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WAIMANU LAGOONS MANAGEMENT PLAN

June 2000

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DISTRICT COUNCIL

WAIMANU LAGOONS

MANAGEMENT PLAN

Prepared By

Boffa Miskell Limited

For

Parks and Recreation Department
Kapiti Coast District Council

July 2000

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PREFACE

The Kapiti Coast District Council is pleased to publish the Waimanu Lagoons Management Plan. The Waimanu Lagoons Reserve is a special place:- popular for informal recreation, full of historic interest and an important part of the Kapiti Coast's distinctive coastal system with its associated natural values. Major changes to the environment in and around the reserve have occurred during the last 100 years. The lagoons were shaped into their present form in the 1970's and since then there have been recurrent management issues relating, in particular, to water quality. The challenge is to resolve these issues and enhance the special qualities of the reserve on a sustainable basis.

Public consultation

Public consultation is an important part of preparing management plans because reserves are a community asset, usually managed for public benefit. In April 1999, the Council advertised its intention to prepare a management plan for the Waimanu Lagoons Reserve and invited members of the public to submit their ideas and concerns. Prior to that, representatives of the Waikanae Community Board and Parks and Recreation Department of the Council had met with local residents on several occasions to discuss management issues and concerns. It became evident that up-to-date information about the lagoons' environment was needed so an ecological report was commissioned in July 1999. The findings of the ecological report were discussed at a further meeting with people who had made initial submissions.

A Draft Management Plan was then prepared, taking into account the eight initial submissions that were received, the discussion of the ecological survey and background information provided by the initial submitters during the drafting process. The draft Plan was released for public comment in December 1999 and 32 submissions were received by closing date in March 2000.

The submissions contained detailed additional information and comment about the draft proposals. All submissions reflected the strong feelings about the lagoons and their management in the local community. Various amendments were made throughout the document in the light of the new information, the views expressed and the changes that occurred at the reserve during the 1999/2000 summer (see next below). The main amendments were summarised and distributed to submitters in June 2000, prior to the Plan being passed to Council for final approval.

Interim Management

The level of community concern about the lagoons environment was such that the Council implemented some of the environmental management and monitoring proposals contained in the Draft Plan, although public submissions had not at that stage been received.

Feral Geese

Firstly, the feral geese were removed from the reserve in December 1999, to eliminate the associated nuisance problems before the Christmas holiday period.

Tidal Flushing

Secondly, tidal flushing of the lagoons was carried out five times between December 1999 and June 2000. The Draft Plan had recommended that tidal flushing be reintroduced on the basis of two or three flushes per year, but not until the autumn of 2000. This delay was recommended for two reasons:

1. to gauge opinion on the proposal from the public submissions;
2. to measure and record the environmental conditions and levels of the problem midge and aquatic plant species at the lagoons before any significant change to the management of the aquatic environment was made. This was to be the base-line data with which subsequent changes in the lagoon environment could be compared.

However, strong representations from the Waimanu Lagoon Neighbours Group persuaded the Council to initiate flushing without further delay.

The public submissions strongly endorsed the continuation of the tidal flushing. Submitters noted that, compared to the previous summer, the water clarity had improved, the midge problem had reduced, and the amount of submerged aquatic plants (water weeds) had not been present to the same degree. One or two submitters also noted, however, that the 1999/2000 summer had been cooler and wetter than the previous summer and this might well have influenced the observed changes. This is discussed further in Section 5.

Monitoring

The basic level monitoring described in Section 30 of this Plan was also initiated in December 1999 by volunteer residents and Council staff. The detailed records and analysis of this first season's monitoring are held in a separate Waimanu Lagoons Monitoring Record at the Council offices. Preliminary indications confirm the observations noted above. However, with only one season's records available, conclusions must be drawn with caution.

We are pleased that there has been a successful start to the monitoring programme, which we hope to build upon from here.

Where to from Here?

The Management Plan sets out a number of new initiatives, some of which have already started (e.g. monitoring) and others of which will be implemented gradually over a period of years as resources allow, such as new planting.

A full review of the tidal flushing regime will be needed in the year 2002, when the results of several years' trial will assist us to assess the success of the approach adopted.

One of the first initiatives to be implemented after this Plan is finalised will be to invite interest and participation in the proposed Waimanu Lagoons Focus Group. We hope that this will foster a sense of partnership between the Council and the community in the future management of the Waimanu Lagoons.

Mike Cardiff
Parks and Recreation Manager

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PART ONE: INTRODUCTION

1. Management Plans

The Kapiti Coast District Council has been progressively preparing management plans for its public reserves to review current management practices and determine future management strategies for individual reserves. The management plan process also assists the Council to identify priorities and plan future resource allocation between the Council's numerous reserves.

A management plan is a working document, which sets out the objectives and policies for managing an area and how these will be achieved. It is a reference point for consistent everyday management and future planning by the administering body. It is also a public statement that explains the governing principles and reasons for decisions to interested parties.

While a management plan provides the overall direction for ongoing management, there is generally a need for an annual schedule of special works to be drawn up and priorities assigned, taking into account the long-term implementation programme in the management plan and the availability of resources. The schedule would describe and cost out the special works to be completed in the year. This would be available to the public and would also be incorporated into the Council's financial programming and budget allocations.

This is an effective way to regularly review the detail of the management plan (as required by the Reserves Act), taking account of changing circumstances or increased knowledge. A more comprehensive review is also required at regular intervals, usually five years.

2. Management Plan Format

The management plan begins with a setting-the-scene description of the reserve and its uses. This is by no means exhaustive and additional information has been appended or identified in the reference list for further reference when needed.

The Aim(s) and Objectives of the management plan are then identified, followed by a Policies section, which sets out the ways in which the aim(s) and objectives are to be achieved.

The Policies are grouped under three headings, to reflect the principal objectives of management plan:

- Public Recreation
- Ecology
- Administration and Management.

