authorities to decide which activities they undertake and the manner in which they will undertake them; and*
- *c) promotes the accountability of local authorities to their communities; and*
- *d) provides for local authorities to play a broad role in promoting the social, economic, environmental and cultural well-being of their communities, taking a sustainable development approach."*

Section 93 of the Local Government Act requires local authorities to have a Long Term Plan. According to the Act the purpose of this Plan is to:

"a) describe the activities of the local authority; and

b) describe the community outcomes of the local authority's district or region; and
c) provide integrated decision-making and co-ordination of the resources of the local authority; and
d) provide a long-term focus for the decisions and activities of the local authority; and
e) provide a basis for accountability of the local authority to the community; and
f) provide an opportunity for participation by the public in decision-making processes on activities to be undertaken by the local authority"

The Long Term Plan must cover a period of not less than ten financial years, with a review of the Plan being required every three years. The current Long Term Council Community Plan (LTCCP) for Hamilton City covers 2009-2019.

3.3.1. 2009-19 Long Term Council Community Plan and Succeeding Documents

Council's LTCCP is prepared in consultation with the community, for the community. As the local authority, Council is responsible for guiding Hamilton's

development to reach the goals identified in the Plan. These goals are based on the principles of sustainable development.

The LTCCP is a vision for the future of Hamilton and in the area of reserves addresses broad issues rather than specific policy. The Plan contains community outcomes identified by the people of Hamilton that are particularly relevant to the development of a Reserves Act Management Plan for Waiwhakareke Natural Heritage Park:

Hamilton people want a city that:

1.4 Protects and enhances its green spaces and natural environment for everyone to value and enjoy.

This outcome promotes the restoration of indigenous vegetation at Waiwhakareke and its status as a Heritage Park for the public to use. The Park will eventually provide a major piece of the city's green network and be linked to other reserves. The improvement of the health of Lake Waiwhakareke is also supported by this outcome.

2.1 Is recognised for its wide range of events, activities, attractions and entertainment for everyone, including iconic events.

Waiwhakareke Natural Heritage Park will become a major attraction at a local and regional level. This, in combination with other attractions within Hamilton, will raise the status of the city in terms of positive nationwide recognition.

2.5 Values and protects heritage sites, buildings and landmarks.

Waiwhakareke is a site of natural heritage as well as a landmark within Hamilton. The protection of the site is advocated through the objectives and policies of this Management Plan.

3.4 Fosters pride in its natural and built environments and encourages people to work together to keep these clean and tidy.

The natural environment provided by Waiwhakareke Natural Heritage Park is to be cared for collaboratively by project partners, community groups and the general public. For those involved, community planting days will foster a sense of ownership and pride in the park.

3.5 Supports research, education and innovation, and is recognised as a centre of excellence.

This project will contribute to education in Hamilton through the close involvement of educational institutions as project partners (a site for the practice of horticulture, fieldwork and research), the provision of education facilities in conjunction with Hamilton Zoo, community planting programmes with schools and as a model site for ecological restoration.

4.2 Promotes awareness and involvement in community activities and events.

There will be regular community activities and events at Waiwhakareke. Many of these may be linked with Hamilton Zoo. Community plantings will provide opportunities for Hamiltonians to actively maintain and care for the park.

4.3 Addresses social issues and values volunteers.

Community plantings and other activities at the park will be strongly supported by volunteers. Community groups including Friends of Waiwhakareke will help recruit these volunteers.

5.1 Provides opportunities for people of all ages and abilities to access and participate in sport and leisure activities that meet their diverse needs.

The concept plan provides for a network of walkways and a cycleway around the perimeter. These paths will link to Hamilton Zoo and to the green corridor to Rotokauri Lake. While the focus of the park is natural and ecological, it is designed to provide the experience of contact with nature close to the urban setting and incidentally provides a setting for walking or jogging.

5.3 Is an ideal place for family and whanau, with lots of activities and places for tamariki and rangatahi to enjoy.

Waiwhakareke will provide a natural park setting that can be enjoyed by people of all ages and for various activities both passive and active.

7.1 Engages all local communities in planning and developing the city's future.

The development of Waiwhakareke is based in participatory planning and management, which reflects its beginnings with a range of institutions and community groups.

7.2 Ensures Maori are respected as a partner in decision-making and have a voice on issues that affect the city.

This Management Plan has been produced in partnership with local hapu as represented by Nga Mana Toopu O Kirikiriroa, to identify the site's cultural values and identify practical ways in which those values can be expressed in the development and management of the park. The lake and springs on the site are of particular cultural importance and their protection is of great benefit.

Reserves Act Management Plans help fulfil these outcomes by directing the future development and use of reserves with the public interest in mind.

Specific activities are included within the LTCCP as either funded or unfunded projects depending on their importance to the community and the amount of funding that can be dedicated to them over the course of the Plan. The development of Waiwhakareke Natural Heritage Park is a funded project within the 2009-19 LTCCP and therefore has the financial backing of Council secured until the review of the LTCCP.

3.4. Resource Management Act 1991 (RMA)

The purpose of the Resource Management Act 1991 (RMA) is to:

"1) Promote the sustainable management of natural and physical resources.

2) *In this Act, "sustainable management" means managing the use, development and protection of natural and physical resources in a way, or at a rate, which enables people and their communities to provide for their social, economic*, and cultural well being and for their health and safety while -

(a) Sustaining the potential of natural and physical resources (excluding minerals) to meet the foreseeable needs of future generations; and
(b) Safeguarding the life-supporting capacity of air, water, soil and ecosystems; and
(c) Avoiding, remedying or mitigating any adverse effects of activities on the environment (Section 5a)."

The purpose of the Resource Management Act 1991 and the matters identified in this Plan have precedence over the provisions of the Reserves Act 1977.

Section 6 (Matters of National Importance), Section 7 (Other Matters) and Section 8 (Treaty of Waitangi), set out further matters that are complementary to the Purpose of the Reserves Act 1977. Some of these relationships are highlighted below:

- Protection of areas of significant indigenous vegetation and significant habitats of indigenous fauna (Section 6 (c) RMA and Section 3 (b) Reserves Act).
- The relationship of Maori and their culture and traditions with their ancestral lands, water, sites, waahi tapu and other taonga (Section 6 (e) RMA).
- The maintenance and enhancement of amenity value (Section 7 (c) RMA).
- Intrinsic values of ecosystems (Section 7 (d) RMA).

Under s. 31 functions of territorial local authorities include the control of any actual or potential effects of the use, development, or protection of land, including for the purpose of the maintenance of indigenous biological diversity:

The primary focus of both the Resource Management Act 1991 and the Reserves Act 1977 is on the conservation of existing values. However given the relative scarcity of ecotypes to be represented in Waiwhakareke Natural Heritage Park, it serves the deeper purpose of those two acts. For example a function of local government under the Resource Management Act (s. 31 1 b) iii) is the maintenance of indigenous biodiversity. Where biodiversity is impoverished, maintenance implies restoration.

3.4.1. Proposed District Plan

Introduction

As required by the Resource Management Act 1991, Hamilton City Council's Proposed District Plan defines the way in which the city's natural and physical resources will be managed to achieve the principles and purpose of that Act.

In the Proposed District Plan Reserves Act Management Plans are recognised as an 'other method' to implement the objectives and policies of the District Plan, giving greater specificity to each site.

"Policy 5.2 The development and review of Reserves Act Management Plans for the detailed day-to-day planning and development of recreation land in addition to controls under the District Plan."

District Plan Zoning

The District Plan groups land into zones of similar activities whose effects can be controlled by similar rules. The District Plan identifies the following three Recreation Zones:

- Recreation Environment
- Recreation General
- Recreation Major

The zoning of reserves is related to their classifications under the Reserves Act 1977. There are two main purposes to the zoning of the reserves in the District Plan:

(a) They act as a quasi-management plan in the absence of a management plan prepared under the Reserves Act 1977.

(b) The resource consent process provides for public consultation in the situation where activities or buildings are likely to have adverse effects outside the boundaries of the reserve (e.g. noise, hours of use, height of buildings). This is one of the functions of the Resource Management Act 1991.

Waiwhakareke Natural Heritage Park is currently zoned for a mixture of Recreation Environment and Future Urban but it is questionable whether Recreation Environment is the best zoning for a park with this scale of activity and need for ancillary services. For example both Recreation Environment and Recreation General are limited to one building per park and it is likely that a number of buildings will be required to service this park. Recreation Major is seen as more appropriate.

The Recreation Major Zone (Rule 4.10) provides for parks to serve the city wide and regional population. Parks within this zone are generally extensive areas providing for multi-purpose use and a range of venues catering for recreational, arts, sports and cultural activities. The scale of development permitted on the parks in this zone is greater than in the other recreation zones and makes provision for related retail activity. Thus there is potential for adverse impacts on adjoining properties and development controls seek to avoid, remedy or mitigate them.

The makeup of zones within the next District Plan was not finalised at the time of the writing of this plan. The zoning of Waiwhakareke Natural Heritage Park will be expected to allow for the outcomes described above for the Recreation Major Zone, whilst affording protection to the environment of the park.

Environmental Protection Overlay

The Environmental Protection Overlay is a tool within the District Plan that identifies restrictions on development adjacent to the Waikato River or part of, or adjacent to gully systems, peat lakes and wetlands. The purpose of the overlay is to encourage the protection and enhancement of ecosystems, habitats of plants, birds and other wildlife, and ecological corridors. As a direct result the natural and amenity values associated with these habitats will also be protected.

Part of the Waiwhakareke Natural Heritage Park, including the lake, is covered by the Peat Lakes and Peat Lake Catchments component of the Environmental Protection Overlay. The following specific standards apply to activities in areas covered by this component of the overlay:

"a) Peat Lakes and Peat Lake Catchments Layer of the EPO

i) Building Setback

- *The minimum building setback from the margin of any peat lake or wetland shall be 50m plus the relevant setback requirement for the relevant zone.*

ii) Impermeable Surfaces

- *The maximum area of impermeable surfaces of that part of the site within the peat lakes and peat lake catchments layer of the EPO shall not exceed 40%.*

iii) Vegetation Removal

- *Any area of vegetation removed within 5m of the margin of any peat lake/wetland shall be replanted with an equivalent area of appropriate wetland species within one calendar month.*

iv) Earthworks (Including Clean Fill)

- *The maximum volume of earthworks shall not exceed 40m³ per site per calendar year.*
- *Earthworks shall not take place within 5m of the margin of any peat lake or wetland.*

v) Stormwater Disposal

- *Stormwater run-off from any new building on any site that is wholly or partly covered by the Peat Lakes and Peat Lake Catchments layer of the EPO and adjacent to any peat lake or wetland, shall be disposed of directly to the ground.*
- *The design and implementation of any stormwater disposal system shall be in accordance with the Hamilton City Council Development Manual – February 2000."*

It was not known at the time of the writing of this Management Plan whether overlays such as the EPO would be included in the reviewed District Plan.

Rotokauri Structure Plan

The Hamilton Urban Growth Strategy (1991) identified Structure Plans as the tool to be used to determine the development potential of the City's growth areas. The Rotokauri Structure Plan provides a resource management framework to guide future use and development within the Rotokauri growth area. The location of Waiwhakareke Natural Heritage Park within the Rotokauri Structure Plan area means development on and around the Park will be required to comply with the specific rules of the Structure Plan, in addition to those of the District Plan Zone and Environmental Protection Overlay discussed above.

The park is noted on the Structure Plan map as an indicative reserve, with Collector Streets, Minor Arterial Roads and the Residential Lake Waiwhakareke Landscape Character Area noted as bounding the park area. The Character Area is described in the Plan as one of four distinct residential environments. It seeks to retain existing landform and create a strong relationship between residences and the heritage park. The significance of the park itself is recognised within the Structure Plan as follows:

> *Waiwhakareke Natural Heritage Park — This park will re-create a range of ecosystems characteristic of the Waikato before human intervention. It will be of citywide significance accommodating habitat creation, research, and providing for public access to a natural environment. It will contribute to the character and amenity of the area and complement the activities at the adjacent Hamilton Zoo. The majority of the Park is subject to specific zoning proposals affecting land in Council ownership. Opportunities will be taken to soften the Park's lineal edges by incorporating additional land to be secured through the subdivision consent process.*

The relationship of the Park with the Waiwhakareke Landscape Character Area is detailed in the Structure Plan as follows:

"The Lake Waiwhakareke Landscape Character Area represents a distinctive landscape unit with strong visual, heritage, cultural and ecological associations with the Lake. The Lake itself is the focal point of an initiative to establish a Natural Heritage Park with connections to the Hamilton Zoo in the west and the proposed Green Corridor in the east. Controls have been developed to ensure that development of the neighbouring residential area complements this public park through the orientation of buildings towards it, maximizing lot yield along the Park edge and ensuring that the form of development along this edge enhances public safety for users through passive surveillance. Subdivisional controls will ensure that there is little modification of the landform through earthworks and that roads are provided along the Park edge to give an active frontage to the Park and a slow speed environment. The possible cross-section of this road is indicated in Figure 5. Within the development area itself, existing features such as drains, springs, ponds and vegetation provide the opportunity to establish a strong sense of local identity and linkage with the Park through management measures that would connect them to the Park's ecological systems.

The Lake Waiwhakareke Landscape Character Area derives its character from the combination of natural, cultural and recreational values present in Waiwhakareke (Horseshoe) Lake, the surrounding Natural Heritage Park, ridgelines, and the way in which they all relate to each other. These fundamentals help to identify the design theme and are essential in maintaining the character of the area. Each set of values is explained in more detail below:

Natural character:

- *The sharply undulating topography of the area and the orientation of its prominent ridgelines towards the lake and the north; and the way in which they provide a point of difference in the landscape. The ridgelines give detail to the area, acting as landmarks and providing views to Waiwhakareke.*
- *The green nature/native landscape of the Natural Heritage Park, including its role as an ecological base for indigenous species and its pleasantness and aesthetic coherence as an environment.*
- *The lake as part of the landscape unit helps to create an engaging attractive natural environment. Although eventually it will be surrounded by vegetation, it has a strong role in acting as the focal point of the area.*
- *The gullies and natural ponding areas at the feet of the ridgelines which provide opportunities for stormwater mitigation and restoration planting with strong amenity values.*
- *The opportunity to preserve views of the lake from Baverstock Road with careful consideration to plantings within the Natural Heritage Park.*

Cultural character:

- *The Te Tongahuanui Walking Track. This ran from Hamilton City past Te Uhi Pa and on to Whatawhata. The Exelby-Rotokauri Roads are now built over the top of this track.*
- *The indigenous vegetation still evident in certain places was once used as a resource and served as an attraction for birds and other fauna.*
- *The opportunity to extend cultural representations beyond the boundaries of the Natural Heritage Park such as a Manuka fence and*

plantings of Kawakawa around the main entrance Pou and bi-lingual educational panels.

- *The springs at the top of the gullies below the ridgelines had both spiritual and ceremonial significance. Taonga, wooden carvings or agricultural implements were often hidden in the springs during times of warfare or invasion.*

Recreational character:

- *All of the Landscape Character Area is within 5 minutes walking distance to the Natural Heritage Park*
- *An integrated network of open spaces*
- *The opportunity for further enhancement of pedestrian and cycle linkages extending from the Natural Heritage Park*
- *Green landscapes contributing to the enjoyment of recreational activities"*

3.4.2. Resource Consents

For any activity where the effects are deemed to be more than minor resource consent will be required prior to the activity being carried out. Specific rules and regulations can be found in the Proposed Hamilton City Council District Plan and/or the Waikato Regional Plan, depending on the nature of the proposed activity. Any activities proposed at Waiwhakareke Natural Heritage Park will be subject to the rules of these Plans where relevant, and resource consents will be sought as required.

3.4.3. Waikato Regional Plan and Waikato Regional Policy Statement

The Waikato Regional Policy Statement (RPS) contains policies and methods to manage the natural and physical resources of the Waikato Region. The Regional Plan contains the rules that help to achieve these policies. These documents cover key components of the environment for which the Waikato Regional Council has responsibility under Section 30 of the Resource Management Act 1991, including water, river and lake beds, land and soil, air and geothermal resources. Development or activities undertaken in the vicinity of Waiwhakareke Natural Heritage Park may require resource consent under the Waikato Regional Plan.

Section 3.11 of the RPS deals with biodiversity. It identifies significant resource management issues for the region, noting that:

> *"Biodiversity of indigenous vegetation and fauna is important in maintaining ecosystem viability, nationally and internationally….To maintain biodiversity, the life supporting capacity of the populations making up that biodiversity and ecosystems must be protected. The range and number of habitats supporting indigenous species have already been severely reduced. Effort must be made to reverse this trend."*[1]

The related objective is "Biodiversity within the Region maintained or enhanced."[2]

[1] Environment Waikato Operative Regional Policy Statement, October 2000, Updated November 2002, p. 142
[2] Environment Waikato Operative Regional Policy Statement, October 2000, Updated November 2002, p. 143

The environmental results anticipated from this area of the Regional Policy Statement include:

"1. Biodiversity in the Region maintained and enhanced, including the distribution and abundance of indigenous species and ecosystems in the Region.

*2. Increased awareness of the values of areas of indigenous vegetation and habitats of indigenous fauna in the Region."*3

Section 3.15 of the Statement concerns heritage, both natural and cultural, and notes their inextricable links. The issue for the region is that:

> *"Natural and cultural resources are integral parts of the Region's heritage. Subdivision, use and development have the potential to degrade and destroy natural and cultural heritage."*4

The related objective emphasises the importance of protecting regionally significant resources.

The RPS places its emphasis on the conservation of existing values, though noting the region's declining biodiversity and that efforts must be made to reverse this trend. In the context of the Hamilton Ecological District and particularly Hamilton itself, preservation is not enough; values must be restored. Further, visible and accessible natural areas will serve to inform the Hamilton public about such areas, foster positive attitudes and support and take pressure off existing natural areas. Therefore Waiwhakareke Natural Heritage Park supports the RPS.

At the time of the drafting of this plan a Draft Regional Policy Statement had been released for public submission.

3.5. Historic Places Act 1993

The Historic Places Act 1993 overrides this Management Plan and the Reserves Act 1977 with respect to the protection and preservation of Waahi Tapu and archaeological sites. Users of this management plan should refer to Section 10 and Appendix 4 for Policies and Key Implementation Areas relating to consultation with Tangata Whenua prior to carrying out works on a Pa or Waahi Tapu site.

3.6. Waikato River Deed of Settlement and Waikato-Tainui Raupatu Claims (Waikato River) Settlement Act 2010

The Waikato River is at the heart of Waikato-Tainui's spiritual and physical wellbeing, their tribal identity and their culture. The revised Waikato River Deed of Settlement was signed on 17 December 2009 between Waikato-Tainui and the Crown with the objective of settling the outstanding claim of Waikato-Tainui to the Waikato River. It is the intention of the Deed that Waikato-Tainui and the Hamilton City Council will enter a joint management agreement that may, among other things, provide for Waikato-Tainui involvement in District Plan and Reserves Act Management Plan reviews to ensure that matters in the Deed are provided for.

[3] Environment Waikato Operative Regional Policy Statement, October 2000, Updated November 2002, p. 149
[4] Environment Waikato Operative Regional Policy Statement, October 2000, Updated November 2002, p. 164

Since it drains to the Waipa River, which joins the Waikato, Lake Waiwhakareke within the Waiwhakareke Natural Heritage Park is covered by the Waikato River Deed of Settlement. This is acknowledged in this Management Plan with the Lake being managed so as to give effect to the objectives of the Deed for the Waikato River (Deed of Settlement, s. 4.1).

3.7. Regional Pest Management Strategy 2008-2013/Regional Pest Management Strategy Operational Plan 2008/2009

The Regional Pest Management Strategy 2008-2013 identifies plants and animals that are designated pests in the Waikato Region. The Operational Plan 2009/10 details the activities that Environment Waikato intends to undertake in that financial year in regard to the control of the declared pests. Pest management priorities in Waiwhakareke Natural Heritage Park will be informed by regional pest management priorities and specific management needs.