Under each main heading, policies are grouped under topics. Background information is included for each topic to explain the reasons for the policies. The policies are to be applied in the context of the preceding related explanatory paragraphs. There are two types of policies:

- *Management policies* which set out principles (e.g. providing for a range of compatible passive recreational activities), provide for everyday management (e.g. mowing regimes), or give guidance for situations as they arise (e.g. request for a local festival.)
- *Action policies* which identify specific initiatives or projects for implementation

Finally the Implementation Section summarises the actions that have been identified and assigns priorities and a broad framework for implementation, including any monitoring programmes that may be required.

To make the text more readable the full name of the Kapiti Coast District Council is generally shortened to "the Council" or "Council".

PART TWO: DESCRIPTION

3. Location, Legal Description and District Plan Zonings

The Waimanu Lagoons Reserve is situated at Waikanae Beach on the Kapiti Coast: - a growing beach settlement on coastal dunelands (see Figure 1). The reserve is traversed by Barrett Drive and also has small road frontages at the intersection of Marewa and Barrett Drives and in two locations on Tutere Street. It is bounded by the Waikanae River estuary to the south but is otherwise surrounded by residential housing or land that is zoned for residential subdivision.

The area covered by this management plan comprises:

- Lot 2, DP 71625	Recreation Reserve	5.2417 ha
- Lot 26, DP 76975	Recreation Reserve	0.0016 ha
- Lot 25, DP 76975	Recreation Reserve	0.0056 ha
- Lot 3, DP 71625	Recreation Reserve	3.4320 ha
- Lot 50, DP 42960	Recreation Reserve	0.2271 ha
- Lot 17, DP 72800	Recreation Reserve	0.0568 ha
- Lot 24, DP 76975	Local Purpose Reserve (walkway)	0.0092 ha
- Lot 4 DP 71625	Local Purpose Reserve (Esplanade)	1.4800 ha
	Total	***10.454 ha***

The locations of the lots are shown in Figure 2. Most of the reserve land (8.9648) ha is classified as Recreation Reserve under the Reserves Act 1977. Under Section 17 (1) of the Act the purpose of recreation reserves is:

> *"providing areas for the recreation and sporting activities and the physical welfare and enjoyment of the public, and for the protection of the natural environment ... with emphasis on the retention of open spaces and on outdoor recreational activities."*

The remaining land is classified as Local Purpose Reserve under the Reserves Act 1977, designated for the purposes of either:

- walkway (a narrow pedestrian accessway of 0.0092ha to the reserve from Major Durie Place); or
- esplanade reserve (the 1.48ha of land along the river berm and beach front). The purpose of esplanade reserves is stated under Section 229 of the Resource Management Act 1991:

"(a) To contribute to the protection of conservation values by, in particular-
(i) Maintaining or enhancing the natural functioning of the adjacent sea, river, or lake; or
(ii) Maintaining or enhancing water quality; or
(iii) Maintaining or enhancing aquatic habitats; or
(iv) Protecting the natural values associated with the esplanade reserve or esplanade strip; or
(v) Mitigating natural hazards; or

(b) To enable public access to or along any sea, river, or lake; or

(c) To enable public recreational use of the esplanade reserve or esplanade strip and adjacent sea, river, or lake, where the use is compatible with conservation values."

The reserve is zoned Open Space in the District Plan but there are also several other District Plan mapping zones which overlap the open space zoning (see Figure 3). These are:

- The *1% flood extent* - areas that would be inundated in a major flood. This includes all of the reserve, except for a small part of the foredune, and areas of adjacent housing. Further subdivision development is restricted within the 1% flood extent.
- *Ecological site* (E81), Waikanae River Mouth, which takes in part of the lower lagoon and the river berm area at the south end of the Waimanu Lagoons Reserve.
- *Outstanding Landscape*, which includes the same area as the ecological site.

4. Physical and Natural Features

4.1 Topography and Soils

The inland part of the Waikanae floodplain consists of alluvial terraces built up primarily by material washed down from the mountains and deposited along the coast. Closer to the coast, however, sands have been deposited along the coast and blown inland to form extensive dune lands. Typically, lowfore dunes built up from the continual deposition along the coast. Lower-lying areas immediately inland of the foredunes were previously the site of an extensive series of streams, lakes and wetlands right along the coast but many of these areas have now been drained. The Waimanu Lagoons lie in one of these low-lying areas.

Formerly, the Waikanae River separated into two channels where it entered the floodplain: the Waikanae River, following a course similar to the present day, and the Waimeha River, which flowed west to the coastal foredune and then turned south to flow behind the foredune to rejoin the Waikanae River near the river mouth. The river mouth was mobile, shifting back and forth between the Waimeha river mouth and today's Mazengarb Road area. It seems that at some stage in the 1890's the Waimeha River dried up, as it is shown as a "dry shingle bed" on a map drawn in 1896.[1] The reasons for this are not known. The former upper river course disappeared but the lower part persisted as the smaller Waimeha Stream.

The Waimanu lagoons are part of an ancient river course – formerly the course of the Waimeha River (and then Stream). The Waimeha Stream was diverted in 1921 when an alternative mouth was cut through the fore dunes further north.[2] Although the diversion reduced the amount of water coming in to the reserve area, it remained a swamp until the early 1970's, when it was dredged to form a lagoon (see Section 7, Historical Outline also). The 350,000 cubic metres of dredgings were used to raise the reserve land around the lagoons, form the bar that separates the lagoons from the Waikanae River and fill adjacent land for residential subdivision. One long lagoon was initially formed from the dredging but was subsequently divided in two by Barrett Drive. These are referred to in the management plan as the upper and lower lagoons (see Figure 4).