Exotic plant species at Waiwhakareke Natural Heritage Park will be removed from the park through the use of mechanical control (e.g. willows), hand weeding, herbicide use and shading out by natives. The area to be planted may be sprayed with herbicide prior to planting to reduce competition from weeds if necessary, but most plants will be planted directly into untreated pasture.

The proposed pest proof fence around the park will prevent potential pests including exotic mammals such as rats, cats, possums, mice, stoats, ferrets and rabbits from entering the park. Prior to the installation of the fence it is expected a mammal control programme will be initiated to assess pest numbers, the risk they pose and suggest methods of eradication. Further information and an explanation of the need for a pest proof fence can be found in Section 5.

3.8. Draft Regional Walking and Cycling Strategy for the Waikato Region 2009-2015

Environment Waikato's role in regional walking and cycling is to promote, support and coordinate walking and cycling initiatives across the region. The development and maintenance of walking and cycling infrastructure is the role of the NZ Transport Agency and local authorities. Walking and cycling are identified by the strategy as key alternative transport options which are beneficial in terms of getting people active and also for the environment through reducing the number of cars on the road and therefore carbon emissions. Walkways will be a major part of Waiwhakareke Natural Heritage Park with internal pathways proposed to link the ecosystems and key features. The proposed cycleway links around the outside of the park will fit in well with this strategy in providing access across the suburbs of Brymer and Rotokauri and providing access to key facilities like Hamilton Zoo and Wintec.

3.9. National Guidelines for Crime Prevention Through Environmental Design (CPTED)

The National Guidelines for CPTED provide a framework for incorporating crime prevention within quality urban design by focusing on reducing the opportunity to commit crime, therefore lessening the motivation to offend. The Guidelines specify seven qualities of well designed, safer places. These are as follows:

1. Access - Safe Movement and Connections
2. Surveillance and Sightlines - See and be Seen
3. Layout - Clear and Logical Orientation
4. Activity Mix - Eyes on the Street

5. Sense of Ownership - Showing a Space is Cared for
6. Quality Environments - Well Designed, Managed and Maintained Environments
7. Physical Protection - Using Active Security Measures

In the production of the Draft Waiwhakareke Natural Heritage Park Management Plan CPTED principles have been considered where necessary in the proposed developments on the park with an aim of reducing criminal opportunity and increasing public safety. This includes appropriate lighting in terms of the Council's policy for Lighting on Parks (reviewed 2008) and suitable width of paths.

3.10. City Strategies

3.10.1. Environmental Sustainability Strategy

The Environmental Sustainability Strategy sets out the key principles to manage change in Hamilton so the city is shaped positively over the next five years. The Strategy's consideration of the city's ecosystems is particularly relevant to this Management Plan. It notes that only 3% of Hamilton's original lowland ecological habitats remain and at least 20% of the city's original flora is threatened or extinct. Hamilton's lakes are mentioned as having had water quality issues in the past. This emphasises the significance of this Management Plan in managing Lake Waiwhakareke and its catchment.

3.10.2. City Scope

The City Scope Strategy guides the future development of Hamilton's built environment by focussing on the integration of development within the context of its surrounds, particularly that of the natural environment. The Strategy requires any future development or changes on the site of Waiwhakareke Natural Heritage Park to integrate with the existing surroundings where possible.

3.10.3. Active Communities Strategy

Council's Active Communities Strategy supports Hamiltonians in being physically active. A key means of implementing the programme will be the provision of environments where people can enjoy recreational activities. Waiwhakareke Natural Heritage Park will be such a setting, providing informal recreation through the walking paths that will be established through the park and the cycleways expected to be constructed around the perimeter.

3.10.4. Access Hamilton Strategy

Access Hamilton aims to enable good access around Hamilton by managing traffic congestion, travel times, safety, parking and convenience, while at the same time ensuring that there are good transportation networks for all travellers whether they use carsor public transport or walk or cycle.

Under the Rotokauri Structure Plan, Rotokauri Road to the east of Waiwhakareke Natural Heritage Park will become an arterial route and a principal means of serving the South end of Rotokauri's residential development and the proposed town centre. Other arterial and collector level roading that currently surrounds the Park is not proposed to change markedly, with access available from existing infrastructure. Residential development adjacent to the park will be served by local roads and it is hoped that one of these will become the Northern boundary of the park, located between the peat swamp area and the foot of the hill. The Strategy will however help to guide roading

infrastructure where change needs to be accommodated in the future as the park is increasingly utilised by the public.

Walkways and cycleways enhance the city's open space network by encouraging use, creating linkages and protecting environmental values. Walkways and cycleways provide opportunities for people to access more active lifestyles with minimal costs and many neighbourhoods can access them without having to use a car to get there. They can link open space areas and extend the perceived size and remoteness of open space areas without requiring the acquisition of large areas of land. Walkways will form part of the internal infrastructure of Waiwhakareke Natural Heritage Park, with networks allowing public to enjoy all areas of the park and the various ecosystems within it. Cycleways will be provided outside the pest proof fence around the perimeter of the park. *Cycle parks will also be provided at entrances to the park.* Provision will be made through the Rotokauri Structure Plan for walkway/cycleway links into this area and links will be made with existing nodes in Brymer and toward Avalon Drive.

3.10.5. Creativity and Identity Strategy

Hamilton's Creativity and Identity Strategy supports innovation and creativity in Hamilton's urban landscape. Waiwhakareke Natural Heritage Park provides a great opportunity for the culture and identity of Maori to be recognised through interpretation boards, Pou, entrance treatments including Waharoa and other design themes. Iwi are a partner in the project and will be heavily involved in ensuring recognition of the cultural history of the Park. More discussion of the cultural elements of the Park can be found in Section 10 of this Plan.

3.11. Other Documents

The legislation and policy outlined above have set the framework, the philosophy and the process for this Management Plan including its policy for the future use, development and maintenance of Waiwhakareke Natural Heritage Park. The plan also seeks to be compatible with other policy documents as it will in turn influence other policy, by-laws, LTCCP/Annual Plan priorities and service delivery agreements and standards.

3.11.1. International and National relationships

New Zealand is a signatory or party to the following international agreements which are related to the management of the environment and the enhancement of biodiversity.

- Convention on Biological Diversity
- Agenda 21
- United Nations Framework Convention on Climate Change
- Convention on International Wetlands of Significance ("Ramsar")

Waiwhakareke Natural Heritage Park is already a nationally recognised project in the restoration community and will contribute to New Zealand's commitments as a signatory/party to these agreements.

The New Zealand Biodiversity Strategy was prepared and enacted in 2000 to give partial effect to New Zealand's role as a signatory to the 1993 Convention on Biological Diversity. The decline of New Zealand's indigenous biodiversity is described in the State of New Zealand's Environment report as "our most pervasive environmental issue" Halting the decline in New Zealand's biodiversity and involving the community and individuals in its management are

key goals of the Strategy. The development of Waiwhakareke will result in an increase in biodiversity, helping to meet the goals of the Strategy and Convention at a local level.

Agenda 21 is a national commitment with principles translated into Local Agenda 21 which is a Hamilton City Council Policy. This commitment was undertaken by Council in 1993 and re-affirmed in 2008, and requires that the principles of sustainable development underpin city planning considerations. Protection of rare environments, enhancement of water resources and integrated decision-making are all outcomes of the Heritage Park development which meet the goals of Agenda 21.

In 1971 the Convention on Wetlands of International Importance was signed in Ramsar, Iran. It is normally referred to as the Ramsar Convention. There are presently 159 contracting parties around the world. The purpose of the Convention is to encourage:

"the conservation and wise use of all wetlands through local and national actions and international cooperation, as a contribution towards achieving sustainable development throughout the world".

The development of Waiwhakareke Natural Heritage Park will enhance and expand an existing degraded wetland area with an ecosystem approach, increasing its environment quality and biodiversity values.

3.11.2. Hamilton City Stormwater Management Plan (under development)

At the time of the writing of this management plan Council was in the process of applying for a comprehensive stormwater discharge consent from Environment Waikato. The consent application includes a Stormwater Management Plan (SMP), which provides an outline of how Council will carry out its operational activities and statutory functions to ensure the continued and appropriate management of its stormwater network. Beneath this plan is the Rotokauri Catchment Management Plan, also under development. Most of the stormwater within Hamilton City is eventually discharged into the Waikato River. The only outfall from Lake Waiwhakareke discharges into Lake Rotokauri. Management of Waiwhakareke will contribute to the improvement of the quality of that water.

3.11.3. Related Management Plans

A number of other management plans for Hamilton reserves also have a role in ecological restoration and enhancing biodiversity or in the cultural management of reserves, and thus can complement the management plan for WNHP. These are as follows:

- Riverside Reserves Management Plan 2004
- Hamilton Lake Domain Management Plan 2010
- Gully Reserves Management Plan 2007
- Minogue Park Management Plan 2009
- Donny Park Management Plan 2004
- Nga Tapuwae O Hotumauea — Maori Landmarks on Riverside Reserves Management Plan 2003

3.11.4. Parks, Domains and Reserves Bylaw 2007

The Parks, Domains and Reserves Bylaw 2007 is designed to assist with the administration and operation of reserve land controlled by Hamilton City Council. The bylaw is intended to prevent reserves being misused or damaged

by the public. The bylaw complements management plans by defining unacceptable behaviour and providing for enforcement.

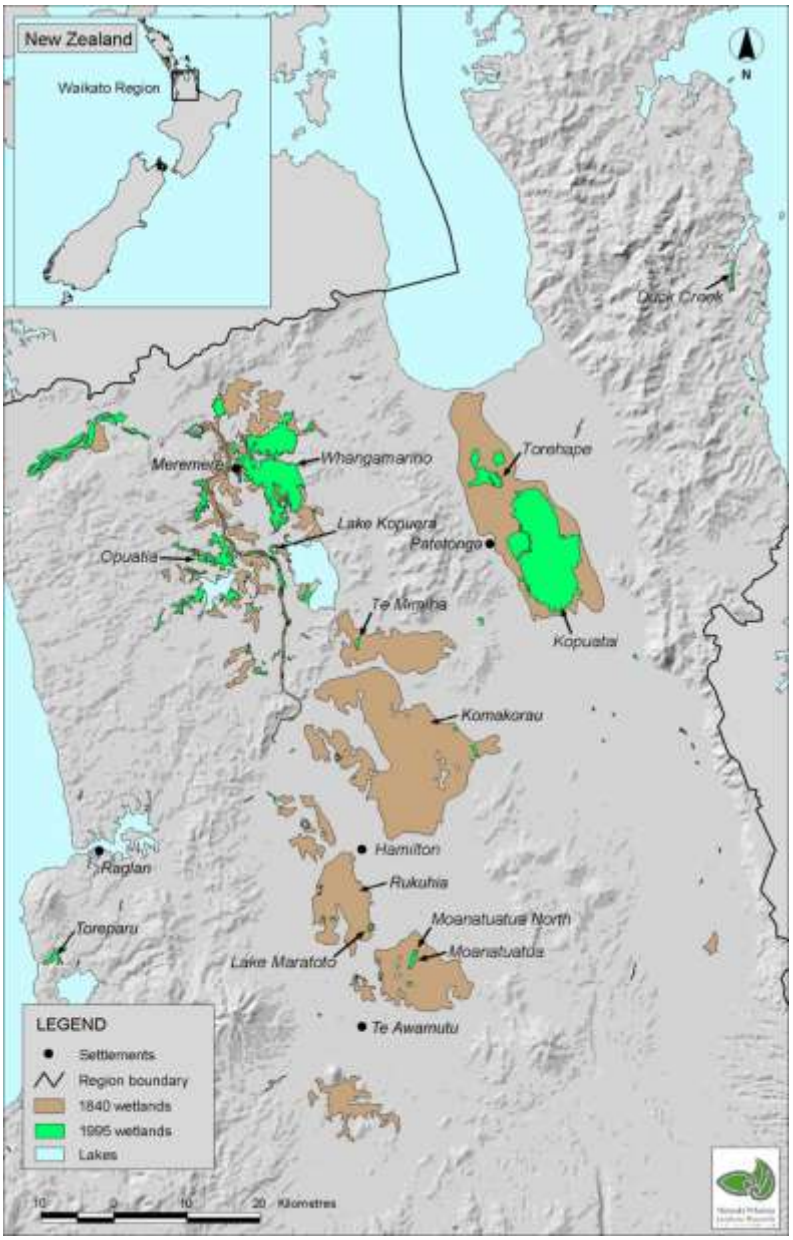
3.11.5. Hamilton Zoo Documents

Hamilton Zoo will provide a vital complement to Waiwhakareke Natural Heritage Park in the future with shared parking and visitor centre facilities proposed and co-management. Any policy documents produced in the future by Hamilton Zoo will take account of the objectives and policies of the park described in this Management Plan

4.0 Site Description

4.1. Introduction

Waiwhakareke Natural Heritage Park will enhance the profile of the city of Hamilton by providing further tourism and recreation opportunities and will complement existing destinations in and around the city such as Maungatautari Ecological Island, Lake Karapiro and the proposed National Wetland Centre in Ohaupo. The park will provide an important ecological area in the Waikato by enhancing rare ecosystems and creating a refuge for flora and fauna.



Picture 2 - Wetlands in the Waikato Region: 1840 and 1995

Less than 1% of pre 1840 wetlands remain in Hamilton and wetlands are one of New Zealand's rarest and most at risk ecosystems as illustrated by Picture 2 above[5]. Waiwhakareke Natural Heritage Park is the last undeveloped natural wetland that includes a lake in the immediate Hamilton area, and conserving and enhancing the wetland will save some of this habitat type. It will provide an opportunity to bring back native birds to Hamilton, especially as the area will provide a stepping stone for forest birds between the Hakarimata Ranges and Maungatautari.

The opportunities for education and research are significant, offering people of all ages the opportunity to improve their understanding of New Zealand and the Waikato's environmental values and natural history. The development of the education programmes and opportunities for the involvement of the community will also have many positive social impacts for the local community and visitors.

The park is also significant in terms of recreation values. It is a large area of green space in the West of the city, complementing established destination parks such as Hamilton Gardens, Claudelands Park and Hamilton Lake Domain in other areas of the city. The park will provide increased opportunities for informal recreation including walking, appreciation of nature and children's play, with upgrades and installation of pedestrian and cycle linkages within Hamilton.

4.2. Site geography and geology

The Hamilton landscape is made up of three elements: the low 'Hamilton Hills'; an alluvial plain formed by coalescing fans deposited by the Waikato River; and low terraces of pumice alluvium deposited by the most recent Taupo eruption (McCraw 1997). Waiwhakareke Natural Heritage Park incorporates both Hamilton Hills and low terraces of pumice alluvium. Lake Waiwhakareke formed when the constantly changing courses of the Waikato River dammed valleys entering the Waikato Basin, causing streams to pond (McCraw 2002). The poor drainage encouraged the establishment of plants tolerant of the wet conditions, and peat slowly formed both upwards and outwards. The outward spread blocked the mouths of valleys leading into the bogs, forming the peat lakes (McCraw 1997), including Waiwhakareke.

Waiwhakareke Natural Heritage Park is located between Rotokauri Road to the east, Baverstock Road to the south and Brymer Road to the west. The park is separated from the Hamilton Zoo by Brymer Road and from the Waikato Institute of Technology Avalon Campus by Rotokauri Road. Roading and land use will change as the area develops. To the north, the park boundary currently borders farmland, which is zoned Future Urban and will be developed under the Rotokauri Structure Plan in the future. Existing residential development occurs on the south side of Baverstock Road and in the south-east corner of the block proposed for the Park. Further residential development is proposed for the south-east corner, on an area currently in pasture. See Figure 2 for an aerial photograph of the park and its surrounds.

Lake Waiwhakareke is a crescent shaped water body, three hectares in area, situated in the middle of the Park. It is the second largest lake within the Hamilton City boundary. Around the lake margins and on the flats, the soil is Kaipaki peat (Fig. 3). The higher land and hills surrounding the lake are Hamilton clay loam and on the slopes adjacent to Rotokauri Road there is a

[5] Botany of the Waikato, Waikato Botanical Society, 2002, Page 50

small area of Te Rapa peaty sand. Hamilton clay loam is developed on strongly weathered tephra (Bruce 1979).

It is well to moderately drained, but the subsoils become exceedingly sticky when wet. In many places, this compacted clay impedes water percolation and ground water seepage at this depth is common in cuttings (Bruce 1979). Kaipaki peat averages between 1 and 1.5m deep, is very poorly drained and the water table is close to the surface for most of the year (Bruce 1979). The peat is labelled as greater than 1.3m deep in the Rotokauri Structure Plan. Te Rapa peaty sand is imperfectly drained due to the close proximity of poorly drained soils keeping the subsoils moist (Bruce 1979).

Picture 3 - Lake Waiwhakareke looking North

Figure 2 - Park Location and Boundary

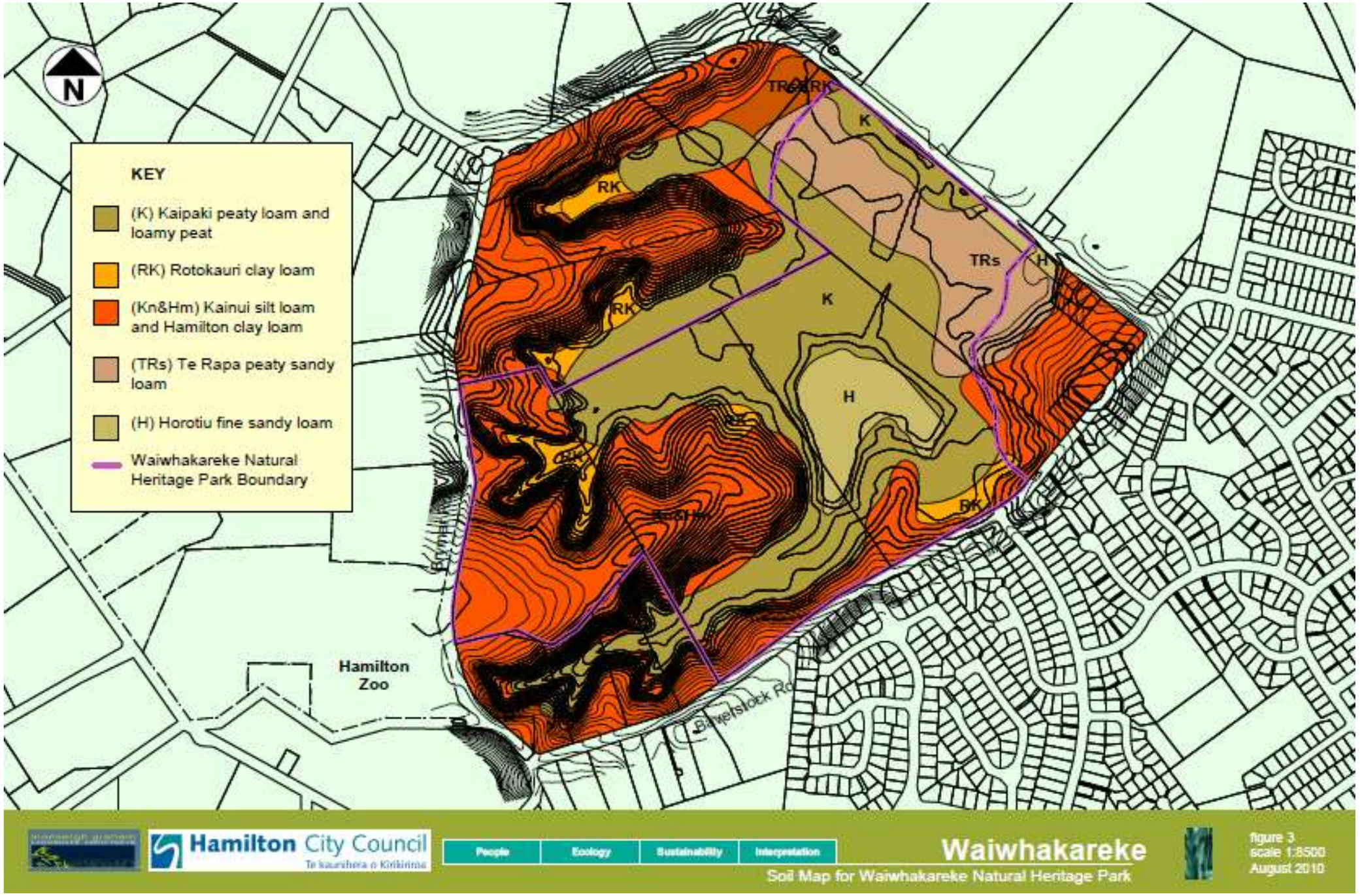


Figure 3 - Soil Map

4.3. Drainage and water quality

4.3.1. Introduction

In the past, Lake Waiwhakareke was probably surrounded by raised peatland and its nutrient status would have been dystrophic. Dystrophic lakes typically receive a large quantity of organic material, are acidic (low pH), and have low productivity. It is smaller than it once was due to drainage and the peat is no longer expanding. Farming activities in the catchment have increased the nutrient input to the extent that the lake is now classed as hypertrophic.

4.3.2. Drains

Four man-made drains run into Lake Waiwhakareke (numbers 1-3 and 5 in Fig. 4) and there is one outfall drain. The outfall is on the north-east side of the lake and drains to Rotokauri Road (Drain 4) where it crosses Rotokauri Road before looping back and draining into Lake Rotokauri. This drain has steep sides (c. 70cm) and has a reasonable flow of water from the lake. The water was approximately 6cm deep in October of the years studied, and a very brown colour. The bottom was very soft and silty. Cattle have access to the drain on one side, and the other side has shelter from Lawson's cypress (*Chamaecyparis lawsoniana*) trees. Champion et al. (2001) found that the drain has low species diversity and that the species present were tolerant of pollution and low oxygen levels.

In October 2004, there was no obvious flow into the lake from Drain 1, which was choked with vegetation (wet pasture species). This drain is only fenced on one side, allowing stock to access it at times. There is no tall vegetation at any point along its length. The drain originates from a wetland area on private land at the head of the catchment. There is slow flow of water along the drain at this end, and tadpoles were noted here. The drain is approximately 2m wide along its entire length, with water in a smaller channel within this. The water in the drain is up to 40cm deep and the bottom is extremely silty. The water running in this drain was clear in October, probably due to the fact that no stock were in any of the paddocks along its length. As the area around it is planted, Drain 1 will be slowed, pooled and meandered so far as is possible without affecting drainage from the neighbouring property. The goal will be to achieve a level of treatment before the water enters the lake and to provide habitat.

Drain 2 is little more than a slight depression in the land with shallow surface water, but very boggy land. Drain 3 is also little more than a depression, but it does have free-flowing water in summer (10cm deep). The bottom was silty. Drain 5 has a reasonable flow into the lake (c. 6cm deep), and the water entering the lake was turbid. Cattle have access to this drain on one side near the lake and either side further away. There is bank collapse further upstream caused by stock access. Near the lake, shelterbelt trees shade the drain for a short distance. Another substantial drain from the hill slopes to the north joins Drain 5. Drain 5 originates at the head of a gully which contains three remnant kahikatea. The land at the bottom of this gully is very wet and the drain hard to distinguish. Drains 2, 3 and 5 will be blocked off in the future.

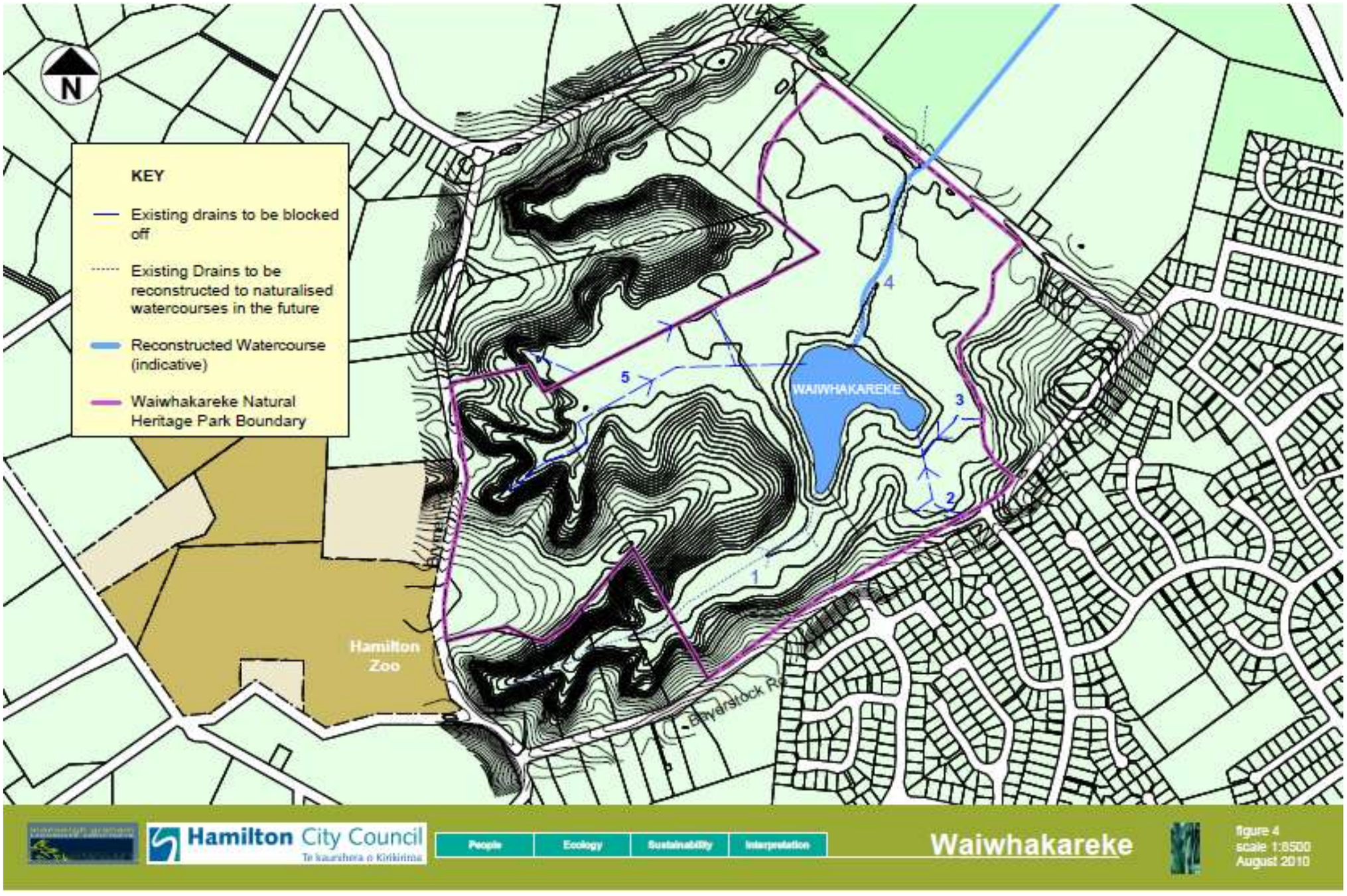


Figure 4 - Drains

4.3.3. Water quality

Measure	Monthly average 2006-8
Total nitrogen	1566 mg m^{-3}
Total phosphorus	958 mg m^{-3}
Chlorophyll concentration	57.2mg g^{-3}
Secchi disc depth	0.95 m
pH	6.98
Conductivity	125µS cm^{-1}

Table 1 - Data provided from surveys 2006-2008 carried out by Duggan, University of Waikato

Studies in 2006-2008 indicated very poor water quality and show little improvement over the period of testing. Phosphorus inputs into the lake from the catchment only account for approximately half of the lower water quality. A nutrient budget indicates that a large proportion of the phosphorus present is likely being released from the lake bed through the deoxygenating of the bottom waters.

The lake thermally stratifies in summer and is coloured by humic acids released from the peat. These values in addition to the data above mean that the lake is classified as hypertrophic (Duggan, 2010). Over time, the releasing of phosphorus is expected to reduce and a decrease in phytoplankton will see water quality improve (Duggan 2009).

Picture 4 - Raupo clumps on the margins of Lake Waiwhakareke

4.4. Natural Values

4.4.1. Introduction

This section describes the pre-restoration state of the site and restoration activities carried out to date.

The development of the park represents a significant opportunity to contribute to the restoration of native flora and fauna in Hamilton City and the wider Waikato area, through the reconstruction of indigenous ecosystems. The lake supports a number of bird and fish species as well as invertebrates.

At the time of writing this plan planting at the park was well underway with an estimated 16 hectares restored to indigenous vegetation at the end of the 2010 planting season.

4.4.2. Past Vegetation

Pollen records and other studies have been analysed to identify past patterns of vegetation in the park. This information will help meet the restoration intent of recreating the ecosystems that existed in the Hamilton Basin prior to human occupation. Five main areas of past vegetation have been identified:

Lake Zone

(Peat lake/aquatic ecosystem)

The submerged vegetation here was dominated by native charophytes (*Nitella hookeri/cristata, Chara corallina*), pondweeds (*Potamogeton ochreatus, P. cheesemanii*), and milfoils (*Myriophyllum propinquum*). The emergent marginal vegetation typically comprised narrow monospecific zones of raupo, *Baumea articulata*, and *Eleocharis sphacelata* from the lakeshore outwards.

Riparian Zone

(Peat lake margin and swamp wetland)

Kahikatea was the main species but individual trees were much smaller than on the better drained soils. Cabbage tree, swamp coprosma, *Coprosma propinqua,* manuka, flax, *Dianella nigra,* and *Hypolepis distans* were also relatively common.

Wetland/Swamp Zone

(Kahikatea, pukatea semi-swamp forest)

Semi-swamp forest was dominated by kahikatea, but several other species were present in varying quantities, including rimu, matai, pukatea, swamp maire, tawa, pokaka, and the occasional cabbage tree. Prominent in the understorey were silver fern, mapou, hangehange, *Coprosma areolata*, and turepo, and tangles of kiekie and supplejack. The ground cover was dominated by ferns, herbs, grasses, and sedges including *Hymenophyllum demissum*, hen and chicken fern, *Astelia fragrans*, *A. grandis*, and *Microlaena avenacea*.

Hillslope

(Tawa and rimu broadleaved-podocarp forest)

Here, occasional rimu and local miro, kahikatea, totara, and northern rata were emergent over a canopy dominated by tawa. Other widespread broadleaved species in the canopy included titoki, hinau, rewarewa, and pukatea. The understorey was characterised by a variety of small trees, shrubs, and tree ferns including mahoe, pigeonwood, raurekau, and silver fern. Ferns and grasses such as hen and chicken fern, crown fern, *Hymenophyllum demissum*, and *Microlaena avenacea* occurred in the ground layer.

Ridgetop

(Kauri, tanekaha, rewarewa conifer-broadleaved forest)

Major canopy species on ridge crests in the Hamilton region were kauri and tanekaha, with canopy associates of rimu, tawa, and rewarewa. The understorey was characterised by the presence of shrubs such as mingimingi and prickly mingimingi and silver fern and wheki tree ferns. In the ground layer, sedges, grasses, and ferns such as crown fern and *Doodia media* were common, with occasional kauri grass.

Further information about the past vegetation in the natural zone can be found in Appendix 5.

4.4.3. Existing flora

The present-day flora of the un-restored areas of the site is dominated by exotic pasture. There is an 8m x 2m patch of sphagnum moss on the western arm of the lake (Downs et al. 2000). This is a major species in peat formation. There is also an abandoned house site on the property which contains a mix of wild and overgrown garden plants (including some planted natives), and a large oak tree. The tables below show the main floristic diversity prior to restoration.

Pasture species	
swamp willow weed	*Persicaria decipiens** [6]
exotic water purslane	*Ludwigia palustris*
marsh bedstraw	*Galium palustre subsp. palustre*
Gipsywort	*Lycopus europaeus*
Lake emergent plants	
jointed baumea	*Baumea articulata**
kutakuta	*Eleocharis sphacelata**
raupo	*Typha orientalis**
exotic water lily	*Nymphaea cultivar 'Chromatella'*
milfoil	*Myriophyllum propinquum*
Lake Edge	
Grey willow	*Salix cinerea*
Cabbage tree	*Cordyline australis**
Weeping willow	*Salix babylonica*
Gorse	*Ulex europaeus*
Harakeke	*Phormium tenax**
Swamp millet	*Isachne globosa**,
Swamp sedge	*Carex virgata**

[6] Native plants or animals are indicated with an *.

Swamp kiokio	*Blechnum novae-zelandiae**
Blackberry	*Rubus fruticosus*
Hawthorn	*Crataegus monogyna*
Willow weed	*Polygonum spp.*
Mercer grass	*Paspalum distichum*
Other areas	
Ferny azolla	*Azolla pinnata*
Beggar's ticks	*Bidens frondosa*
Dwarf bedstraw	*Galium palustre*
Yorkshire fog	*Holcus lanatus*
Catsear	*Hypochoeris radicata*
Sharp-fruited rush	*Juncus acuminatus*
	Juncus effuses
Japanese honeysuckle	*Lonicera japonica*
Lotus	*Lotus pedunculatus*
Water purslane	*Ludwigia palustris*
Gypsywort	*Lycopus europaeus*
Spearwort	*Ranunculus flammula*
Buttercup	*Ranunculus repens*
Curled dock	*Rumex conglomerates*
Bog stitchwort	*Stellaria alsine*
Pink bindweed	*Calystegia sepium subsp. roseate**
Swamp willowherb	*Epilobium pallidiflorum**
Common duckweed	*Lemna minor**
NZ lobelia	*Lobelia anceps**
Slender knotweed	*Persicaria decipiens**
Fireweed	*Senecio minimus**
Baumea	*Baumea rubiginosa**

Table 2 - Flora present on the site prior to restoration planting

4.4.4. Planting to date

The Zones referred to in the following text are based on those mapped in Figure 6. Planting was initiated on the site in 2004, and different species mixes were designed for each zone. The plant lists found in Appendix 1 further detail the species lists for planting.

Zone 1 is the lake margin semi swamp Zone, which was planted from 2004 to 2006. This Zone was planted to improve the water quality of the lake and enhance its margins. Plantings are of the manuka-flax vegetation type. The Zone has established well due to the moisture content in the soil resulting from its proximity to the lake and is now ready for the enrichment planting of canopy species as the canopy cover is at a desired level.

Zone 2 was planted in the winter of 2007. This area was selected as an experimental site to trial different plant mixes (Kanuka dominant, broad leaf dominant, with nitrogen fixer) and treatments to promote weed suppression and moisture retention. Treatments included the use of 100mm thick mulch, planting straight into the ground with no mulch and placement of recycled paper plates around the base of the plants (eco cover). The same species were planted at the same time in all three treatment areas. Note that these plantings were subject to the extreme drought over the summer of 2007.

Picture 5 - Enthusiastic Planters in Zone 1

The paper plate treatment proved to be ineffective as pukeko ripped them up to uncover the slugs and snails that were living under them and wind caused them to be blown away. The area that had no mulch lost significant proportions of its broadleaf plants, such as *Pittosporum tenuifolium* and *Coprosma robusta,* while *Kunzea ericoides*, *Leptospermum scoparium* and *Plagianthus regius* were severely stressed. By contrast the mulched area experienced minimal losses and has achieved full canopy coverage from 2007-2009.

The ridge crest and hill slope of Zone 3 on the north western corner of the site had its first planting in winter of 2008. This Zone was treated with mulch and has already achieved good canopy cover. Zone 3 will be ready for enrichment planting from 2011-12.

The semi swamp of Zone 4 was also planted in 2008 with pioneer species such as *Phormium tenax* and *Leptospermum scoparium.* This planting has almost achieved successful canopy coverage and enrichment planting will be considered in the next 2 years. A miniature peat dome was formed on the eastern side of the lake to create a trial plot of peat forming plants such as *Sporadanthus ferruginea* and *Empodisma minus*.

In 2009 a gully and semi swamp planting was implemented with a slight variation in the planting selection. The semi swamp was planted with a higher density of carex species and the hill slopes had higher densities of drupe bearing species such as *Coprosma robusta* and *Melicytus ramiflorus*. The employment of a skilled project coordinator allows the project to be managed in an adaptive manner, in accordance with new knowledge and improved practices over time.

Picture 6 - The first plantings at Waiwhakareke Natural Heritage Park, planted September 2004, with the project officially launched by the Hon. Chris Carter, Minister of Conservation.

4.4.5. Fauna

A variety of common fauna use or inhabit the lake and surrounding environs. As the ecosystems are slowly restored and recreated, the habitat values and food sources will be enhanced and the species diversity will increase. This section describes fauna present in the area before restoration and over its early years.

Birds

A key objective of the park is to maintain and enhance habitat for native birds, with particular emphasis on encouraging the return of native birds (e.g. tui) previously resident in Hamilton City.

Picture 7 - A Tui — a native bird that will be encouraged to reside at Waiwhakareke..

Terrestrial Birds		
Common name	**Maori name**	**Latin name**
Australasian Harrier		Circus approximans
Australian Magpie		*Cracticus tibicen*
Blackbird		*Turdus merula*
Black Swan		*Cygnus atratus*
(Champion et al 2001)		
Fantail	Piwakawaka	*Rhipidura fulginosa*
Goldfinch	Tauhou	*Carduelis carduelis*
Green Finch		*Carduelis chloris*
Grey Warbler		*Gerygone igata*
House Sparrow		*Passer domesticus*
Indian myna		*Acridotheres tristis*
(Morgan 2010)		
Ring Necked Pheasant		*Phasianus colchicus*
Rock Pigeon		*Columba livia*
Silvereye		*Zosterops lateralis*#
Skylark		*Alauda arvenis**
Song Thrush		*Turdus philomelos*
Spur-winged Plover		*Vanellus miles novaehollandiae*#
Starling	Riroriro	*Sturnus vulgaris*
Swamp Hen	Pukeko	*Porphyrio melanotus**
Welcome Swallow	Parera	*Hirundo tahitica neoxena*#
Yellowhammer		*Emberiza citrinella*
Aquatic Birds		
Common name	**Maori name**	**Latinname**
Black Shag	Kawau	*Phalacrocorax carbo novaehollandiae*Porphyrio*
Canada Goose		*Branta canadensis maxima*
Grey Duck		*Anas superciliosa*#
Grey Teal	Kawaupaka	*Anas gracilis*
Hybrid Duck	Tete	
Little Shag		*Phalacrocorax melanoleucos*
Mallard Duck		*Anas platyrhynchos*
Paradise Shelduck	Putangitangi	*Tardorna variegata*

Table 3 - Birds observed to be present in Waiwhakareke Natural Heritage Park 1992-2010

Aquatic invertebrates

Champion et al. (2001) recorded the following aquatic invertebrates in Lake Waiwhakareke including its tributaries and outlet drain.

Common name	Latin name
Aquatic snail	*Potamopyrgus antipodarum*#
Damselflies	*Xanthocnemis*# *sp.*
	Austolestes colensonis#
	Ischnura aurora#
Backswimmers	*Anisops sp.*#
Water boatman	*Sigara sp.*#
Dragonfly	*Antipodochlora braueri*#

Table 4 - : Aquatic invertebrates present in Lake Waiwhakareke

Fish and amphibians

Champion et al. (2001) found the following fish species in Lake Waiwhakareke;

Common Name	Latin Name
Shortfin eel	*Anguilla australis*[#]
Longfin eel	*Anguilla dieffenbachii*[#]
Common bully	*Gobiomorphus cotidianus*[#]
Rudd	*Scardinius erythrophthalmus*
Brown bullhead catfish	*Ameiurus nebulosus*
Brown trout	*Salmo trutta*
Giant kokopu	*Galaxias argenteus*[#]
Frog tadpoles	*Littoria aurea*
Gambusia	*Gambusia affinis*

Table 5 - Fish species using Lake Waiwhakareke and tributaries

A later survey by the University of Waikato in 2005 noted a similar suite of species but provided additional data on relative abundance. Shortfin eels were present in high numbers, and size ranges indicate that they were recruiting successfully. Following the fishing, both the catfish and rudd were removed and other species were returned to the lake. Catfish were the most abundant invasive fish, and their presence is generally considered to be deleterious to the ecosystem; however no koi carp or goldfish were captured, which is a positive indicator (Hicks 2010).