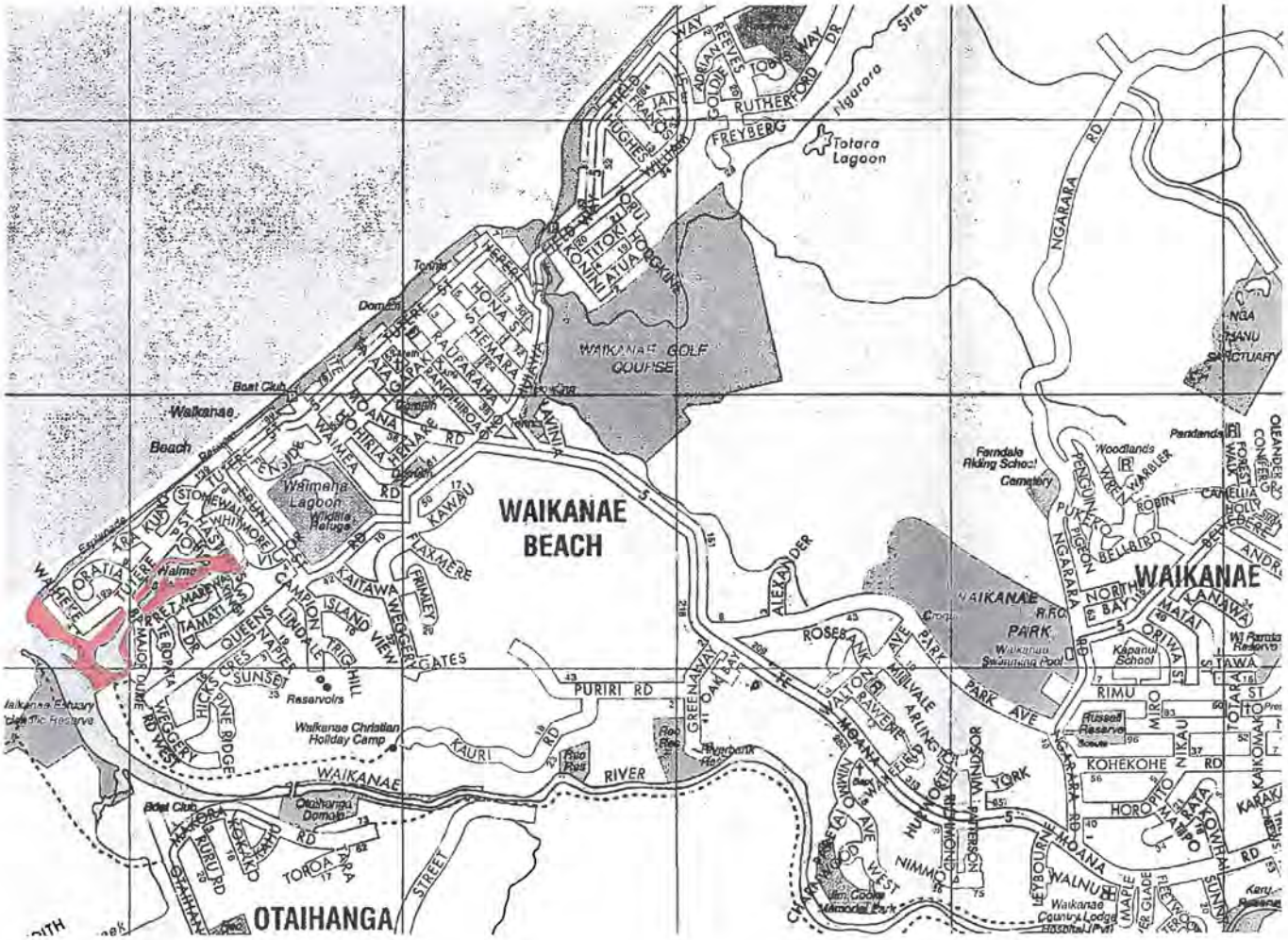
The southwest part of the reserve also spans the end of the Waikanae Beach foredune where it opens out to the Waikanae River mouth and estuary.

Most of the soil in the reserve has probably been disturbed or imported from the lagoon dredging. There may be some areas of peaty soil originating from the former swamp but much of the soil appears to be sandy and free draining. This sandy soil is susceptible to erosion from wind and physical wear on steeper slopes if vegetation cover is disturbed.

4.2 Hydrology

Once the Waimeha Stream was diverted, the catchment of the Waimanu Lagoons (which includes the nearby Waimeha Lagoon and the vestige of the former Waimeha Stream) was reduced to a relatively small and increasingly urbanised area, bounded approximately by Te Moana Road to the north, the dunes covered by the Weggery estate to the east and the summit of the foredunes along the beach front. Little is known about the hydrology of this small catchment in terms of normal flow levels, volume of stormwater discharges and ground water sources. However, the lagoons clearly receive most of the stormwater from this catchment:- 4 culverts discharge directly into the Waimeha Lagoon; 5 into the stream; and another 4 into the Waimanu Lagoons. Further stormwater no doubt discharges into the stream upstream of Waimeha Lagoon also. All this stormwater flows out though the Waimanu Lagoons.

[1] Chris and Joan McLean, *Waikanae Past and Present* (1988) p. 153
[2] Chris and Joan McLean, *Waikanae Past and Present* (1988) p. 153-154



01 Preliminary Issue 23/09/99
Revision

Waimanu Lagoons Management Plan

Figure 1 Location Map

Scale: N/A
Date: October 1999

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	Recreation Reserve
	Esplanade Reserve

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Waimanu Lagoons Management Plan

Figure 2 Legal Description

Scale: N/A
Date: October 1999

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Ecological Area

Outstanding Landscape

Waimanu Lagoons Management Plan

Figure 3 District Plan Zoning

Scale: N/A
Date: October 1999

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The Council carries out monthly testing for coliforms in the lower of the two Waimanu Lagoons, where samples are taken from the end of the jetty, but other possible contaminants such as heavy metals, other organisms and sediment loading are not tested. The results of the coliform monitoring since March 1998 are contained in Appendix 1. The water quality standard is currently that the water be suitable for secondary contact recreational use such canoeing or paddling but not recommended for swimming.

The 1999 ecological survey found that there was good water quality in the Waimanu Lagoons, in terms of nutrient levels (that is, that the water is not overly enriched) and that the nutrient levels were higher in the Waimeha Lagoon than the Waimanu Lagoons. It is likely that the Waimeha Lagoon, with its more abundant riparian vegetation, filters the water that then flows on to Waimanu Lagoons via the stream.