Future opportunities for fish species include restoration of the margins of Lake Waiwhakareke as habitat for black mudfish, the local mudfish species. Black mudfish may require translocation to establish new populations. While further research is required, it is likely that the Lake and its surroundings would provide a suitable habitat for the threatened mudfish and other galaxiids such as the giant kokopu, and could fulfil an important conservation role for this and other aquatic species.

4.5. Recreation and Community

Waiwhakareke Natural Heritage Park is currently leased for farming and there is no official public access onto the land. However, once the Park has become established, there will be a number of recreational opportunities. Within the Park, walking is likely to be the dominant activity, particularly for appreciation of the plants and wildlife. Access for disabled members of the community will be provided for, including considering the needs of wheeled pedestrians in the development of park infrastructure. Cycle paths will be provided around the perimeter of the pest-proof fence and will provide important transportation links with the surrounding residential areas and nearby facilities.

Planting days are an important means for community involvement. Community groups with goals complementary to those of the park (such as Tui 2000) help mobilise community volunteers to work on the project. The Friends of Waiwhakareke group has been established by Tui 2000 as a core group of volunteers with monthly newsletters and updates. This group gathers to plant/weed at the park on the last Saturday of each month except December. There are also many other organisations in Hamilton with a strong interest in ecological restoration and through the Friends group and the Waiwhakareke website interested parties will be able to find out when events are happening at the park and register their interest.

Picture 8 - Zoo workers help out at Waiwhakareke with a planting

Formal children's play spaces (swings, slides etc) will be built in neighbourhood parks adjoining the park, and there will also be informal play spaces located there. The Park will connect to the Wintec campus through the road network to be established on the east side of Rotokauri Road.

When completed, the Park will promote the social wellbeing and health of surrounding residents. Studies have confirmed that there is a link between improved mental health of people and access to green spaces. The Park will contribute to and enhance the existing recreational space in the north-west of Hamilton and the Heritage Park will provide an opportunity for those living in the area to experience nature firsthand with no cost involved. In being involved with the creation of the park local residents will be provided with a space that they can identify with.

4.6. Landscape and aesthetics

Lake Waiwhakareke is recognised by locals as a feature of the landscape and the neighbours appreciate the view that the lake and surrounding rural land has to offer. This view will gradually change as planting progresses and the trees mature, turning the view from that of a rural landscape to one of a natural, native treescape.

Major public access points to the park will require landscaped plantings that are aesthetically appealing. With careful thought to plantings there may also be an opportunity to preserve some views of the lake from Baverstock Road, at least in the short term. Viewing platforms at highpoints in the Park will be valuable in enhancing the visitor experience. Viewing platforms will also be located on the western side of the lake and an observation hide on the eastern side of the lake will provide an opportunity both to view birdlife and appreciate the aesthetic qualities of the lake.

4.7. Historical and Cultural

Waiwhakareke is regarded as an important landmark and food gathering location for tangata whenua who traditionally occupied these lands prior to the Waikato land-wars of 1863. The overall shape of Waiwhakareke has changed very little since 1865, as it was the headwaters of an ancient stream. The most accepted translation of Waiwhakareke is 'Wai' meaning 'water' and 'whakareke' which means 'to plunge a pole'.

The vegetation that previously existed around the lake provided many resources for Maori. A number of noted bush stands of totara, matai, kauri, kahikatea, pukatea and tawa were interspersed throughout this region. The first three species provided a number of key building materials. Berries such as hinau, koroi (kahikatea) and miro were collected and prepared for consumption. Native birds such as korimako (bellbird) huia, kiwi, kaka (parakeet) and kuku (native pigeons) which came to feed on forest berries or fruits were snared and trapped.

One significant forest stand that originally stood in the Waiwhakareke Natural Heritage Park locality was named Te Raukaka (many parrots). Kaka were caught there while nesting in certain trees, particularly the pukatea. Kakas were prized for their red-brown under wing feathers and were also used as decoys in order to attract other birds. All that survives of Te Raukaka are a few standing trees in the Mooney Reserve to the east of the Heritage Park.

One of the main industries for local hapu was the harvesting of raupo from the swamp margins of Lake Waiwhakareke, where pollen was laboriously extracted, carefully prepared and made into a coarse type of bread or cake.

Picture 9 - Raupo on the edge of Lake Waiwhakareke

It is currently unknown when exactly the first Maori inhabitants came into the area. However indications of occupation can be gathered from the detailed studies of pollen deposits that are normally found preserved in the silt and mud deposits on the muddy bottom of lakes and swamp environments. Thus the lake bed of Waiwhakareke may provide indications of when humans first entered the area and when the first burn offs of local forests and vegetation occurred. Such activities were linked to clearing bush for tracks for ease of travel and access to local food resources as well as to provide a constant supply of domestic fire that was often left to smoulder in dry peat for many years.

There was a famed, unnamed walking track that followed along what is now Brymer Road. This track provided overland access between the Waikato and Waipa Rivers by travelling along the hill ranges to the north where the Hamilton Zoo is now sited. The zoo site is named Te Maro O Rangitara, the apron of Rangitara, an ancient ancestor who lived in this area. The walking track continued around the northern shore line margins of Rotokauri (Lake) and on to the Te Ohote stream which discharges into the Waipa River north of Whatawhata. This supply route enabled ease of communication and access to stone resources on the west coast for implements and to other settlements along the Waipa River.

The area of the Heritage Park was considered as a temporary stopping place by travelling parties, hence the absence of fortified Pa in the general area, but the locality was primarily known as a food gathering place for local hapu on brief expeditions gathering tuna (eels), ducks, and parohe (native trout), elsewhere known as kokopu. Locally the term "kokopu" relates to the large silver bellied eel.

Therefore it is highly probable that evidence may remain of features such as ancient camp sites used for the preparation of raupo and preservation of birds for consumption, soils indicative of traditional Maori cultivation or soils that supported fern-root as a result of burn offs.

According to the accounts of Ngati Wairere chieftain Waharoa Te Puke, the noted fighting chief Te Rauparaha was pursued through this area and passed by Waiwhakareke sometime in 1812 during a failed attempt to invade the lands of Ngati Wairere.

The swamps surrounding Lake Waiwhakareke contained valuable flaxes that were gathered by ancient Maori for manufacturing textiles such as cloaks, mats and ropes, due to their superior strength of fibre or softness. In addition, the trade in flaxes became a huge industry for Maori as early as the 1820s in order for them to acquire iron tools and weapons such as muskets. The Heritage Park land was shared by three local hapu, the Ngati Koura, Ngati Ruru and Ngati Ngamurikaitaua. They lived on the shore margins of Rotokauri (Lake) and occupied a Pa there named Te Uhi during the 1840s.

According to the accounts of Ngati Wairere, the first European to have passed through this area was named Korehako sometime during the late 1820s. It is believed that he was captured by Ngati Koura at Aotea harbour and was brought inland to live at Kirikiriroa Pa. In the 1830s came Mr Edward Meurant who was a trader in flaxes and gum to Europeans. He married a local Ngati Koura woman named Te Rangikauwau They had a settlement on the banks of the Waipa River near the Te Ohote Stream.

Throughout the 1830s land located south of the Waitemata Harbour in Auckland was relatively unknown to European settlers. Cohabitation of the north of the North Island between Maori and Europeans was relatively peaceful but to the south, and including Kirikiriroa and its surrounds, the Maori ruled supreme.

Another noted visitor who passed Waiwhakareke on route to Kirikiriroa was Taupiri based CMS missionary Potaenui otherwise known as Reverend Ashwell. Ashwell orchestrated some of the huge land clearances that many Christian missionaries in the greater area undertook. Ancient forest reserves were burnt to the ground to make way for agriculture. This damaged the natural resource based commercial trade that Maori undertook prior to 1860.

Maori activity continued in the area after 1864 with gum digging and the removal and hauling of Kauri out of the local swamps for fashioning into river canoes. These were then dragged along the route now followed by Baverstock Road en route to the Waikato River.

Te Roore Tatangi, a fully tattooed chief, and Te Onetapu were Ngati Koura leaders who lived at Pukete pa just prior to 1867 and were known to have had gangs employed to assist European settlers to drain peat lands for farming purposes. Kauri gum collections by local Maori occurred right up until the 1920s. The gum was found to be a superior resin and ingredient for varnish and was exported to London from New Zealand. This trade provided an introduction to European industry for local Maori.

The work of missionaries and the extension of industry in the form of gum digging and farming practices helped to integrate the two cultures in the Waikato Region. By 1843 missionaries such as Reverend Ashwell had set up permanent mission stations at locations throughout the Waipa area. Many Maori were converted to Christianity and continued the clearing of the forests to make way for European type farms. They were introduced to agricultural practices such as wheat production and harvesting.

The 1850s saw Maori operating their own flax and flour mills in the area, expanding the variety of new industry introduced by Europeans. In the 1860s, with the European population firmly established in the Waikato, groups of Maori were employed by European farmers to assist in the drainage of peat land in the area surrounding Waiwhakareke. This allowed the peat land to be used for pastoral farming.

Baverstock Road, which runs along the south eastern boundary of the Heritage Park, was formerly known as Thomas Road. Land directly around Lake Waiwhakareke was owned by the Thomas family from 1929, followed by the Clements family who eventually on sold to Council. These families used the land primarily for dairy farming with sheep being grazed occasionally. Crops were sometimes grown for winter feed, usually lucerne and turnips.

Up until Council purchased the area in 1975, the lake was not fenced off. It was used at various times for swimming by children and also as a short cut through the area via canoe for some people. Mushroom collecting from the surrounding paddocks was common in autumn.

A direct result of the lack of fencing around the lake was pollution of the water through cattle effluent. Cattle were able to access the lake directly and could graze the edges, with the resulting contamination degrading water quality. This, in combination with nutrient rich run-off from the pasture, moved the lake from a dystrophic state (very low fertility and peat stained water) to a fertile, algae dominated system.

The hills to the north of WNHP largely consist of clay soils which are difficult to farm. Over time droughts have had a major effect on the productivity of this area with visible signs of past dry spells evident in places.

The urbanisation trends and population growth in New Zealand throughout the 20th Century resulting from European settlement has led to the boundaries of Hamilton City expanding. The area containing the Heritage Park came into the City as part of the 10th city extension in November 1989.

4.8. Education and Research Facilities

Presently there are no formal education facilities or programmes that focus on the Heritage Park, although funding has been recently received to establish them. This plan outlines how education programmes will be developed to ensure the best use is made of learning opportunities at the site. The development of the Heritage Park provides opportunities to study not only the features on the site, but the development of them over time across a wide array of disciplines such as restoration, specialised arms of ecology, social studies of community engagement, tourism, and cultural studies.

Hamilton Zoo will be the main proponent of tailored learning from the Park, as it will be the physical base for the delivery of the formal education programmes to school students and the development of teaching resources and much of the interpretive education material. The Zoo is one of New Zealand's four major Zoos and the first to be accredited in ISO 14001 Environmental Management Systems (2002) and also the first in New Zealand to gain accreditation from the Australasian Regional Association of Zoo Parks and Aquariums (now known as the Zoo and Aquarium Association) in 2008. Hamilton Zoo provides advocacy for native and exotic species and is actively involved in conservation programmes.

Other key agencies in the delivery of education and research programmes and opportunities are the University of Waikato, Wintec, local schools and the wider community. Further information on education and research based intentions of these stakeholders can be found in Sections 11 and 12.

4.9. Summary

Section 4 has provided an overview of the site's current values. Sections 5-14 provide more specific detail of what is planned across a range of areas for the Heritage Park. Each area of management interest has one or more objectives, with associated policies that are discussed in turn. In accordance with the vision, the restoration of Waiwhakareke Natural Heritage Park will proceed subject to these objectives and policies.

5.0 The Natural Heritage Park Concept

5.1. Objective

To create a self-sustaining, pest-free habitat sanctuary that represents the original ecosystem diversity of the Hamilton Basin.

5.2. Policies

5.2.1. Five main ecosystems will be established at the Park consisting of species representative of pre 1840 vegetation.

5.2.2. Shared facilities will be located in areas convenient for both park users and zoo visitors.

5.2.3. The project will be implemented in stages to ensure there are adequate resources available for the completion of each successive milestone.

5.2.4. Implementation will generally follow this management plan as adopted by Hamilton City Council or more effective or acceptable methods by agreement and will be coordinated by an experienced manager.

5.2.5. Overall design will follow a theme that will reflect the Park's purpose and which will be used for all facilities provided throughout the park and surrounding Community Parks.

5.2.6. The desirability of enclosing the park within a pest-proof fence will be fully researched when the park's area is fully planted, in light of the fence technology then available and the scientific knowledge at the time.

5.2.7. Temporary and/or relocatable buildings may be provided within the Park boundary where needed to service the park's development, e.g. for storage of planting equipment, but permanent buildings will be situated outside the pest-proof fence.

5.2.8. All services such as water pipes will be run around the perimeter of the park to ensure the integrity of the park and to prevent damage during maintenance works.

5.2.9. Lighting will not be provided within the Park's restoration area to limit light spill and reduce the use of the Park at night. If a pest proof fence is installed the area it encloses will normally be closed at night.

5.3. Discussion

5.3.1. Ecosystem establishment

The key goal of the Waiwhakareke Natural Heritage Park restoration is:

"To create a self-sustaining habitat sanctuary that represents the original ecosystem diversity of the Hamilton Basin"

This ecosystem diversity is represented by the following five ecosystem types:

- Kauri, tanekaha, rewarewa conifer-broadleaved forest
- Tawa, rimu broadleaved-podocarp forest
- Kahikatea, pukatea semi-swamp forest
- Peat lake margin and swamp wetland
- Peat lake/aquatic ecosystem

These ecosystems are associated with specific landforms, each of which is present in the Heritage Park (Fig. 6). These landforms can be described as:

- Ridge crest
- Hillslope
- Semi-swamp
- Lake margin/swamp
- Lake/aquatic habitat

The three forest ecosystems will require total reconstruction and the two ecosystems associated with the peat lake will require major restoration. A Restiad Bog sub-ecosystem is being established within the lake margin/swamp area. The ultimate goal of this restoration is to have self-sustaining ecosystems representative of the past Hamilton landscape within the city boundaries.

5.3.2. Staged implementation

Flexible staged implementation will be used to match available resources, and will ensure that the public can begin to use the park at the earliest possible time. Initial development has been focussed on the planting of the areas around the lake, with the retirement of the lake margin from grazing, followed by weed control and planting (Fig. 7). Grazing of undeveloped areas provides weed suppression and will allow farming to remain economically viable for as long as possible.

Carrying out planting in stages will provide the following benefits:

- Outcomes of different methods can be monitored to enable success to be reinforced and failure to be eliminated.
- The path network can be built into the staged planting so that there will quickly be defined areas of public access to native vegetation, thereby helping maintain public support.
- It will allow time to build sufficient stocks of eco-sourced plants for planting.
- It will increase chances of success because there will be sufficient resources for initial site care and maintenance.
- It will provide a variety of plant ages and plant types (successional stages) for bird species, including maintenance for a time of open habitat for birds such as the pied stilt.

The next key area of focus will be on the main entrance way off Brymer Road, creating a recognisable arrival and entrance point, and ensuring the facilities essential to the development of the park are in place. As the entrance will be a joint venture with the Zoo, facilities such as the Conservation Education Centre will serve both facilities. Implementing the plan in stages allows for the completion of areas and functions for use by the public as early as possible.

5.3.3. Visitor amenities

To capture the uniqueness of the park, amenities within and adjacent to it will be designed to a consistent theme. This will help to create a sense of entering a special place for visitors to the park. A car park will be constructed at the joint main entrance off Brymer Road to service both the park and the Zoo. The plans allow a staged development to expand the car parking area as and when visitor numbers increase.

Paths will provide public access throughout the park. All main walkways have been planned for slope contours to allow for wheelchair/pushchair access. Main paths will be hard surface pathways and include a series of raised boardwalks in particularly wet areas to allow for maximum accessibility. Pull off

areas for maintenance vehicles will be included in the path design. Further minor paths may be added to the plan in the future.

It is highly desirable that all services will be laid around the perimeter of the park, rather than across it. Laying of pipes would result in large scale earth disturbance which would detract from the integrity of the park and not be in keeping with the overall vision. Such pipes would have the potential to adversely affect the water table. Services would require maintenance in the future, and this could result in more earthworks just as plantings are becoming established, thus wasting time and effort. A pest-proof fence would prevent the entry of heavy machinery, unless a number of vehicle gates are included in the design, thus adding to the cost of the fence and making the fence more vulnerable to pest entry. An easement might also be required for such services which would compromise the planting plans. The 10m gap proposed between the fence and legal boundary is one place where service pipes could be laid without compromising the park.

It is likely that a pest proof fence will achieve changes of direction through a series of steps rather than a single abrupt change.

The natural heritage concept means that facilities inside the eventual pest-proof fence area should be kept to a minimum. Thought will need to be given to servicing facilities inside a fence e.g. emptying rubbish bins, and it may be suitable to locate such facilities outside the pest-proof fence and rely on public education to prevent littering.

5.3.4. Public Safety

Safety and security at the park may become an issue in the future when vegetation becomes sufficiently thick to block views. In keeping with Council's Lighting on Parks Policy the Heritage Park restoration area will not be lit at night. This will discourage people from entering the park at night and will avoid conveying an illusion of safety as well as decreasing exposure to potential criminal activity. It will also benefit the wildlife in the park and the astronomical observatory adjacent to the zoo, where there is an issue with light spill. This measure is also in keeping with good Crime Prevention Through Environmental Design (CPTED) practice.

5.4. Key Implementation Actions

5.4.1. Plant appropriate species in the staged approach outlined in Figure 8.

5.4.2. Construct main paths as each stage of planting occurs to provide for public access at the earliest opportunity.

5.4.3. Construct an entrance way and parking facility off Brymer Road to service both the Heritage Park and Hamilton Zoo.

5.4.4. Ensure all detailed design reflects an overall theme for the Park and adjacent Community Park facilities.

5.4.5. Service the development of the Park with relocatable temporary buildings only, unless they will fulfil a permanent function post-implementation.

5.4.6. Consider installation of a pest proof fence around the perimeter of the Heritage Park when the initial phase of planting is complete, in light of available technology and scientific knowledge at the time.

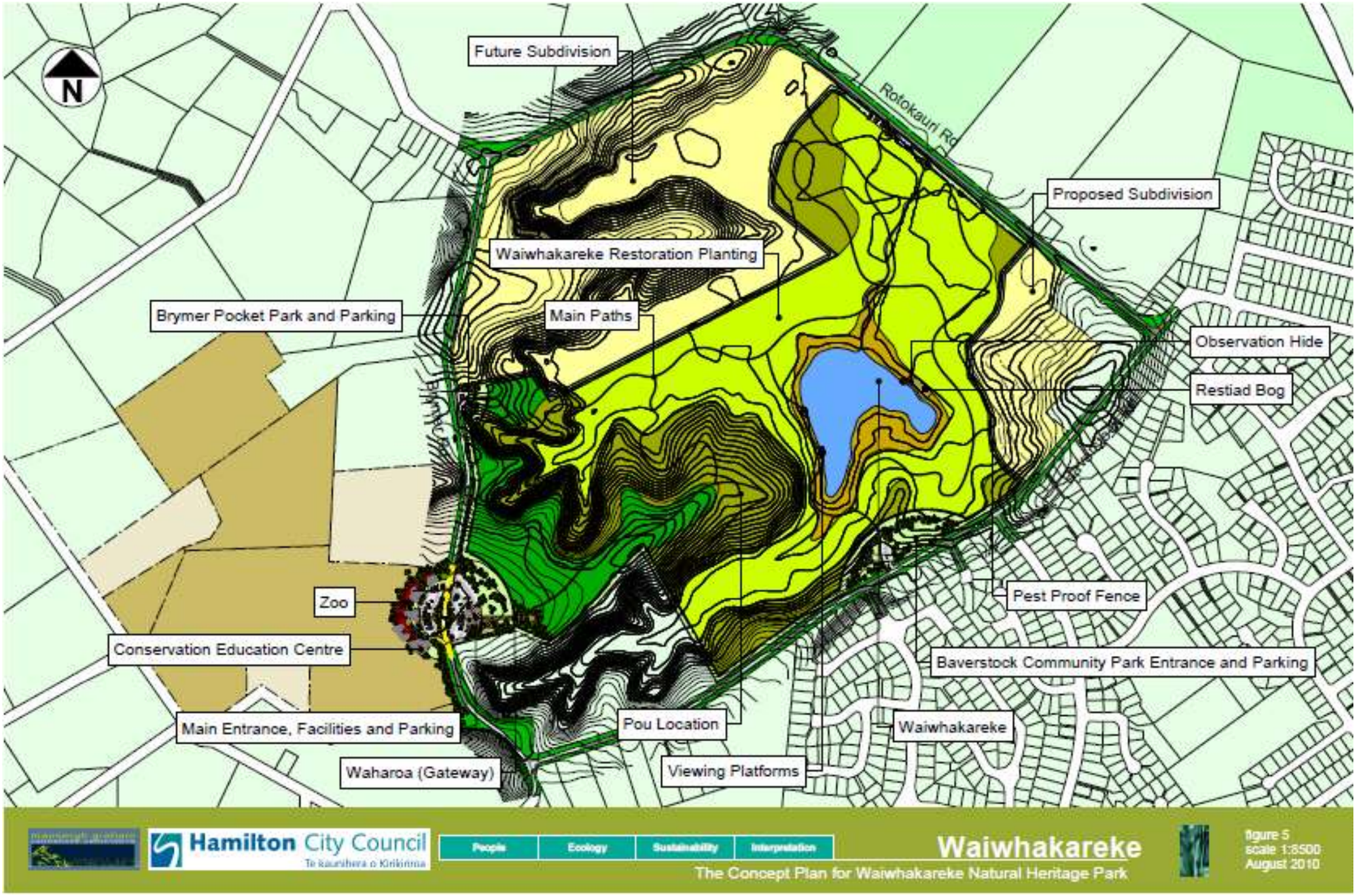


Figure 5 - Overall Concept

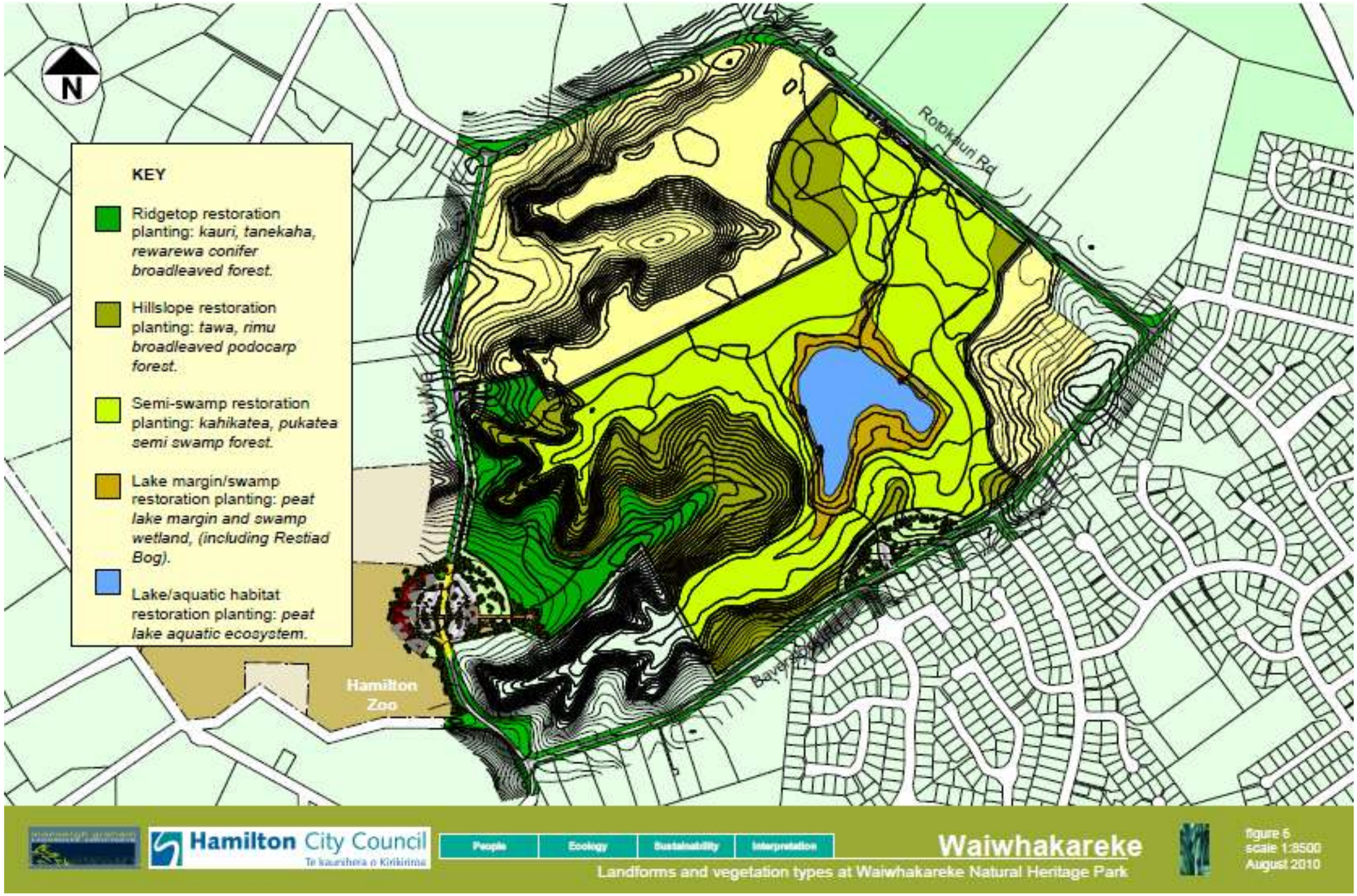


Figure 6 - Landforms and Vegetation Types

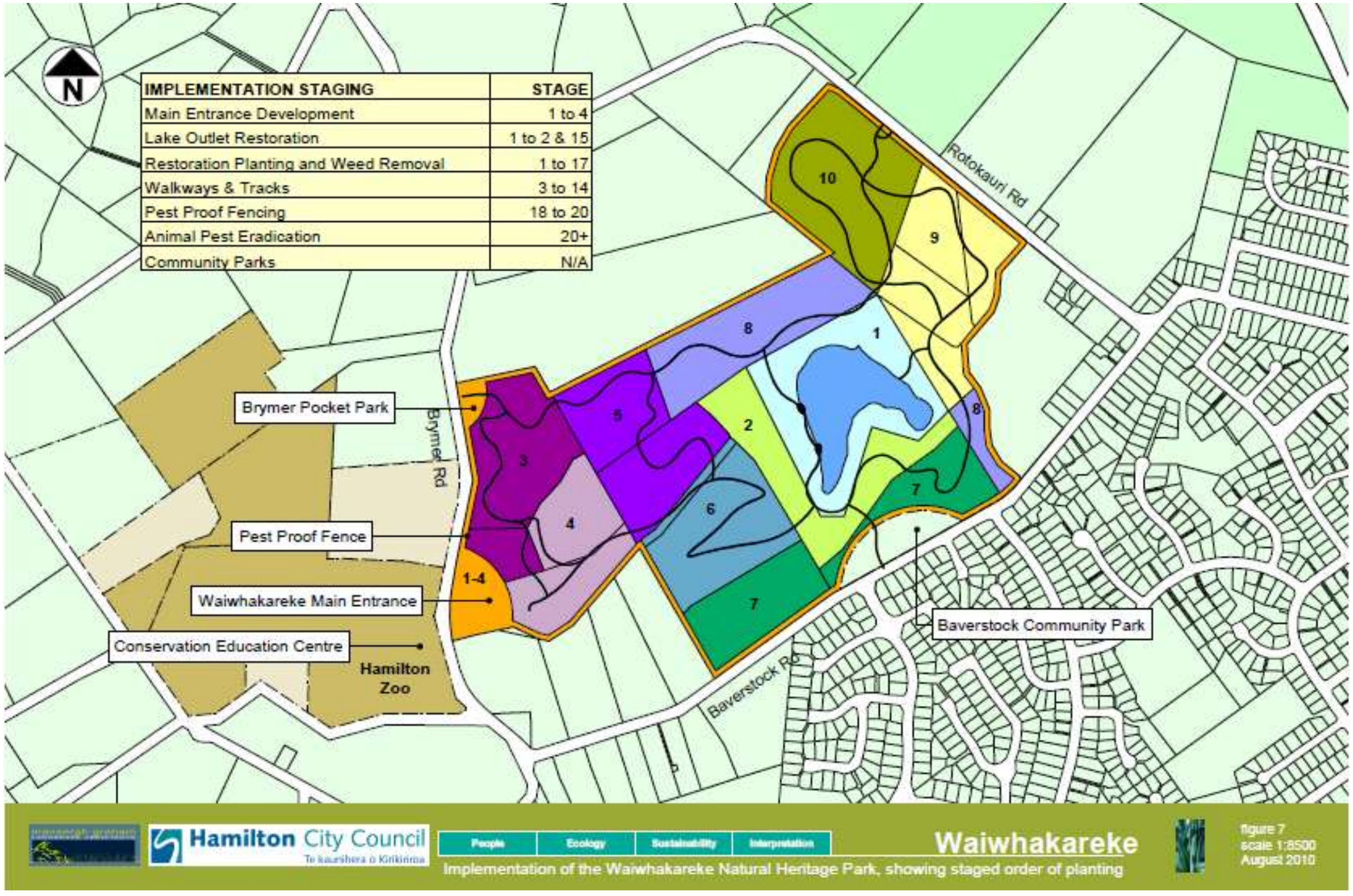


Figure 7 - Staging

6.0 Conservation and Enhancement of Indigenous Flora

6.1. Objective

To reconstruct and restore indigenous vegetation communities to Waiwhakareke Natural Heritage Park in the appropriate topography and soil type.

Picture 10 - Dense lakeside flax plantings at Waiwhakareke Natural Heritage Park

6.2. Policies

6.2.1. Fencing from stock will take place as planting is carried out. Measures to prevent damage to plants by other animals such as hares and rabbits will be carried out as necessary to ensure plants establish.

6.2.2. Plant pest management will be undertaken as necessary and the relative effectiveness of different methods will be monitored.

6.2.3. The Park will be progressively vegetated in the order described in Figure 7 in general accordance with the planting lists in Appendix 1.

6.2.4. Each zone must be planted with the appropriate species for its soil type as shown in Figure 6.

6.2.5. Indigenous plants will only be removed from the park if necessary for safety or where they compromise other aspects of the park, such as fence integrity. In addition, cultural take may be considered.

6.2.6. The only species used in the restoration process will be those that occurred naturally within the Hamilton Ecological District.

6.2.7. Species introduced to the area will be eco-sourced as far as is practicable.

6.2.8. Flexibility will be provided for within the planting programme based on research needs, availability of nursery stock and other variables.

6.3. Discussion

6.3.1. Exclusion and pest plant management

The park's farmed area will progressively decrease as planting areas are fenced off. Different types of plant pest management may be employed and the outcomes of different approaches will be compared. Some exotic plant species will be removed from the park through the use of mechanical control (e.g. willows). Otherwise the methods will be hand weeding, herbicide use and shading out by natives.

Native plantings are best released from weeds by hand-pulling to avoid damage. Some areas may be sprayed with herbicide prior to planting to reduce competition from weeds. In cases where the planting is to take place on recently retired pasture, herbicide treatment is unlikely to be necessary. Invasive weed wastes will be promptly removed from the Park to ensure further weed spread does not occur.

6.3.2. Staging and zoning of restoration planting

Initial planting will include slow growing, hardy trees amongst a mixture of fast growing shrubs and smaller trees to provide rapid shelter and canopy formation. Later, understorey and sensitive species will be introduced. Further information on plant species and numbers can be found in Appendix 1.

Generally, early successional species will be planted first to provide canopy cover and suppress weed species. Infill planting can occur later. Larger, more mature plants are more likely to establish quickly and require less maintenance than smaller plants. Species will be planted to reflect natural patterns. Close spacing will assist in crowding out weeds and will reduce maintenance requirements.

Plants representative of a given ecosystem will be planted on the appropriate soil type and slope (Fig. 3) and will be planted in stages to ensure there are enough available plants and resources to carry out the planting and maintain the area (See Fig. 7 for development stages). Different planting densities, planting and releasing methods and orders of plantings will be tested through various planting stages. The unplanted area will remain as grazed farmland until it is needed.

6.3.3. Eco-sourcing

Where possible, plants will be eco-sourced from natural populations in the Waikato. This is because the plants growing naturally in the Waikato should be the best adapted to the local conditions. Locally sourced plants will also ensure genetic variation between populations throughout New Zealand is maintained, which is important for the long-term survival of species.

It is important that high genetic diversity is maintained amongst the plants at the Heritage Park. Eco-sourced plants will be supplied from a large number of sites covering as large an area as possible within the ecological district. Information on the location of the parent seed will be recorded to ensure a good diversity is maintained. If seed is unavailable in the district or sources in the district have been exhausted and/or the diversity of sources is low, seed may need to be collected from the closest alternative source.

6.3.4. Potential seed sources

Kauri/tanekaha forest is to be recreated at the Heritage Park. Within the Hamilton Ecological District, Pukemokemoke Reserve contains representatives of these species and is a possible seed source for propagation. Permission for collection will need to be obtained from the Department of Conservation and the Maori landowners.

Rimu/tawa vegetation is also still represented in the Hamilton Ecological District. The foothills of the Karakariki Ranges and Mt Pirongia contain examples of this vegetation and are a possible seed source. Permission will be obtained from the relevant landowner before any seed collection is undertaken.

Kahikatea/pukatea vegetation is still represented in the Hamilton Ecological District in small remnants. Yarndley's Bush, Whewell's Bush, Barrett's Bush and Jubilee Park are possible seed sources for this vegetation type. Permission will be obtained from the relevant landowners before any seed collection is undertaken.

There are no intact remnants of peat margin vegetation in the Hamilton Ecological District. Possible sources for plants will be the margins of other peat lakes in the district. Remnant vegetation remains around the lake edge and some species may be able to be cultivated from these.

The two peat producing plants that have been established as a part of the Restiad bog on the lake margin are *Sporadanthus ferruginea* and *Empodisma minus*. These have been sourced from outside the Hamilton Ecological District at the Torehape peat dome and transported to the Heritage Park along with peat.

6.4. Key Implementation Actions

6.4.1. Progressively plant Waiwhakareke Natural Heritage Park as indicated in Figure 7.

6.4.2. Plant species appropriate for the soil type (Fig. 6), in a well mixed way that reflects micro-sites and natural dispersion patterns. Protect planting from stock grazing with fencing.

6.4.3. Undertake pest and weed management when necessary with a view to the establishment of a pest-free area in the future.

6.4.4. Record the parent location of eco-sourced plants and ensure that the planting programme maintains local genetic diversity to the greatest degree practicable.

7.0 Conservation and Enhancement of Native Fauna

7.1. Objective

To create a favourable environment for native fauna, including threatened species to be introduced following possible construction of a pest proof fence.

7.2. Policies

Picture 11 - The native New Zealand Wood Pigeon (Kereru/Kuku) — a potential resident of Waiwhakareke in the future.

7.2.1. Native fauna will be introduced to the Park at the appropriate time. Introduction of certain larger species will likely require the establishment of a pest-proof fence, while small invertebrates and soil microfauna) are expected to colonise naturally.

7.2.2. Pest fish will be controlled in the lake, drains and the proposed outlet channel where necessary.

7.2.3. A pest management programme will be carried out as appropriate, and later, construction of a pest-proof fence will be considered to prevent predation of birds, reptiles and invertebrates.

7.2.4. Trees will be planted along the Rotokauri outfall drain to allow for shading of the stream within the Park boundary in order to lower water temperature and improve fish habitat.

7.2.5. The outfall (Fig.4; Drain 4) will be re-routed to a more naturalistic course and will be re-shaped to make the sides less steep to allow for fish refuge during flooding.

7.3. Discussion

Restoration of native vegetation to the Park will provide new habitat for key bird species such as Tui and Kuku, in addition to other bird, reptile and invertebrate species. By providing suitable habitat and a predator free environment it is hoped that birds will be encouraged to the Park from the Hakarimata range and other nearby bush stands. As the project progresses, it is intended that some animals that will not naturally colonise can be released into the Park. These will be obtained from captive breeding programmes, including

those managed by Hamilton Zoo, and translocations of wild populations from other sources.

7.3.1. Provision of food-sources for wildlife

The establishment of the previous vegetation patterns will provide reliable and plentiful native food sources to the area. This will assist in attracting and retaining fauna in the Heritage Park. Establishing year round food supply will also assist in enhancing ecosystem function. The provision of native food supplies will also reduce the reliance of fauna on invasive species as sources of nutrition and assist in the spreading of native seeds throughout the city by mobile species.

7.3.2. Animal pest management

Exotic mammals (such as rats, cats, possums, mice, stoats, ferrets and rabbits) represent a significant threat to birds, invertebrates and vegetation within the Heritage Park. The full population of mammalian pests in the Park is not known, but rabbits and hares are certainly present in large numbers and rats and mice are likely to be present. Possums are also likely to be visitors and even residents, particularly when food sources increase. A mammal control programme will be implemented. Construction of a pest-proof fence will be considered later in the project, after a significant area of the park has been planted. It is likely that for the Waiwhakareke Natural Heritage Park restoration project to be truly successful, a pest-proof fence will be necessary at a later stage in the restoration.

Picture 12 - Example of a pest proof fence.

After the fence has been constructed and pest animals have been eradicated inside the enclosure, threatened species such as kiwi, brown teal and giant weta can be introduced. Locally uncommon species will also benefit from a pest proof fence, and numbers of fantails, grey warblers and tui will all increase. Many of these bird species will come to a pest free haven on their own from

surrounding areas. These species will visit gardens in the area, thus increasing the public's experience of nature.

Pest fish will be eradicated where possible and otherwise controlled in the lake and drains. This will be done using the best methods available at the time, including use of the University of Waikato electro fishing boat. It is also possible that the Lake may act as a receiving area for native species uplifted from other areas where they are under threat. In this way the Lake could contribute to long term conservation outcomes by providing safe habitat for native species such as the mudfish.

7.3.3. Enhancement of water bodies

The lake will be improved to encourage native fish and invertebrate species through planting of native species along its margins and fencing from stock.

Reducing the steep sides of the outflowing drain (Fig. 4; Drain 4) will be beneficial to native fish species as a gentler slope will provide refuge from high water flows. Planting along the drain length will also provide fish habitat through roots and undercut banks. Debris (such as rocks, branches) placed in the stream will also be beneficial to fish, and may be placed in the drain, provided they do not compromise water flow management. It may be desirable to allow seasonal level fluctuations, provided this can be managed without creating a nuisance for park neighbours.

7.4. Key Implementation Actions

7.4.1. Realign and re-contour the out-flowing drain (Drain 4) to produce a more natural water course and enhance the in-stream habitat in consultation with City Waters and other parties.

7.4.2. Plant the lake margin and drain edges to provide shade and improved food sources.

8.0 Improvement of Water Quality

8.1. Objective

To achieve and maintain water quality in Waiwhakareke as close as practicable to its natural dystrophic[7] state while establishing and maintaining the water table at a height that is suitable for the restoration of the semi-swamp and lake margin/swamp areas (see figure 6).

8.2. Policies

8.2.1. Water quality will be monitored using standard water quality indicators.

8.2.2. The water level of the lake will be monitored and reviewed periodically in relation to other management considerations (including neighbour impacts and the water table in the swamp and semi-swamp zones) to determine if a weir is required in the Rotokauri outfall.

8.2.3. Storm water disposal from surrounding growth cell developments will be considered in relation to the natural values of the site and will be managed so as to have minimal impact upon the restoration programme.