4.3 Climate

The climate is characterised by typically warm summers and mild winters. Rainfall is 800-1000mm per annum, evenly distributed through the year. West to northwest winds prevail with quite frequent gales.

In the several years prior to the preparation of this Plan, there were unusually hot, dry summers, until the 1999/2000 summer which was somewhat cooler. Paraparaumu airport data shows that rainfall was well above average and winter temperatures warmer in 1998. The average temperature in January 1999 (the summer when midge nuisance was particularly bad) was also higher than in the years immediately before and after.

4.4 Vegetation

Originally, the site would have been covered in a mosaic of indigenous wetland vegetation, varying according to differences in drainage. These would typically have included sedges, rushes and raupo, harakeke (swamp flax) and cabbage trees around the wet and damp edges, with shrub and small trees such as manuka, koromiko and karamu on slightly higher ground. On the drier dune land, ngaio, kanuka, akeake and taupata would have been typical.

Today, most of the reserve area is managed as mown grass with scattered single or small groups of specimen trees including pohutukawa, ngaio, taupata, macrocarpa, karo, cabbage trees, and Norfolk Island pine. The berm is mown right to the water's edge around most of the lagoon edge but, in places, flax, rushes and sedges are growing on the bank or in the margins of the water. At the time of the 1999 ecological survey, there were two main species of aquatic plants,[3] nitella (*Nitella hookeri)* and blunt pond weed (*Potomageton ochreatus)*, both native species. Watercress and duckweed also occured in the open drain that connects Waimanu and Waimeha Lagoons. This aquatic vegetation reflects the predominantly freshwater character of the lagoons at the time. This is likely to fluctuate according to changing conditions.

(Note: The submerged aquatic plants are also commonly referred to as 'water weed,' 'aquatic weed' or just 'weed'. The word 'weed,' which has negative pest connotations, has been avoided in this Plan because submerged aquatic plants are an important part of the lagoons ecology and should not necessarily be regarded as a pest plant. There may be times, however, when the amount of growth causes problems and may need intervention to control.)

Salt marsh vegetation with important ecological value occurs on the river / estuary edge adjacent to the south end of the reserve. As noted earlier, this area is part of the Waikanae Estuary Scientific Reserve.

The foredune area is vegetated mainly in marram grass with scattered pampas, black wattle and lupin, and some planted karo and pohutukawa (none locally indigenous).

Several noxious weed species occur to a varying extent in or adjacent or immediately adjacent to the reserve: - pampas grass, blackberry, gorse and wattle.

[3] Boffa Miskell Limited, (1999) *Waimanu Lagoons Ecological Survey,* p. 8

4.5 Wildlife

The Waimanu lagoon area would originally have been very rich in bird and fish life when it was a river / wetland environment.[4] It was a very important traditional fishery for eel and whitebait, with eel weirs used abundantly.

It has been subsequently modified but, nevertheless, fish and bird species are found there. Native fish occur in the lagoon, including kokopu (*Galaxis fasciatus)* and abundant common bully (*Gobiomorphus cotidianus)* observed in the 1999 survey, with reported sightings of eel, inanga and mullet. Nineteen macro invertebrate species were identified in the 1999 ecological survey, including dragonflys, pond snails, caddisfly, shrimp, midges and water boatmen. Larvae of the bloodworm midge (*Chironomus zealandicus)* were very populous. This is a species which is well adapted to cope with harsh conditions such as low oxygen or moderate pollution and tend to be occur in large numbers in natural systems containing a deep organic layer in warm shallow waters.

The former Waimeha swamp (now the site of the Waimanu Lagoons) was an ideal environment for inanga / whitebait spawning. Although inanga / whitebait have been reported as being present, the reduction in tidal inflow since the control gate was installed and raised, has obstructed entry for spawning. Whitebaiters report reduced abundance in the river, attributed partly to the loss of the Waimanu area[5].

A number of bird species (both native and introduced) visit or inhabit the reserve, including shags, white-faced heron, various duck and gull species, black swan, and various small birds such as sparrows, blackbirds and welcome swallows. It is likely that the number of bird species that visit the lagoon is boosted by the proximity of both the Waikanae Estuary Scientific Reserve and the Waimeha Lagoon wildlife sanctuary. It is likely that there are also pest animals at Waimanu such as rats, mice, mustelids, feral cats and rabbits.

4.6 Ecology

The Waimanu Lagoons Reserve, although not identified specifically as an ecological site, is nevertheless part of the inter-related stream/swamp/estuary system associated with the Waikanae River and south Waimeha Stream, which has important natural values. The Waimanu lagoons are located in close proximity to two significant ecological sites that are both identified in the District Plan:

- *E81: the Waikanae River Mouth* – 80 hectares of estuary, river mouth, and wetland habitat, is of national significance for both its wildlife and flora and supports some rare plants.
- *E112: Waimeha lagoon* – 5 ha of freshwater wetland which, like the Waimanu lagoons, also occupies part of the former Waimeha River course and drains into the Waimanu lagoons via a small stream.

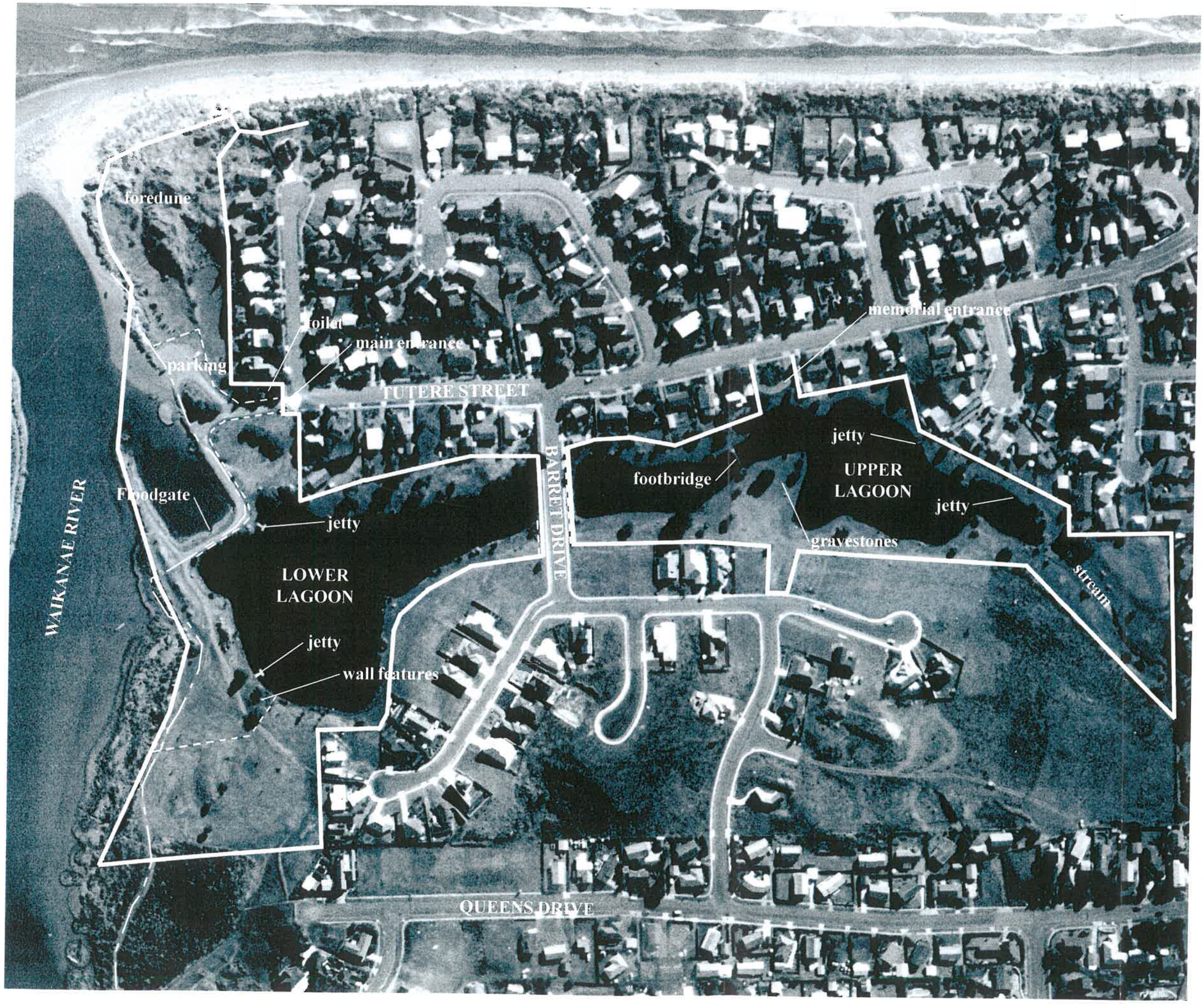
Waimanu Lagoons Reserve provides an open space link between these two sites and, in fact, the southern part of the reserve is included within the Waikanae River Mouth ecological site.

5. Historic Management of the Lagoons

The following account has been pieced together from available information and it is more than likely that more background could be found from a detailed search of historic records. However, some consistent trends are evident from what we do currently know.

Formerly an estuarine river course and then swamp, the site was dredged from the Waimeha swamp in 1971 to form a single long lagoon. Although described as tidal by the land development company,[6] a lock

[4] For further information see *WRFMP Environmental Investigations,* p. 41; Horowhenua County Council Ecological Survey, 1986 and Boffa Miskell 1999 ecological survey .
[5] *Waikanae Past and Present* (1988) p.163 & 174; comments made by whitebaiters at the river mouth, August 1999
[6] *Waimanu Times*, Waikanae Land Company publication, date unknown but thought to be 1975.



KEY

- Waimanu Lagoons Reserve Boundary
- Vehicle Barriers
- Waikanae River Walkway

Revision

Waimanu Lagoons Management Plan

Figure 4 Site Features

Scale: N/A
Date: June 2000

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was constructed at the outlet to the estuary so that the water level "could be regulated by a huge valve"[7]. There seems little doubt that the lagoon, designed to be a marina at the seaward end with a need for boat passage, was originally envisaged to be salt water.

Little information has been found about the early water management regime[8]. However, we do know that the land development company's plans to stabilise and dredge the river mouth to allow for boat passage did not come to fruition and so, the seaward end of the lagoon was never developed as a marina. By 1980 the single lagoon had become two lagoons[9], connected by a culvert under the newly constructed Barrett Drive. This probably modified the water circulation patterns. From this time the lagoons have been managed effectively as ornamental ponds.

Craig Wyn, long-time Council employee, recalls the early years of the then Horowhenua County Council involvement, which was initially based on a "minimum maintenance order":

- In 1983 the lagoons had been tidal for some time with mud crabs present, mainly in the lower lagoon. The control gate had been obstructed with broken concrete and left partially open.
- The control gate was cleared so that the lagoons could be properly drained (for rubbish removal) and efficiently filled.
- Control of noxious or nuisance plants was a focus: - boxthorn which impeded mowing; blackberry, gorse and briar rose,which harboured rabbits; pampas at the request of the noxious plants officer, as it was threatening tidal margins.
- Mowing sufficient to reduce fire danger from tall grass was undertaken.

The submerged aquatic plant problem, which has been a long-standing concern, seems to have been occurring to a greater or lesser extent since about 1982. According to a local newspaper report[10], the lagoons had been popular for small yachts, swimming, wind surfing and boating until that time but had subsequently deteriorated. A temporary clean-up had been carried out at Christmas 1983 but the lagoon had become an "unusable, stinking mess" again by April 1985, according to residents. Algal growth with a bad smell was reported. At that time the reserve was not owned by the then County Council but the Council undertook to increase the frequency of tidal flushing. (Craig Wynn notes that a drop in air and water temperatures had eliminated the algal bloom by the time the flushing took place.