8.3. Discussion

8.3.1. Water quality

Regular water quality monitoring will be undertaken so that any changes arising from the recreation of the surrounding ecosystems can be detected. According to the measurements made by Duggan in 2006-08, Lake Waiwhakareke is hypertrophic. Hypertrophic lakes are very high in nutrients; leading to poor water quality. Nutrient reduction is key to improving the lake's water quality.

Research is needed to determine the concentrations of phosphorus and nitrogen that would have naturally been found in the lake, as there is conflicting information on the natural status of peat lakes. Once such concentrations are determined, these levels will be adopted as targets for the lake's water quality. Native macrophytes will be re-established in the lake and exotic macrophyte weeds will be monitored and removed if and when they establish. Further details on proposed monitoring may be found in Section 12 of this Plan.

8.3.2. Fencing and modifying the drains

Prior to the arrival of humans, it is unlikely that Lake Waiwhakareke had surface water channels flowing into or out of it. Water would have entered the lake through groundwater flow and rain only. The drains were dug to enable the land to be used for grazing. Direct stock access to drains increases sedimentation and nutrient loads into the lake. The drains leading into and out of the lake (Fig. 4) may be planted and fenced over time where possible to further improve water quality.

Planting over time and a reduction in channel size is likely to see the present inflowing drains disappear, with the exception of the main one that runs from the neighbouring pasture parallel to Baverstock Road. This will mean that the wet area at the top of Drain 5 will likely increase in size and the low lying land towards the lake will become wetter, recharging the peat. This will provide ideal conditions for the establishment of swamp and semi-swamp forest.

[7] Dystrophic lakes have low levels of nutrients and algae, but are stained a brown colour from the humic acids in the peat, resulting in low water clarity.

8.3.3. Retention of outflow and water level

The Rotokauri drain (Drain 4) needs to remain as an outlet to the lake. In times of high rainfall, water would have always escaped the lake and followed the low points in the land. This drain will be redirected to meander in a more natural way across the park area before reaching Rotokauri Road.

Water levels in the Rotokauri Drain will be monitored to ensure that the outflow is not excessively draining the lake. Natural water fluctuation with the seasons is a part of the normal function of Lake Waiwhakareke and ideally this will be allowed to occur without control by a weir. In considering control measures it must be born in mind that a weir could hamper native fish passage so if one was to be constructed, the provision of fish passage where appropriate would be a design criterion. The effect of the reconstruction of Rotokauri Road will be considered when the road is designed to ensure that the park's water table is not compromised.

8.3.4. Stormwater from catchment development

There is a number of options for the management of stormwater from future subdivisions surrounding Waiwhakareke Natural Heritage Park, and further investigation needs to be carried out in conjunction with the Council's City Development and City Waters Units to determine what needs to be done to maintain water quality in the lake, sufficiently wet conditions to prevent peat shrinkage, and to avoid potential effects on neighbouring properties.

Picture 13 - Semi Swamp Plantings and Hillslope areas at the Brymer Road side of the Park.

It is assumed in this management plan that the maintenance of the water level in the lake and thereby the water table in the surrounding swamp and semi-swamp areas of the park are of higher priority than achieving dystrophic water quality. Thus the latter is a target only to the extent that the first can be attained.

Issues that will need to be considered include:

- The amount of water needed to maintain the current lake level and ensure the peat is sufficiently wet for creation and maintenance of a wetland area.

- How much water currently enters the Park from the areas proposed for subdivision and how this will change after subdivision.
- What capacity the peat has for soaking up the predicted amounts of storm water.
- The effects of diverting storm water from developments in the catchment away from the Park.
- The potential for lake water quality to be compromised by storm water discharge.
- What plant species are most appropriate for use in a nutrient stripping wetland (species will need to be compatible with the rest of the park's goals (i.e. indigenous species that occurred in the Hamilton Basin in the past).

Note that the report by Pridmore (1992) also recommended the following safeguards for the management of the lake, including:

- Use of stormwater to recharge or maintain the ground water level.
- Installation of a weir at the lake outlet to maintain lake height.
- Lake not to be used as a stormwater retention pond.
- Ground water in low-lying areas around the lake not to be drained for housing developments.
- Appropriate sediment and pollutant control measures be installed.
- No on-site effluent disposal that may eventually discharge into the lake.

These recommendations should also be considered in planning for stormwater management and, in conjunction with newer information to guide management of the lake.

8.4. Key Implementation Actions

8.4.1. Determine the probable water quality of Lake Waiwhakareke in pre-European times, and adopt specific water quality targets in light of the results and a consideration of the practicability of reaching the proposed targets.

8.4.2. Identify and investigate options for the best way to deal with stormwater from developments in the catchment in a way that complements the goals of the Park.

8.4.3. Provide water volume and nutrient targets to guide stormwater management in the catchment.

9.0 Enhancing Recreational Values: Linkages and Landscape Connections

9.1. Objectives

9.1.1. To enhance and promote recreational use of Waiwhakareke Natural Heritage Park for passive recreation in a manner consistent with the park's primary objective (see 5.1).

9.1.2. To provide access to the Park for all members of the community and create links to neighbouring reserves and destinations

9.1.3. To provide park amenities for the convenience and enjoyment of visitors, consistent with the park's primary objective.

9.2. Policies

9.2.1. Facilities in the park will conform to an overall design theme in keeping with the Park's concept.

9.2.2. Viewing platforms and points will provide an opportunity to view the aesthetic qualities of the lake and the wider landscape.

9.2.3. Interpretative material on aspects of the park will be made available to visitors.

9.2.4. Fallen native trees, branches and leaves will be left in situ to create a fully functioning ecosystem, except where public safety may be compromised or removal for a cultural use is authorised.

9.2.5. Recognise that the landscape view will change from that of a rural landscape to that of a natural, native treescape.

9.2.6. Surrounding Community Parks, including children's play areas, will be planted and designed in a way which is in keeping with the Waiwhakareke Natural Heritage Park concept.

9.2.7. Primary paths and main facilities at the park will be designed to accommodate disabled people.

9.3. Discussion

9.3.1. Design theme

Implementing a Design Theme in keeping with uniqueness of the Park will help to create a sense of entering a special place and ensure any facilities adjacent to the Park are visually appealing and do not spoil landscape views. A distinctly Waiwhakareke brand will also be created and incorporated into all aspects of the park including furniture, signage and rubbish bins. The natural theme of the Park's design will also be enhanced by the rechanneling of the Rotokauri out flowing drain to be more meandering in nature. The design theme should also inform the type and nature of plantings in adjacent Community Parks. They should reflect the plantings inside Waiwhakareke Park to ensure consistency of landscape views across the wider landscape.

9.3.2. Visitor infrastructure

Providing well-formed paths that offer a logical circulation pattern will enable visitors to experience the park without compromising its ecological goals, as visitors can be drawn away or separated from ecologically sensitive areas. Strategically placed seating will reflect the overall design theme of the park. Public donations for commemorative seating may be sought to help fund the

seats. Accessibility will be considered in path design and seating placement to ensure that disabled people are able to experience the park.

Views of the lake from the surrounding areas will gradually reduce as trees are planted and mature. Viewing platforms along the lake edge will allow the public to view the lake. Viewing platforms on high points of land will allow views across the park landscape. These platforms may be raised several metres to continue to provide views as trees grow. Such platforms will conform to the overall design theme for the park.

A formed cycle way running along the outside of the pest-proof fence will connect Brymer and Rotokauri Roads and Baverstock and Rotokauri Roads, creating an off road linkage between the western suburbs, Wintec and Rotokauri to the North. It will also link to a walkway/cycleway that will follow the water course from Waiwhakareke to Lake Rotokauri and then by a route yet to be determined back to the Zoo.

Picture 14 - An indication of the positive cycling experience that Waiwhakareke Natural Heritage Park perimeter track will offer.

This path will also be used for maintenance access to the pest-proof fence if it is constructed and will ensure that tall vegetation is kept away from the fence to prevent re-invasion from climbing pests.

Reference to a programme for the development of Brymer Road will be included in the Management Plan through a minor review when it has been analysed in terms of safety for access between Hamilton Zoo and the park.

9.3.3. Interpretation — Enhancing the Visitor Experience

The visitor experience to the Park will be enhanced by self-guided tours using a brochure and map. Interpretative panels will be provided that include information on ecosystem reconstruction, conservation, ecosystem processes, historic and Maori values. These will provide an opportunity to enhance user enjoyment and to educate visitors about the various aspects of the park. Their location and content will be determined by the park's features. Interpretative panels at the entrance ways will discuss the goals of the project and serve to tell

visitors the park rules. All interpretative materials and panels will be constructed in a way and at a height such that they are accessible to all members of the community, including children and those using mobility scooters etc.

9.3.4. Amenity Protection and Public Safety

Woody debris and leaf litter are important components of a functioning ecosystem, providing habitat for decomposer invertebrates, which are an essential part of the ecosystem food web. To ensure fully functioning ecosystems are created and to maintain the naturalness of the park, trees, branches and leaf litter will be left where they fall, provided public safety is not compromised. Where public safety is placed at risk, debris will be moved to elsewhere within the Park, rather than being removed entirely. Leaving weed wastes in the Park impacts on its visual qualities. Prompt removal will prevent views being spoiled and will minimise the chance of waste material being distributed, potentially causing further weed spread.

9.3.5. Community Parks

Two Community Parks will be provided in close proximity to the Heritage Park and will contain formal play areas. They will be designed and constructed in a manner than reflects the park's design theme. These Community Parks will be located on the Heritage Park boundary, close to the suburban areas, and contain formal play equipment and other features.

9.4. Key Implementation actions

9.4.1. Provide interpretation panels and brochures that include information on the goals of the project's natural, conservation, historic and Maori values.

9.4.2. Create well formed paths as the project progresses to develop and maintain public access.

9.4.3. Construct viewing areas at strategic points around the Park.

9.4.4. Develop a cycle way around the perimeter of the park and locate cycle parks at entrances.

9.4.5. Ensure maintenance crews leave dead and or fallen native vegetation in situ, except for authorised cultural take, and remove weed waste promptly.

9.4.6. Ensure facilities in the Park and in the Community Parks conform to an overall Park Design Theme.

10.0 Tangata Whenua Values

10.1. Objective

10.1.1. To identify, conserve and enhance Tangata Whenua values within Waiwhakareke Natural Heritage Park.

10.1.2. In its education role Waiwhakareke Natural Heritage Park will be developed to showcase the importance of the site to Maori and to educate the public on aspects of Maori culture

10.2. Policies

10.2.1. The Park will be named after the Maori name for the lake - Waiwhakareke.

10.2.2. Native vegetation will be established in the park to recreate ecosystems.

10.2.3. A Rahui will be instituted covering the park's vegetation except for permitted cultural activities.

10.2.4. Interpretation panels and Pou, will be installed to enhance the profile of Tangata Whenua within the Park and to present knowledge of cultural history.

10.2.5. The protocols developed by Nga Mana Toopu O Kirikiriroa (NaMTOK) will be followed in regard to any archaeological finds, artefacts or human remains discovered during the course of earthworks at the park. Should any such finds be made, NaMTOK and Waikato-Tainui will be consulted.

10.2.6. Naturally occurring fresh springs will not be piped or diverted because of the traditional belief of Maori in the cleansing and spiritual powers of spring water.

10.3. Discussion

10.3.1. Introduction

Section 4.6 of this plan explains the significance of Lake Waiwhakareke for local tangata whenua, and notes that the restoration of the park provides an opportunity to maintain and enhance these values. Opportunities exist to educate the public regarding Maori conservation concepts, historical occupation of the area and to raise the profile of Maori culture. The inclusion of relevant bi-lingual information on interpretative panels is one means of achieving this. Recognition of the Maori significance of the site can also be achieved by using the lake's traditional name (Waiwhakareke) and referring to the stand of kahikatea—pukatea to be established by the traditional name of Te Raukaka.

A Waharoa at the main entrance will further enhance the site's Maori profile. Its themes will be identified in discussion between HCC and NaMTOK. A Pou will be located on the hilltop slopes and will provide a marker against which growth of plantings can be measured. Such a Pou would become a landmark for the surrounding area and as the plants grow around it a track could be provided nearby so when the Pou is assimilated within the bush it can still be accessed. The Pou will be carved in the kawa of ancestral occupants of the land and enclosed with a manuka or kanuka fence and surrounded by plantings of kawakawa.

Sustaining and increasing local flora and fauna onsite will recreate a past environment of great significance. Certain cultural practices will be able to be reinstated and recognition of the importance of the site to Maori will be retained. When the reserve becomes more established it will be able to become

a place where traditional knowledge associated with ancient forest lore and associated rituals can be taught.

10.3.2. Cultural practices

Limited take of culturally important resources may be possible from the Heritage Park, subject to specific management approval by Hamilton City Council. Depending on their location mature trees (particularly totara and kauri) lost due to storm damage or other causes may be offered to local hapu for carving purposes.

Feathers from native birds such as kuku (Native pigeons) tui, kotuku, pukeko, weka and kaka were prized and used for personal adornment and for precious cloaks. Where circumstances permit, recently deceased native birds or feathers may be collected in order that they can be used for traditional purposes and to maintain the skills of traditional weaving for the tangata whenua. Any of the springs on the site that contain dark or black iron rich muds *(Puna Paru)* will be identified and set aside for traditional usages for dyeing flax textiles. Permission for collection of such material must be obtained from an authorised Council officer[8].

It was an ancient practice for Maori to erect a carved Pou to declare a Rahui over an area of land. This is a restriction prohibiting the harvesting and gathering of key food resources such as eels, fernroot, Parohe (native trout) ducks and native pigeons. The observance of an initial Rahui provides an opportunity for plants to become established before any disturbance occurs; it may be appropriate to extend this indefinitely subject to the exceptions noted above.

10.3.3. Protocol for archaeological finds

This protocol is designed to ensure that the correct statutory processes are followed, particularly in the case where human remains are uncovered. It also allows Maori to undertake the exhumation and re-interment of any ancestral Koiwi with the appropriate ceremonies and rituals. The protocol for archaeological finds is outlined in Appendix 3.

10.4. Key Implementation Actions

10.4.1. Include information on historic Maori occupation of Waiwhakareke Natural Heritage Park and the surrounding area and Maori conservation concepts on interpretative bilingual panels.

10.4.2. Install two Pou within the park - one at the main entrance and one on the ridge top to gauge plant growth. These will be surrounded by manuka/kanuka fences.

10.4.3. Rahui (i.e. protection from harvesting of certain plants) to be observed during establishment of native trees to protect them from disturbance for a period long enough to allow the plants to withstand any pressure from people.

10.4.4. Consult Tangata Whenua regarding any archaeological finds, artefacts or human remains in accordance with the protocol detailed in Appendix 3.

10.4.5. Invite proposals from local hapu regarding opportunities for promoting Maori cultural awareness within the park.

[8] Any person authorised by Hamilton City Council, directly or indirectly under its delegated authority, to act on its behalf and with its authority.

10.4.6. The stand of kahikatea-pukatea bush to be established within the Park will be referred to by the traditional name of Te Raukaka.

11.0 Education and Engagement

11.1. Objectives

11.1.1. To promote Waiwhakareke Natural Heritage Park and the Hamilton Zoo as an educational resource for schools, tertiary institutions and the wider community.

11.1.2. To encourage public participation in the restoration of Waiwhakareke Natural Heritage Park.

11.2. Policies

11.2.1. The entrance way and visitor facilities of both Hamilton Zoo and the Heritage Park will be integrated

11.2.2. The educational values and opportunities offered by the Heritage Park will be promoted to local schools, tertiary institutions and adult education programmes.

11.2.3. Public education on the project goals of the Park and why restoration is necessary will be promoted.

11.2.4. Public and community groups will be encouraged to be involved in the restoration, maintenance, research and monitoring and regular community planting days will be held to maintain community involvement.

11.2.5. Partnerships with community groups and local schools will be established and maintained to facilitate restoration of the Park.

11.3. Discussion

11.3.1. Zoo Integration

Shared facilities will include an education facility, public toilets, parking, tourist shop, information centre and café. Hamilton Zoo will also be involved in the project through rearing and breeding of native birds, reptiles and insects for release in the Park. There is also the option of joint management between both facilities including shared maintenance staff. The principal agency that will deliver the formal education programmes related to the park is Hamilton Zoo.

Waiwhakareke Natural Heritage Park will provide an opportunity for students and the wider community to learn about native plants, animals and ecosystems through their involvement in restoration activities. Children can be involved in the restoration and learn about ecology, cultural and environmental values. Several agencies will be involved in research and education delivery related to the Park, including Hamilton Zoo, WINTEC, University of Waikato and local schools and community groups.

11.3.2. Education

Hamilton Zoo will lead the specific onsite education programmes related to the Heritage Park. The Zoo has secured a three year Ministry of Education LEOTC (Learning Experiences Outside The Classroom) Grant for the social sciences, which began in July 2010. The programme is focussed on the zoo, but Waiwhakareke is included within the scope. This grant programme enables specialist resources to be developed for education purposes, fund additional staff for programme administration and delivery and assist other programmes in their interactions with school students. More information on the specific objectives of the LEOTC programme can be found in Appendix 4.

Hamilton City Council are pursuing the establishment of a Conservation Education Centre next to the car park on the Zoo site, as provided for in the

Capital Development Programme for the Zoo and Waiwhakareke within the 2009-19 Long Term Council Community Plan (LTCCP) (unfunded section). In addition to Hamilton Zoo, the Heritage Park provides an important educational and scientific resource to other education providers throughout the Waikato Region. Already the Park concept is used as part of teaching undergraduate ecology courses at The University of Waikato, including field trips to the site. Various plots are being maintained and monitored as experiments. There is potential for research to be undertaken by the University on fauna as well with translocation of mudfish and other initiatives. . It is anticipated that University of Waikato Biology classes will be actively involved in monitoring progress of the plantings, the state of the lake and drains and visitor experiences etc.

Wintec has utilised the park in many aspects of its teaching to date, The Horticulture Unit has had participation with community planting projects, as part of their Horticultural Courses, as well as Landscape and Arboricultural Courses since 2005. Wintec's Business course has utilised the Park for their course in terms of economic development and tourism opportunities

11.3.3. Engagement: School and Community Involvement

The Park provides an important educational resource to local schools, especially as a way of introducing children to ecological principles and restoration. In particular, there are opportunities for Nga Taiatea Wharekura in Rotokauri Road to make extensive use of the Park for education given its close proximity to the site. In the past the school has allowed use of their facilities for functions/official gatherings. Other schools have been involved as part of community plantings e.g. Arbor Day. These forms of education teach children the basics of planting and this can be transferrable to their homes and positively influence their environmental values and attitudes later in life.

There is a keen interest in native fauna and flora among many urban residents and a strong desire to 'do their bit' for the natural environment. Engaging volunteers and community groups in operations of the park that are amenable to public involvement helps both the task of restoration and of raising awareness and appreciation. There are many opportunities for the community to be involved in the reconstruction and restoration of Waiwhakareke Park. These include involvement in growing eco-sourced plants and assistance in planting and plant maintenance. There are a number of community groups in the Hamilton area interested in restoration. Tui 2000 has a large interest in the Waiwhakareke project and has the ability to mobilise volunteers to help with the project. Provided they are well supervised to ensure the goals of the project are not compromised, the use of volunteers will substantially reduce project costs. There is potential for a community based nursery to be developed by volunteers in the future.

11.4. Key Implementation Actions

11.4.1. Provide shared facilities at Hamilton Zoo, including a café (accessed from car park), tourist shop and Conservation Education Centre.

11.4.2. Liaise with schools and community groups to promote educational opportunities

11.4.3. Promote educational workshops to tell the community about best-practice restoration techniques as discovered through this project.

11.4.4. Transfer knowledge on restoration to other practitioners through conferences and journal papers.

11.4.5. Ensure the local community is kept informed on progress through newspaper articles and community newsletters.

11.4.6. Hold regular community open days to utilise volunteer help and maintain enthusiasm in the project.

11.4.7. Seek partnerships with community groups involved in restoration.

12.0 Research & Monitoring

12.1. Objective

12.1.1. To encourage the use of Waiwhakareke Natural Heritage Park as a research resource.

12.1.2. To put in place effective monitoring programmes for a range of ecological indicators to ensure adaptive management techniques are used as the restoration progresses.

12.2. Policies

12.2.1. Waikato University, Wintec and other institutions will be encouraged to take up research opportunities relating to the restoration process and the ecology of the park in general.

12.2.2. Research projects relating to planting methods, plant mix, establishment and follow up maintenance (inter alia) will be permitted, and to the extent that is practical, plantings will be co-ordinated with research programmes. Research activities will not have a permanent detrimental effect on the Park.

12.2.3. Practical research into the cultural, visitor needs and impacts, management and recreational characteristics and values of Waiwhakareke Natural Heritage Park will be encouraged.

12.2.4. Research activities and results will be promoted and interpreted to enhance understanding of the Park and the restoration process by the public and restoration groups.

12.2.5. A range of ecological indicators will be monitored to keep track of the restoration process and provide for an adaptive management regime.

12.3. Discussion

Many aspects of the developing ecosystems at Waiwhakareke Natural Heritage Park will be subject to regular monitoring by staff and volunteers from a number of organisations, as discussed below. Every effort will be made to provide research and monitoring results to the public as a way of motivating volunteers and keeping the community informed of progress. Research results will also be disseminated in a more formal manner to other restoration practitioners through conferences, professional membership meetings and networks.

12.3.1. Tertiary research development

The University of Waikato and WINTEC, the Waikato Institute of Technology, are key partners in the development of Waiwhakareke Natural Heritage Park. The park offers opportunities to undertake monitoring and observation of its environment and to carry out research into restoration principles, particularly in relation to the reconstruction of entire ecosystems from scratch. Departmental research programmes will be carried out in addition to fostering research at the park through higher degree programmes.

12.3.2. Restoration Experiments

This project will be one of the first in the world to allow forest reconstruction to be carried out in an experimental way, with the benefit of baseline data and a regular monitoring programme to demonstrate succession and changes in the ecosystem over long periods of time. Restoration is not a simple process, and

establishment of the appropriate plant species does not necessarily result in the restoration of ecosystem processes. Establishment of a strong body of vegetation data will contribute important knowledge to restoration ecology as a discipline.

At present vegetation monitoring consists of regular assessments of a series of permanent plots in each of the main ecosystems: the restiad bog, riparian areas, the semi-swamp forest and the hillslope plantings. The plots are of variable sizes and the monitoring is undertaken generally on a bi-annual basis which will progressively change to longer term timeframes. In each of the plots the following data is collected:

- Frequency and diameter of all planted trees and saplings
- Frequency and density of all herbs and woody seedlings
- Estimates of ground cover

As it develops, the use of the Park as a teaching resource by Waikato University will increase. At present the Park forms an important element of the teaching in BIOL312 Applied Terrestrial Ecology and BIOL515 Ecosystem Sustainability.

12.3.3. Monitoring of plant and animal pests

Monitoring of pest species will need to be carried out to ensure pests remain at low levels, or ideally, are completely eradicated. Total eradication is only likely to be achieved if a pest proof fence is determined to be necessary at a later stage of the planting. The need for such a fence will be assessed once a significant portion of the planting programme is complete.

Monitoring of indigenous species can be used to show success in establishing healthy ecosystems, e.g. by monitoring invertebrate populations. It will also determine which species arrive naturally and which species will be candidates for re-introduction. Species re-introduced to the site will also need to be monitored to ensure they establish a viable population.

12.3.4. Monitoring of fish populations

Monitoring of native and exotic fish populations has been carried out in Lake Waiwhakareke as discussed in Section 4. Koi carp are not present in the ecosystem based on previous surveys and this is likely due to obstructions in the Rotokauri outfall drain. Any future changes to the drain will have to identify the barrier which appears to be in place and provide an alternative if it is affected by proposed changes at any point through the course of the drain to Lake Rotokauri.

Further information is needed on the status of catfish and rudd in the lake as the techniques used to date do not provide clear indications of population density and recruitment status. It is proposed that experts at the University of Waikato obtain this information and thereafter monitor populations at tri-annual intervals to examine the impact of the restoration process on fish populations. Any decisions on the need to remove invasive fish species such as gambusia, catfish or rudd, should be based on the evidence of biomass and abundance sufficient to cause environmental harm.

12.3.5. Monitoring of water quality

As discussed in section 4, the status of the water quality of Lake Waiwhakareke and that of the inflowing and out flowing water bodies has been researched over the past five years. A regular monitoring programme will be established to record changes in the water quality over time in response to the restoration

effort and resulting changes in the catchment hydrology. It is proposed that the water quality monitoring be carried out by the University of Waikato and occur at quarterly intervals.

12.3.6. Monitoring of birds

The abundance and diversity of birds present in the Park has been monitored since 2004 as part of the biennial Landcare Research city-wide bird monitoring programme (Fitzgerald & Innes 2009). Two of the studies' ten slow-walk count transects traverse the site. In addition, the Ornithological Society of New Zealand (OSNZ) undertakes regular monthly bird counts on Lake Waiwhakareke itself noting what species are present and recording new species as they are sighted. It is proposed that both these monitoring programmes continue at their present frequency, in addition to any future research and studies into avian abundance and behaviour on the site.

12.4. Key Implementation Outcomes

12.4.1. Encourage the University of Waikato, Wintec and other institutions to participate in research in the Park

12.4.2. Utilise the outcomes of research to inform the ongoing management of the Natural Heritage Park.

13.0 Economic Opportunities

13.1. Objectives

13.1.1. To provide for tourism consistent with the park's primary purpose while maintaining and enhancing the natural amenity of the Park.

13.1.2. To investigate other economic opportunities related to the project such as sponsorship, endorsements and environmental accounting initiatives.

Picture 15 - School children undertaking sampling at a drain in the Park.

13.2. Policies

13.2.1. Facilities that complement the natural environment will be provided in conjunction with Hamilton Zoo, including information areas, signage, public toilets, eco transport support facilities, food and beverage outlets and parking.

13.2.2. Research into the carrying capacity of the park will be conducted to allow for sustainable use of the environment.

13.2.3. Signage will encourage use of the paths as a circular system.

13.2.4. The park and zoo area will be developed as a destination for regional, national and international tourists.

13.2.5. Other economic opportunities such as those presented by the carbon market under the proposed Emissions Trading Scheme for planting of new forests will be investigated.

13.3. Discussion

The environmental values of the park as well as its proximity to Hamilton Zoo provide an excellent opportunity to develop a destination for regional, national and international tourists in conjunction with other activities in Hamilton City and complementary to environmental attractions in the regions such as Maungatautari Ecological Island. Although Waiwhakareke Natural Heritage Park is focused on the restoration of the natural environment it is important that in addition to this, ancillary services are provided to enhance the experience for the potential user.

Project costs may also be reduced through business involvement and/or corporate sponsorship. The Park will become a substantial carbon sink in the future, and companies may pay for the rights to such a carbon sink.

An array of natural attractions in Hamilton such as the Hamilton Gardens, the future site of the Natural Wetland Centre in Ohaupo and the adjacent zoo indicate that visitor facilities are of great importance to maintain the profile of the Park. The development of interpretation/information centres, café facilities, eco transport support facilities, public toilets and car parking in conjunction with the Hamilton Zoo will enhance the visitor experience.

Also important to the sustainability of the park and facilities is research into the level of use that can be managed without having an adverse effect on the restored environment. Assessment of visitor numbers and investigations into over and under use of the park will be undertaken annually to develop a benchmark for sustainable use.

Picture 16 - A tour group enjoys Waiwhakareke Natural Heritage Park.

13.4. Key Implementation Actions

13.4.1. Seek to create Waiwhakareke Natural Heritage Park as a destination for regional, national and international tourists.

13.4.2. Develop visitor facilities in conjunction with Hamilton Zoo.

13.4.3. Ensure a quality tourist experience without compromising the park's environmental values.

13.4.4. Conduct research into visitor numbers and use of the park.

13.4.5. Research creative options for raising of funds through such initiatives as carbon trading, recognising the value of newly planted forests.

13.4.6. Seek business partnerships and sponsorship to provide for tourism.

14.0 Future Management & Milestones

14.1. Introduction

The restoration and development of Waiwhakareke Natural Heritage Park is managed by a project coordinator from Hamilton City Council with advice from an advisory group representing the project partners. The indicative development sequence for the project is outlined in Appendix 6. This sets out a high level description of the works and their desirable order. The restoration is expected to mature over a hundred year timescale with the majority of management and infrastructure inputs required over the coming two decades. This section covers the manner in which the Management Plan will be given effect from a planning perspective. The second section contains a summary of the key implementation outcomes that are listed at the end of each section.

14.2. Annual Plans

Annual plans will be required to ensure objectives are met and best practice techniques are used.

An annual plan should include:

- Details of the previous year's planting (including notes from the planting diary), any monitoring results and a review of any advocacy work.
- A review of the previous year's research activities.
- Planting proposals for the year, including area to be planted, plants required, weeds to be controlled, mulch requirements, plant maintenance requirements.
- Path construction details for the year, including exact location and building material requirements
- Other facilities necessary for planting e.g. relocation of maintenance shed to an area close to the planting.
- Public advocacy plans for the year, including community planting days, newsletters etc.
- Human resource requirements for the year (including paid and volunteer workforce).

The use of such plans will enable progress to be reviewed annually and will ensure best practice techniques are used and mistakes learnt from. This will help guide the restoration towards successful outcomes.

14.3. Key Deliverables

Action	Relevant Section of Plan
Construct an entrance way and parking facility off Brymer Road to service both the Heritage Park and Hamilton Zoo.	Section 5
Consider installation of a pest proof fence around the perimeter of the Heritage Park when the initial phase of planting is complete in light of available technology and scientific knowledge at the time.	Section 5
Progressively plant Waiwhakareke Natural Heritage Park as indicated in Figure 8.	Section 6
Realign and re-contour the outflowing drain (Drain 4) to produce a more natural water course.	Section 7
Develop water volume and nutrient targets in relation	Section 8

Action	Relevant Section of Plan
to stormwater management.	
Provide interpretation panels and brochures that include information on the goals of the project's natural, conservation, historic and Maori values.	Section 9
Create well formed paths and viewing areas as the project progresses to develop and maintain public access.	Section 9
Develop a cycle way around the perimeter of the Park.	Section 9
Install two Pou within the park, one at the main entrance and the other on the ridge top overlooking the lake to gauge plant growth.	Section 10
Provide shared facilities at Hamilton Zoo, including a café (accessed from car park), tourist shop and Conservation Education Centre.	Section 11
Hold regular community open days to utilise volunteer help and maintain enthusiasm in the project.	Section 11

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Appendix 1: Glossary of Maori Terms — Rarangi kupu

The following defines the Maori terms used within this management plan. The definitions have been supplied by local hapu or derive from www.maoridictionary.co.nz

Iwi - Extended kinship group, tribe, nation, people, nationality, race - often refers to a large group of people descended from a common ancestor

Koiwi - Human bone

Kaumatua - elder male

Kaitiaki - guardianship or stewardship

Kawa - Priestly rituals or local protocols

Kokowai - ochre

Nga Tapuwae O Hotumauea - Maori Landmarks on Riverside Reserves Management Plan 2003 produced by Council to aid in the management and recognition of these landmarks alongside the Waikato River. The name refers to the Hotumauea of Ngati koura who it is said once leapt across the Waikato River.

Pa - Fortified village

Puna Paru - Spring of oxidised mud or mud pool.

Pou — An upright post, pole or pillar

Rahui - to put in place a temporary ritual prohibition, closed season, ban, reserve - traditionally a rāhui was placed on an area, resource or stretch of water as a conservation measure or as a means of social and political control for a variety of reasons which can be grouped into three main categories: pollution by tapu, conservation and politics. Death pollutes land, water and people through tapu. A rāhui is a device for separating people from land, water and the products from these. After an agreed lapse of time, the rāhui is lifted. A rāhui is marked by a visible sign, such as the erection of a pou rāhui, a post.

Rangatahi - Younger generation, youth

Rohe - area or region

Tamariki - Children

Tangata whenua - local people, hosts, indigenous people of the land - people born of the whenua, i.e. of the placenta and of the land where the people's ancestors have lived and where their placenta are buried.

Taonga - Treasure or chattles anything prized

Waahi tapu - Sacred place

Waharoa - Entrance to a pā, gateway, main entranceway

Whanau - immediate or extended family, family group, a familiar term of address to a number of people - in the modern context the term is sometimes used to include friends who may not have any kinship ties to other members

Wharekura - School

Appendix 2: Plantings at Waiwhakareke Natural Heritage Park

There are four main planting areas, characterised by a different mix of species to reflect the ecotypes that would have existed pre-human in the conditions prevailing in those parts of the park. The initial plantings will in some cases be followed up at a later stage by supplementary planting, in addition to recruitment that is likely from the existing seed bank within the soil and wind and bird dispersed seeds from other areas. The charts indicate approximate final species composition of all the ecosystem types. However this composition will vary with natural successional processes and colonisations; it is a target rather than a rigid prescription.

Some planting principles

- Harden off plants for a sufficient period before planting.
- Harakeke (flax) may be a good nurse crop to suppress weeds and provide shelter to other plantings (Reay and Norton 1999). Other species can be interplanted amongst it; these will eventually shade out the harakeke and move the succession to a low semi-swamp forest.
- Pasture grass will be retained when planting. The pasture grass retains good ground moisture, dies off creating organic matter and suppresses weeds. (This method used where mulch is not cost effective).
- Mulch is best at suppressing weeds and allows for moisture to percolate through to the ground. This retains the moisture and creates good organic matter which provides habitat for invertebrates.
- Fertilise during planting on ridge tops and hillslopes if necessary (but not in peat areas).
- Note that plant establishment may be limited by the presence or absence of mycorrhiza in the soil (it is not known if the appropriate mycorrhizal species are present in these pasture soils).
- Plant some of the same species in clumps of 4-5 plants to aid in pollination and ensure a mix of male and female plants are present (especially plant clumps of harakeke and cabbage tree).
- Reassess planting in 3-5 years time to determine what further species require planting (this will include species that require shelter, but may also include species that failed to establish initially).
- Some epiphytes will need to be introduced once trees are large enough to accommodate them.
- Existing exotic trees should be poisoned in-situ leaving habitat for invertebrates, birds and fish species. This will also provide shelter for under plantings and the root systems will help prevent erosion.
- Most tree species will need to be planted after a sheltering canopy is achieved. A planting density of about 400 trees per hectare should be aimed for (spacing of approximately 10m).
- Initial planting on hillslopes will follow standard revegetation patterns (establishment of a canopy with a mixture of broadleaved shrubs), followed by underplanting of podocarps and more sensitive species. This pattern may be varied for research reasons.

Dominance scale

L = low (0-5%)

M = medium (5-20%)

H = high (>20%)

A. Swamp Planting Area

Common/Maori Name	Latin name	Dom.
	Astelia grandis	L
	Baumea rubiginosa	L
	Carex geminata	L
Purei	*Carex secta*	L
	Carex virgata	L
Mingimingi	*Coprosma propinqua*	L
	Coprosma rigida	L
Karamu	*Coprosma robusta*	L
	Coprosma rotundifolia	L
Hukihuki	*Coprosma tenuicaulis*	L
Cabbage Tree/ Ti Kouka	*Cordyline australis*	L
Kahikatea	*Dacrycarpus dacrydioides*	L
Turutu	*Dianella haematica*	L
Hinau	*Eleaocarpus hookerianus*	L
Tupari-maunga	*Gahnia xanthocarpa*	L
Pukatea	*Laurelia novae-zelandiae*	L
Manuka	*Leptospermum scoparium*	M
Mapou	*Myrsine australis*	L
Kaikomako	*Pennantia corymbosa*	L
Harakeke	*Phormium tenax*	H
Maire tawaki	*Syzgium maire*	L
Wire Rush	*Empodisma minus*	L
Giant Wire Rush	*Sporadanthus ferrugineus*	L

Abundance figures based on Clarkson (pers. Comm.)

B. Semi Swamp Planting Area

Common/Maori Name	Latin name	Dom
Kakaha	*Astelia fragrans*	L
	Astelia grandis	L
	Carex geminata	L
Purei	*Carex secta*	L
	Carex virgata	L
Putaputaweta	*Carpodetus serratus*	L
	Coprosma areolata	L
Mingimingi	*Coprosma propinqua*	L
	Coprosma rigida	L
Karamu	*Coprosma robusta*	L
	Coprosma rotundifolia	L
Hukihuki	*Coprosma tenuicaulis*	L
Cabbage Tree/Ti Kouka	*Cordyline australis*	M
Kahikatea	*Dacrycarpus dacrydioides*	H
Rimu	*Dacrydium cupressinum*	L
Turutu	*Dianella haematica*	L

Common/Maori Name	Latin name	Dom
Hinau	*Eleaocarpus hookerianus*	L
Long-leaved Lacebark/ Houhere	*Hoheria sexstylosa*	L
Pukatea	*Laurelia novae-zelandiae*	M
Manuka	*Leptospermum scoparium*	H
Whiteywood/ Mahoe	*Melicytus ramiflorus*	M
Red Matipo/ Mapou	*Myrsine australis*	L
Kaikomako	*Pennantia corymbosa*	L
NZ Flax/ Harakeke	*Phormium tenax*	H
Manatu/ Ribbonwood	*Plagianthus regius*	L
Matai	*Prumnopitys taxifolia*	L
Nikau	*Rhopalostylis sapida*	L
Seven-finger/ Pate	*Schefflera digitalis*	L
Maire tawaki	*Syzgium maire*	M

Abundance figures are based on Whaley et al. (1997). Swamp maire figures are based on numbers found in Hammond Bush (Clarkson and Downs 1999).