The next reference to the lagoon management dates from 1985 / 1986, when an ecological survey and management plan were commissioned by the Horowhenua County Council. It seems that the report was commissioned because of concerns about algal growth in the lagoons. The survey found that the lagoons were, at that time, salt-water with the water level controlled by raising or lowering the control gate. The algal species observed included green algae *(*mainly *Enteromorpha* and *Chaetomorpha aerea),* a red alga *(Gracilaria)* and a brown alga seaweed (*Carpophyllum flexosum)* which may have drifted into the lagoon. These species differ from those observed in the 1999 survey, reflecting the different salinity of the water. The report mentioned a fortnightly tidal flushing regime except for the Christmas period when the gates remained closed to maintain high water levels for recreational use. It was suggested that the regular exposure and recovering of mud during flushing, might contribute to the algal growth by releasing nutrients through sediment disturbance although it seemed to reduce the algae by about 50%. The report also suggested that having a constant high water level in summer might reduce the amount of algal growth.

The report suggested experimenting with a longer control gate closure period over the summer, combined with winter spraying, raking and removal of the dead algal material but indicated that "more severe methods" might be required such as "squaring off" the bottom of the lagoon to deepen the water margins.

Following this report it seems that experimental conversion to a fresh water environment was advocated and, in December 1986, it was decided to try this in the following autumn.[11] From the information

[7] *Waimanu Times*, Waikanae Land Company publication, date unknown but thought to be 1975.
[8] However, the Maori Land Court records, 1840's – 1880's, are a likely source of additional information from accounts of fishing resources in the Waimeha Stream and Waimanu swamp areas.
[9] An aerial photograph dated 06.10.80 shows Barrett Drive bisecting the lagoons. Source: A.R. Edwards
[10] Kapiti Observer, 22 April 1985
[11] Kapiti Observer, 19 December 1986.

currently available it is not clear whether this happened but in 1988, the local history, *Waikanae Past and Present,* noted that the lagoon still tended to "become choked with weed which thrives in the warm, shallow, salt water."[12] Craig Wynn believes that from about 1986, the focus of aquatic plant control shifted to *Nitella,* which was by then dominant, difficult to flush and prone to spreading from prevailing winds. He recalls that it was a nuisance for boating events.

Initially, two 150mm boards were placed under the gate, to prevent salt water from entering the lagoon with big tides. This raised the water level in the lagoons and meant that flood effects then had to be watched. Salt water and flotsam still entered the lagoons, especially when the river mouth was close to the lagoons. The flushing generally occurred over a five day week, avoiding weekends and public holidays when possible, and culminating with the big tides of a new or full moon. The flushing period was reduced when the Rotary Club Optimist yachting times extended to Tuesdays as well as Saturdays.

Little documented information after 1988 has been located but it seems that the gates were raised on a more permanent basis in the early 1990's[13], reducing the amount of salt water entering the lagoons and converting them to essentially fresh water. Craig Wynn recalls that the control gate was completely rebuilt about 1994 and in the subsequent six years entry of saltwater was completely eliminated. He comments that "Nitella was reducing with the reduction of salt content" and that the freshwater 'weed' in the northern lagoon was not seen as a problem because their was less boating there and the freshwater species could be controlled by occasional influxes of salt water.

Photo: Steve Hollett, October 1999

Midge swarms and submerged aquatic plant growth increased to nuisance levels in the summer of 1998/99.

[12] *Waikanae Past and Present*, p. 175
[13] Personal recollections from local residents, KCDC operations staff & DoC personnel.

Residents recollect some infrequent tidal flushing since then, with occasional complete drainage and drying out but this has apparently not occurred for some time. The control gate is opened to lower the water level when a flood warning is issued, however, so as to increase the lagoons' capacity to receive stormwater and reduce the chance of flooding to adjacent properties that lie within the 1% flood area.

In the summer of 1998/99, local residents again became concerned about the state of the lagoons, reporting water discoloration, increased submerged aquatic plant growth, and a population explosion of midges to serious nuisance level. An ecological survey was commissioned in July 1999 to assess the current ecological condition of the lagoon to assist with addressing the lagoon management issues and concerns. A summary of the survey report is contained in Appendix 2 but a brief resume of its findings follows in the next section. The full report is held at the Paraparaumu and Waikanae public libraries.

The Draft Management Plan was released for public comment in December 1999. It recommended that limited tidal flushing be reintroduced but not until public submissions had been received and a proposed programme for monitoring the lagoons' environment had been conducted over the 1999/2000 summer and autumn. This initial monitoring was to provide base-line data against which subsequent years' could be compared. However, the Neighbours of Waimanu Lagoons group lobbied the Council to begin an "experimental flushing programme"[14] without further delay as the residents were "alarmed at the worsening state of lagoon" - in particular, aquatic plant growth and midges. The Council decided to proceed and the first tidal flushing occurred in mid-December 1999. There were five flushings up to the end of May 2000 with each flushing spanning 2-3 days (usually 4 tidal cycles).

Public submissions received on the Draft in March 2000 were strongly in favour of continuing the flushing with submitters commenting on improved water clarity, reduced aquatic plant growth and reduced midge levels. A minority of submitters were opposed, or expressed reservations, because they recalled problems occurring with tidal flushing previously. Conversely, others thought that the problems had begun when the control gate was raised and tidal water excluded from the lagoons.

During the summer, the proposed monitoring programme was also started. This was carried out daily by volunteer local residents and weekly by Council staff. Although some preliminary observations have been made about the apparent effects of the flushing and the monitoring results, (see Sections 16.1 and 30 respectively) it is noted that the 1999/2000 summer was considerably cooler than the previous 'problem' summers and this may also have influenced the state of the lagoons. Consistent management and monitoring will be needed for several years before conclusions can be drawn with more certainty.