C. Hillslope Planting Area

Common/ Maori Name	Latin name	Dom
Kauri	*Agathis australis*	L
Titoki	*Alectryon excelsus*	L
Makomako/ Wineberry	*Aristotelia serrata*	M
Tawa	*Beilschmeidia tawa*	M
Rangiora	*Brachyglottis repanda*	L
Purei	*Carex secta*	L
	Carex virgata	L
Putaputaweta	*Carpodetus serratus*	L
	Coprosma areolata	L
Tree Coprosma/Mamangi	*Coprosma arborea*	M
	Coprosma rhamnoides	L
	Coprosma rigida	L
Karamu	*Coprosma robusta*	L
Hukihuki	*Coprosma tenuicaulis*	L
	Coprosma spathulata	L
Cabbage Tree	*Cordyline australis*	L
Tutu	*Coriaria arborea*	L
Rimu	*Dacrydium cupressinum*	L
Hinau	*Elaeocarpus dentatus*	L
Kotukutuku	*Fuchsia excorticata*	L
Hangehange	*Geniostoma ligustrifolium var. ligustrifolium*	M
Koromiko	*Hebe stricta*	L
Pigeonwood/ Porokaiwhiri	*Hedycarya arborea*	L
Long-leaved Lacebark/ Houhere	*Hoheria sexstylosa*	H
Rewarewa	*Knightia excelsa*	L
Kanuka	*Kunzea ericoides*	L
Pukatea	*Laurelia novae-zelandiae*	L

Common/ Maori Name	Latin name	Dom
Mingimingi	*Leptecophylla juniperina subsp. juniperina*	L
Manuka	*Leptospermum scoparium*	L
Mingimingi	*Leucopogon fasciculatus*	L
Kawakawa	*Macropiper excelsum*	L
Manakura	*Melicytus micranthus*	L
Mahoe	*Melicytus ramiflorus*	H
Red Matipo/ Mapou	*Myrsine australis*	M
Maire	*Nestigis cunninghamii*	L
Maire	*Nestigis lanceolata*	L
Heketara	*Olearia rani*	L
Kaikomako	*Pennantia corymbosa*	L
NZ Flax/ Harekeke	*Phormium tenax*	L
Kohuhu	*Pittosporum tenuifolium*	L
Ribbonwood/Manatu	*Plagianthus regius*	L
Totara	*Podocarpus totara*	L
Miro	*Pruomnopitys ferruginea*	L
Matai	*Prumnopitys taxifolia*	L
Lancewood/ Horoeka	*Pseudopanax crassifolius*	L
Nikau	*Rhopalostylis sapida*	L
Seven-finger/ Pate	*Schefflera digitata*	L
Kowhai	*Sophora microphylla*	L
Turepo	*Streblus heterophyllus*	L
Kamahi	*Weinmania racemosa*	H

Abundance figures are based on Robbins (1962) and Payton et al. (1984)

D. Ridge Crest Planting Area

Common/ Maori Name	Latin name	Dom
Kauri	*Agathis australis*	H
Wineberry/ Makomako	*Aristotelia serrata*	L
	Astelia trinervia	H
Tawa	*Beilschmedia tawa*	L
Rangiora	*Brachyglottis repanda*	L
	Carmichaelia australis	L
Putaputaweta	*Carpodetus serratus*	L
	Coprosma areolata	L
Tree Coprosma/Mamangi	*Coprosma arborea*	M
	Coprosma rhamnoides	M
	Coprosma rigida	L
Karamu	*Coprosma robusta*	L
	Coprosma spathulata	L
Cabbage Tree	*Cordyline australis*	L
Tutu	*Coriaria arborea*	L
Silver fern/ Ponga	*Cyathea dealbata*	M
Rimu	*Dacrydium cupressinum*	M
Tree Fern/ Wheki	*Dicksonia squarrosa*	M
Kotukutuku	*Fuchsia excorticata*	L
Hangehange	*Geniostoma ligustrifolium var. ligustrifolium*	M

Common/ Maori Name	Latin name	Dom
Koromiko	*Hebe stricta*	L
Long-leaved Lacebark/Houhere	*Hoheria sexstylosa*	M
Rewarewa	*Knightia excelsa*	M
Kanuka	*Kunzea ericoides*	L
Mingimingi	*Leptecophylla juniperina subsp. juniperina*	L
Manuka	*Leptospermum scoparium*	H
Poataniwha	*Melicope simplex*	L
Mahoe	*Melicytus ramiflorus*	L
Northern Rata	*Metrosideros robusta*	L
Red Matipo/ Mapou	*Myrsine australis*	M
Marie	*Nestegis cunninghamii*	L
Marie	*Nestigis lanceolata*	L
Marie	*Nestigis montana*	L
Heketara	*Olearia ranii*	L
NZ Flax/ Harekeke	*Phormium tenax*	L
Tanekaha	*Phyllocladus trichomanoides*	M
Kohuhu	*Pittosporum tenuifolium*	H
Ribbonwood/Manatu	*Plagianthus regius*	L
Totara	*Podocarpus totara*	L
Matai	*Prumnopitys taxifolia*	L
Lancewood/ Horoeka	*Pseudopanax crassifolius*	L
Nikau	*Rhopalostylis sapida*	L
Seven-finger/ Pate	*Schefflera digitata?*	L
Kowhai	*Sophora microphylla*	L
Toru	*Toronia toru*	L
Kamahi	*Weinmania racemosa*	L

Appendix 3: Protocol for Dealing with Archaeological Finds

PROTOCOLS FOR UNDERTAKING EARTHWORKS NGA MANA TOOPU O KIRIKIRIROA

PURPOSE

These protocols set out the particular procedures that any developer must follow during any construction works within the rohe of Nga Mana Toopu O Kirikiriroa.

These protocols recognise and provide for the relationship of NaMTOK, as the mandated and recognised representative of Tangata Whenua for the rohe, and their culture and traditions with their ancestral lands, water, sites, Waahi Tapu and other Taonga and to have particular regard to Kaitiakitanga.

DEFINITIONS

In these protocols words will have meanings as follows

"Archaeological materials" means any chattel, carving, object or thing, which relate to the history, art, culture, traditions, or economy of European or any other non-Maori inhabitants of New Zealand.

"Koiwi" means human skeletal remains.

"Kokowai" means a deposit of iron oxide.

"Nga Mana Toopu O Kirikiriroa's nominated representative" means Mr Wiremu Puke.

"Taonga" means any chattel, carving, object or thing, which relate to the history, art, culture, traditions, or economy of Maori or any other pre-European inhabitants of New Zealand.

"The developer" means any person who is responsible for, or has control over, the carrying out of any earthworks at a site.

"The immediate vicinity" means an area around the discovery site that:

a. The New Zealand Historic Place Trust (NZHPT) or NaMTOK considers has a high probability of containing archaeological material, Koiwi or Taonga similar or those found at the discovery site and that warrants careful consideration.

and/or

b. The Developer determines is necessary as a safety buffer zone separating those investigating or retrieving archaeological material, Koiwi or Taonga, from those carrying out other construction activities, so as to provide an acceptable level of safety to all persons, and to the archaeological material, Koiwi or Taonga. The Developer will fence off the area using stakes and tapes.

GENERAL PROCEDURES FOLOWING THE DISCOVERY OF ARCHAEOLOGICAL MATERIAL, KOIWI OR TAONGA

If archaeological material, Koiwi or Taonga, are uncovered which pre-date 1900, then the site is an archaeological site in terms of the Historic Places Trust Act and the relevant provisions of the Act will apply. The site, archaeological material, Koiwi and Taonga contained within the site must therefore be treated in accordance with the conditions of any relevant NZHPT authority existing at

the time of the discovery. If no such authority exists, one must be obtained before the site is further excavated or modified.

Not withstanding the terms of Clause 3.1 above, no site at which Koiwi or Taonga which are uncovered shall be in any way disturbed, altered, modified, or destroyed without the approval of NaMTOK.

Immediately following the discovery of archaeological material, Koiwi or Taonga, the developer will cease all excavation in the immediate vicinity of the discovery site.

The developer will then immediately advise the following of the discovery:

NaMTOK's nominated representative (07) 843 4472

The New Zealand Historic Places Trust (04) 472 4341

The NZ Police — if any Koiwi are uncovered. This is a requirement of the Coroners Act 1988. The Police will report the findings to the nearest Coroner in accordance with Sections 5 (4) of the Coroners Act 1988

The Developer will then secure the discovery area to avoid further disturbance by weather, scavengers, wandering animals or fossickers.

The Developer will arrange for a staff member of representative to be available to meet and guide the New Zealand Historic Places Trust representative, the Police and the NaMTOK representative to the discovery site. The Developer will assist with any reasonable request that any of these people may make.

As public notification of the discovery may result in the desecration of the site and fossicking of archaeological material, Koiwi or Taonga, no information will be released to the media about the discovery except as authorised by NaMTOK.

All construction work in the immediate vicinity of the discovery will remain halted until the NZHPT representative, the Police and NaMTOK have given approval for the work to recommence.

FURTHER PROCEDURES IN THE EVENT THAT KOIWI ARE DISCOVERED

With four (4) hours of the Developer giving notice to the NaMTOK representative that Koiwi have been discovered, the NaMTOK representative will inspect the site and advise the developer whether NaMTOK wish to undertake any cultural ceremonies at the site.

If NaMTOK wish to undertake such ceremonies, the NaMTOK representative will arrange for Kaumatua of NaMTOK to undertake the appropriate cultural ceremonies at the site within twelve (12) hours.

Once these ceremonies are completed, the NZHPT representative in consultation with the Police and NaMTOK representative will inspect the remains.

The Developer will record details of the Koiwi, the site of discovery and any other relevant facts and these records will be made available to the Police and/or NaMTOK.

If the Koiwi are Maori, and the Police and/or Coroner have no suspicion about the Koiwi, the NaMTOK representative and Kaumatua will then gather up the Koiwi and remove them from the site.

In the event that the Police and/or the Coroner have any uncertainty or suspicion about the Koiwi, they are responsible for making any record they require and for any Koiwi that they remove from the site.

If the Koiwi are Maori and the Police and/or Coroner remove only part of the Koiwi, the NaMTOK representative and Kaumatua will remove the remaining Koiwi.

If the Koiwi are non-Maori, the Police and /or the Coroner will be responsible for removing any remaining exposed Koiwi.

Provided there are no conditions in the relevant HPT authority to the contrary, and with the agreement of the NaMTOK representative, the Police and /or Coroner, excavation of the site may then continue.

CUSTODY OF ARCHAEOLOGICAL MATERIAL OR TAONGA EXCLUDING KOIWI

The Developer will have initial control of, and responsibility for, any Archaeological material or Taonga which is uncovered.

No object will be removed from the site until it has been determined, in consultation with the NaMTOK representative and NZHPT representative whether the object is archaeological material or Taonga.

If the object is Archaeological material, the NZHPT representative will record the object and notify the Secretary of Internal Affairs on the prescribed form of the finding of the archaeological material within the requirements of the Antiquities Act 1975. The NZHPT representative will then hand the material to the local Public Museum.

If the object is a Taonga, the NaMTOK representative will record the object and will notify the Secretary of Internal Affairs on the prescribed form of the finding of a Taonga within the requirements of the Protected Objects 1975. The NaMTOK representative will then remove the Taonga from the site.

PROCEDURES FOLLOWING A DEATH ON THE WORKSITE

Following a death on the worksite, work in the vicinity of the place of death will cease. The normal statutory procedures relating to the recovery of the deceased person's body and investigation of the death by the Police and Department of Labour (Occupational Safety and Health) will be followed.

Immediately following the death, the Developer will advise the NaMTOK representative that the death has occurred and the NaMTOK representative will advise the Developer whether or not NaMTOK wishes to carry out any cultural ceremony at the site. If required, the ceremonies will be performed following the recovery of the deceased person's body from the site.

If cultural ceremonies are to the performed the Developer will arrange for a staff member or representative to be available and guide NaMTOK Kaumatua to the site. The Developer will assist with any reasonable request that NaMTOK may make associated with the performance of these ceremonies.

Following the completion of:

a. The statutory investigation of the site of the death, and

b. NaMTOK having carried out any ceremonies, or having advised the Developer that they do not wish to carry out any ceremonies, work on the site may resume.

SAFETY REQUIREMENTS

Prior to any NaMTOK person entering any site, the Developer will inform the NaMTOK representative of the Developer's Health and Safety procedures and practices on the site. NaMTOK hereby warrants that all NaMTOK persons will comply with these procedures and practices provided the Developer provides NaMTOK persons with any requisite safety items such as hard hats, for the time during which NaMTOK persons are on the site.

The Developer shall have the right to order any NaMTOK person who fails to comply with these procedures and practices, to leave the site. NaMTOK hereby further warrants that all NaMTOK persons will comply with any such order.

INSTRUCTING THE DEVELOPER

NaMTOK hereby agrees that NaMTOK shall have no authority to issue instructions to the Developer's staff about any physical work on the site. Any request that NaMTOK may make with regard to NaMTOK persons performing any ceremony or duty on the site pursuant to these Protocols, shall be addressed to the Developer only.

VARIATION OF THESE PROTOCOLS

The terms and conditions of these protocols may be varied at any time by mutual written agreement of the Developer and NaMTOK.

ADDRESS FOR SERVICE

Mr Wiremu Puke

Nga Mana Toopu O Kirikiriroa

PO Box 5216

HAMILTON

Ph (07) 843 4472

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Appendix 4: Past vegetation

The information in this appendix is from Clarkson *et al.* (2001).

Ridge Crests

Characteristic Species	Life Form
kauri (*Agathis australis*)	tree
mapou (*Myrsine australis*)	tree
rewarewa (*Knightia excelsa*)	tree
rimu (*Dacrydium cupressinum*)	tree
tanekaha (*Phyllocladus trichomanoides*)	tree
tawa (*Beilschmiedia tawa*)	tree
white maire (*Nestegis lanceolata*)	tree
Alseuosmia quercifolia	shrub
Coprosma arborea	shrub
Coprosma rhamnoides	shrub
Coprosma spathulata	shrub
hangehange (*Geniostoma rupestre* subsp. *ligustrifolium*)	shrub
heketara (*Olearia rani*)	shrub
kanuka (*Kunzea ericoides*)	shrub
mingimingi (*Leucopogon fasciculatus*)	shrub
prickly mingimingi (*Cyathodes juniperina*)	shrub
Uncinia banksii	sedge
Uncinia uncinata	sedge
Gahnia pauciflora	sedge
Microlaena avenacea	grass
Oplismenus imbecillis	grass
Clematis paniculata	climber
kahakaha (*Collospermum hastatum*)	epiphyte
kauri grass (*Astelia trinervia*)	monocot herb
Metrosideros perforata	liane
Asplenium flaccidum	fern
Blechnum filiforme	fern
crown fern (*Blechnum discolor*)	fern
Doodia media	fern
fragrant fern (*Microsorum scandens*)	fern
hounds tongue (*Microsorum pustulatum*)	fern
Hymenophyllum demissum	fern
Lygodium articulatum	fern
Pellaea rotundifolia	fern
Pyrrosia eleagnifolia	fern
silver fern (*Cyathea dealbata*)	tree fern

Characteristic Species	Life Form
wheki (*Dicksonia squarrosa*)	tree fern

Hillslopes

Characteristic Species	Life Form
hinau (*Elaeocarpus dentatus*)	tree
Kamahi (*Weinmannia racemosa* var. *racemosa*)	tree
kahikatea (*Dacrycarpus dacrydioides*)	tree
mahoe (*Melicytus ramiflorus* subsp. *ramiflorus*)	tree
mangeao (*Litsea calicaris*)	tree
matai (*Prumnopitys taxifolia*)	tree
miro (*Prumnopitys ferruginea*)	tree
northern rata (*Metrosideros robusta*)	tree
pigeonwood (*Hedycarya arborea*)	tree
pukatea (*Laurelia novae-zelandiae*)	tree
rewarewa (*Knightia excelsa*)	tree
rimu (*Dacrydium cupressinum*)	tree
tawa (*Beilschmiedia tawa*)	tree
titoki (*Alectryon excelsus*)	tree
totara (*Podocarpus totara*)	tree
turepo (*Streblus heterophyllus*)	tree
Coprosma lucida	shrub
hangehange (*Geniostoma rupestre* subsp. *ligustrifolium*)shrub	
kawakawa (*Macropiper excelsum*)	shrub
pate (*Schefflera digitata*)	shrub
raurekau (*Coprosma grandifolia*)	shrub
Microlaena avenacea	grass
Oplismenus imbecillis	grass
kahakaha (*Collospermum hastatum*)	epiphyte
supplejack (*Ripogonum scandens*)	liane
Metrosideros fulgens	liane
M. perforata	liane
Asplenium gracillimum	fern
Blechnum filiforme	fern
crown fern (*Blechnum discolor*)	fern
fragrant fern (*Microsorum scandens*)	fern
hen and chicken fern (*Asplenium bulbiferum*)	fern
Hymenophyllum demissum	fern
Polystichum richardii	fern
mamaku (*Cyathea medullaris*)	tree fern
silver fern (*Cyathea dealbata*)	tree fern

Semi-swamp

Characteristic Species	Life Form
cabbage tree (*Cordyline australis*)	tree
kahikatea (*Dacrycarpus dacrydioides*)	tree
mahoe (*Melicytus ramiflorus* subsp. *ramiflorus*)	tree
matai (*Prumnopitys taxifolia*)	tree
pokaka (*Elaeocarpus hookerianus*)	tree
pukatea (*Laurelia novae-zelandiae*)	tree
rewarewa (*Knightia excelsa*)	tree
rimu (*Dacrydium cupressinum*)	tree
swamp maire (*Syzygium maire*)	tree
tawa (*Beilschmiedia tawa*)	tree
turepo (*Streblus heterophyllus*)	tree
Coprosma areolata	shrub
hangehange (*Geniostoma rupestre* subsp. *ligustrifolium*)	shrub
mapou (*Myrsine australis*)	shrub
Melicytus micranthus	shrub
pate (*Schefflera digitata*)	shrub
raurekau (*Coprosma grandifolia*)	shrub
Carex dissita	sedge
C. lambertiana	sedge
Microlaena avenacea	grass
Oplismenus imbecillis	grass
kiekie (*Freycinetia banksii*)	scrambler
kahakaha (*Collospermum hastatum*)	epiphyte
Astelia fragrans	monocot herb
A. grandis	monocot herb
supplejack (*Ripogonum scandens*)	liane
fragrant fern (*Microsorum scandens*)	fern
hen and chicken fern (*Asplenium bulbiferum*)	fern
Hymenophyllum demissum	fern
silver fern (*Cyathea dealbata*)	tree fern

Lake margin/swamp

Characteristic Species	Life Form
kahikatea (*Dacrycarpus dacrydioides*)	tree
cabbage tree (*Cordyline australis*)	tree
*Coprosma propinqua*shrub	
C. robusta	shrub
karamu (*Coprosma robusta*)	shrub

Characteristic Species	Life Form
kaikomako (*Pennantia corymbosa*)	tree/shrub
Leucopogon fasciculatus	shrub
manuka (*Leptospermum scoparium*)	shrub
Pokaka (*Elaeocarpus hookerianus*)	tree/shrub
swamp coprosma (*Coprosma tenuicaulis*)	shrub
Baumea huttonii	sedge
B. rubiginosa	sedge
B. tenax	sedge
B. teretifolia	sedge
Carex secta	sedge
C. virgata	sedge
Schoenus brevifolius	sedge
Tetraria capillaris	sedge
Dianella nigra	monocot herb
Sparganium subglobosum	monocot herb
flax (*Phormium tenax*)	herb
Lobelia anceps	herb
Blechnum minus	fern
Hypolepis distans	fern
wheki (*Dicksonia squarrosa*)	tree fern

Lake/aquatic habitat

Characteristic Species	Life Form
Baumea articulata	sedge
B. huttonii	sedge
B. rubiginosa	sedge
B. teretifolia	sedge
Carex secta	sedge
C. virgata	sedge
Cyperus ustulatus	sedge
Eleocharis acuta	sedge
E. sphacelata	sedge
Isolepis prolifer	sedge
Schoenoplectus validus	sedge
Glossostigma elatinoides	herb
Lilaeopsis novae-zelandiae	herb
Myriophyllum propinquum	herb (submerged)
M. triphyllum	herb (submerged)
Potamogeton cheesemanii	herb (submerged)
P. ochreatus	herb (submerged)
raupo (Typha orientalis)	herb
Isachne globosa	grass
Chara coralline	charophyte (submerged)

Characteristic Species	Life Form
Nitella hookeri/cristata	charophyte (submerged)
N. pseudoflabellata	charophyte (submerged)

Appendix 5: LEOTC Objectives

The LEOTC programme's objective is to raise awareness of and promote critical engagement with conservation and environmental issues. Student learning, achievement and engagement are improved by creating a supportive learning environment; encouraging reflective thought and action; enhancing the relevance of new learning; facilitating shared learning; making connections to prior learning and experience; providing a unique context and by inquiring into the impact of the teaching on the students (to ensure services are continually improving).

Aims:

1. Complement and enhance classroom-based teaching.
2. Align with the New Zealand Curriculum (2007).
3. Foster the development of skills and knowledge about and respect for the natural world.
4. Provide opportunities to gain practical hands-on skills that promote lifelong learning.
5. Facilitate community participation, relationships and involvement.
6. Provide novel, unique experiences that impact positively on student participation, engagement and achievement in education.

Plans are adapted to suit student needs in terms of Key Competencies, Achievement Objectives and Learning Intentions. The contexts can be used to facilitate student learning at different levels by adapting and modifying the activities and expectations in terms of the achievement objectives, activities and success criteria. LEOTC educators will work with teachers to plan, teach and reflect on the learning in these sessions, differentiating the learning to meet the specific learning needs of the students.

Appendix 6 - Indicative Programme of Work

	Stage 1	Stage 2	Stage 3	Stage 4	Stage 5	Stage 6	Stage 7	Stage 8	Stage 9	Stage 10	Stage 11	Stage 12
Waiwhakareke Main Entrance												
Site Preparation	X											
Roading & Parking	X	X				X						
Kerb & Channel	X											
Entrance Paving		X										
Buildings & Structures			X									
Gardens & Planting				X								
Signage				X								
Site Furniture		X			X							
Services			X									
Predator Proof Fencing										X	X	X
Pathway Construction in Conjunction with Planting				X	X		X	X				
Lake Preparation & New Outlet Channel to Lake	X	X						X				
Signage & Maori Entrance Statements			X		X	X			X			
Site Furniture & Utilities					X	X	X					
Services				X								