6. Key Findings of the 1999 Ecological Survey

(Note: this survey was carried out in mid-winter).The water in the lagoons is neither fresh water nor brackish. That is, the salinity is more than the fresh water level but less than for brackish water. There were two submerged aquatic plants prominent at the time of survey, *Nitella* in the lower lagoon and blunt pondweed in the upper lagoon. The slight difference in salinity levels between the two lagoons may account for this different distribution. Both of these are native species and provide aquatic habitat. Neither of them are recognised as significant plant pests in the Wellington region. (The algae species identified in the 1985/86 survey differ from those found in the 1999 survey, reflecting the change from mainly salt to nearly fresh water).

The water does not contain excessive nutrients[15] but the extensive shallows, lack of riparian cover vegetation, and soft base material of the lagoons encourages submerged and surface aquatic plants to develop. Where the lagoon bottom is rocky or of coarser sand material, there appears to be less submerged aquatic plant development and less midge larvae.

There is a stable food web in the lagoons, although of limited species, including six species of native fish[16]. The shallow aquatic vegetation is an important part of this. However, there is a very strong

[14] Letter dated 16 December 1999, to the Mayor and Councillors , from Steve Hollett, on behalf of the Neighbours of Waimanu Lagoon.
[15] The waters of Waimeha Lagoon are, in fact, richer in nutrient
[16] Two species were observed in the survey and four species were reported as being present.

presence of aquatic macroinvertebrate species that can tolerate difficult conditions such as low oxygen or moderate pollution, notably the bloodworm midge that was reported at nuisance levels in the previous summer. These species are typical of natural systems containing a deep organic layer in warm shallow waters.

7. Historical Outline[17]

The Maori people settled the Kapiti Coast, with its temperate climate and the plentiful food sources of the rivers, lakes and coast, long ago. Therefore, the tangata whenua have a long association with the land and resources of the Kapiti Coast. The site of the Waimanu Lagoons Reserve is important to tangata whenua because it was formerly a very rich food source immediately adjacent to a pa and is a place where important events in Maori history occurred.

Apart from cultivation sites and settlements the Kapiti area was little changed by Maori settlement. However, major changes to the floodplain rapidly followed European settlement in the latter half of the nineteenth century. Forests were cleared, the extensive wetlands gradually drained and the land converted to farmland. In 1921, when the Waimeha River was diverted, the site of today's Waimanu lagoons was significantly altered, although it remained as a swampland for some decades.

The Waimeha Swamp, as it was known, underwent the next major modification following the purchase, in 1968, of 120 acres of land in the vicinity of the Waikanae River mouth by the Waikanae Land Company. The Company had plans to develop the land on the north side of the river mouth for residential housing, converting the Waimeha Swamp into a recreational lagoon, controlled by a lock and incorporating a marina. By 1971, a long single lagoon had been dredged from the swamp and an area of some 14 acres, including the lagoons, put aside as public reserve. The company grassed the reserve land, planted native shrubs and developed "delightfully intimate picnic and barbecue areas."[18] The associated residential subdivision was promoted for its "idyllic lagoon setting."

When the lagoons were dredged, two gravestones were discovered. Made of Sydney sandstone, the gravestones commemorate a whaler, William Browne, and the six year old daughter of Major Durie. The gravestones were restored some years ago and placed just north of the footbridge across the northern lagoon. The location of the actual gravesites is not known. There is also some evidence to suggest that there were Maori burials in the vicinity of the Lagoons.[19] The large greywacke boulder located in the adjacent Tutere Street entrance was brought in by the Waikanae Land Company and had a bronze plaque recognising the support of a local Maori elder in the development project. The plaque was stolen and not replaced.[20]

The Waikanae Land Company also gained go-ahead to stabilise the river mouth and dredge it regularly to keep it open for boats, despite opposition from estuary conservation lobbyists whose efforts were subsequently reflected in the creation of the Waikanae Estuary Scientific Reserve. Various attempts to stabilise the river mouth failed. Land sales in the subdivision proceeded but income failed to keep pace with inflation and increased development costs and, in 1979, the company went into receivership.

Housing was first developed on the seaward side of the lagoons reserve. By 1980 the lagoons, though still connected by a large culvert, had been divided in two by the construction of Barrett Drive to connect the as yet undeveloped land on the inland side with Tutere Street. Housing development appears to have slowed for a period but, in the last decade, roading and services have been developed on the inland side where housing is rapidly appearing.

It seems that the land company's original vision of an idyllic waterside setting has been, and continues to be, marketed to potential buyers[21] but the reality has not always fulfilled expectations. Aquatic plant

[17] Much of the early history summarised here comes from *Waikanae River Floodplain Management Plan Environmental Investigations,* Historical Sites section. Reference is also made to the pa site in the Wellington Regional Council's *Waikanae River Environmental Strategy,* (1999)
[18] *Waimanu Times*, Waikanae Land Company publication, date unknown but thought to be 1975.
[19] *Waikanae River Floodplain Management Plan, Environmental Investigations*, p.105
[20] Source; Steve Hollett, from Mr Bill Lawrence, former partner in the Waikanae Land Company.
[21] Comment by resident who lives adjacent to the reserve.

growth to nuisance levels was a problem during much of the 1980's and, more recently, the level of concern amongst neighbours of the reserve rose again, leading to the formation of a 'Neighbours of Waimanu Lagoon Reserve Group' in January 1999. The group's objective has been to improve the quality of the reserve and the lagoons.

In terms of recreational use, it seems that the lagoon(s) were used up to about 1982, as originally intended, for water recreation including small yacht sailing, wind surfing, boating and swimming. Canoeists were photographed in 1988[22] and local schools still use the lagoons for canoeing from time to time. In recent years an Optimist Class sailing school has been run during mid-summer in the lower lagoon, sponsored by the local Rotary Club. Some jet ski use has also been reported. However, the lagoons no longer attract swimmers. Whitebaiters still gather near the outlet gate because whitebait venture into the outlet arm from the river mouth even though few now gain entry to the lagoon.

Whitebaiters near the lagoons outlet, 1999

Within the immediate locality, Waikanae Beach is a popular destination for swimming, walking, boating and fishing. The Waimanu Lagoons are part of a locally popular round walking route which takes in the beach and lagoons. The south end of the reserve is something of a recreational node being the starting point for the Waikanae River Walkway, which follows the river all the way to SH1, and also being the place where vehicle access and parking comes closest to the north side of the river mouth.

[22] *Waikanae Past and Present*, photograph p. 175

PART THREE: AIM AND OBJECTIVES

8. AIM

The aim of this management plan is to manage the Waimanu Lagoons Reserve for public enjoyment and informal public recreation whilst at the same time protecting and enhancing the ecological health of the lagoons and their riparian margins.

> *(Informal recreation: recreational activities, such as walking, which can be spontaneous and do not require specialised sports facilities.*
>
> *Healthy ecosystem: an ecosystem which is stable and sustainable, maintaining its organisation and autonomy over time, and its resilience to stress. Ecosystem health can be assessed using measures of resilience, vigour and organisation[1].)*

9. OBJECTIVES

1. To protect and improve the visual quality of the reserve through appropriate landscape development, taking into account the character of adjacent residential development and open space areas.

2. To provide opportunities for a range of informal public recreational activities appropriate to the Waimanu environment.

3. To have particular regard for kaitiakitanga[2] and to manage the Waimanu Lagoons as part of the wider natural river system, recognising in particular, the inter-relationships between the Waimanu Lagoons catchment and the Waikanae River estuary.

4. To introduce a documented management regime devised specifically to improve the ecological health of the lagoons, including enhancement of water quality and balanced diversification of appropriate species by managing habitat conditions.

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5. To introduce a documented monitoring programme devised to provide short-term indications of potential water management problems and longer term information about the condition of and patterns of change in the lagoons' ecology.

6. To regularly review the lagoon management regime together with the results of the monitoring programme, and to record any resulting modifications in the management regime so as to maintain a consistent historic record of management practices.

7. To encourage public appreciation of the reserve's natural and cultural heritage features and values through education and site interpretation.

8. To protect and enhance the role of the Waimanu Lagoons Reserve within the wider open space network of the Waikanae Beach and lower Waikanae River area in terms of both recreation opportunities and natural habitat linkages.

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[1] Definition from the *New Zealand Biodiviersity Strategy, Our Chance to Turn the Tide,* 2000, p. 140
[2] As defined in the Resource Management Amendment Act 1997, *"…the exercise of guardianship by the tangata whenua of an area in accordance with tikanga Maori in relation to natural and physical resources; and includes the ethic of stewardship".*

PART FOUR: POLICIES

RECREATION

10. Recreational Use

People visit the Waimanu Lagoons Reserve for a variety of recreational activities including walking, whitebaiting (in the adjacent river mouth area downstream of the lagoons' control gate), picnicking, fishing, sailing, canoeing, feeding the waterfowl and enjoying the open space setting. Informal recreation of this nature, which is geared towards simple enjoyment of the lagoon environment, is to be encouraged. Activities that are excessively noisy, such as jet skis or trail biking, are not acceptable because of the potential nuisance to other recreational users and the nearby residential property owners (see Section 13 also).

The lagoons are the central features that make the reserve special to those who use or live beside it. The quality of the water and margins, in terms of both appearance and opportunities for water-based recreation (be it paddling, canoeing or eeling) is a critical factor in providing for public enjoyment. Considering the increasingly urbanised catchment and the lack of extensive riparian vegetation to filter runoff and stormwater, it is unrealistic to aim for water quality suitable for swimming. However, recent testing indicates that the water quality is suitable for activities involving some water contact, such as canoeing, and that nutrient levels are not excessively high. Discoloration of the water and the amount of visible submerged aquatic plant, nevertheless give the impression of poor water quality, which puts people off. Measures to improve the ecological health of the stream and lagoons, as outlined in Sections 16 – 19 below, are expected to improve both real and perceived water quality.

Special events, such as fetes or competitions, which draw significant crowds, are not generally compatible with the passive recreation use of the reserve nor with the limited parking available. However, special events that relate specifically to the lagoons environment, such as model boat regattas or fetes organised by the local community, would be appropriate occasional uses.

Policies

10. i The reserve shall be managed and developed for primarily informal public recreation.

10. ii The Council shall aim to maintain a minimum standard of water quality suitable for secondary contact water-based recreation.

10.iii Measures to improve the clarity of the water in the lagoons to enhance their recreational value, shall be included in the environmental management programme provided that they are consistent with improving the ecological health of the stream and lagoon aquatic environments.

10.iv Organised events and activities of a recreational nature or value to the local community such as fetes or appropriate water-based sports competitions shall be encouraged provided that they do not damage the reserve, compromise or conflict with other recreational use or cause unacceptable disturbance to local residents. Such events shall be subject to prior approval of the Parks and Recreation Manager.

11. Pedestrian Access

There are pedestrian access points from Barrett Drive, Tutere Street (the 'duck feeding' entrance and the main entrance), Marewa Place and Major Durie Place. The mown berms around the lagoons provide an informal, accessible circular walking route. Formed paths are not envisaged, as this would be out of keeping with the informal character of the reserve. However, more durable surfacing will be considered in places where there is excessive wear and, where possible, gradients and grass shall be maintained to provide for disabled access.

The Waimanu Lagoons Reserve has an important linking role in the local open space network, being strategically placed between the Waimeha Lagoon, the Waikanae River estuary, the start of the riverside walkway, and the beach itself. The informal circular walking route around the lagoons is part of various popular local walking routes that take in these destinations, with pedestrian connections to the beach and upstream to Otaihanga and as far as SH1. These linked walking opportunities would be greatly enhanced by direction signs both within the reserve and at the other local open spaces mentioned, particularly for visitors from beyond the local area (see Section 15).

It is unfortunate that an esplanade reserve was not secured along the Waimeha Stream between the Waimeha and Waimanu Lagoons when the area was first developed for housing, as this would have provided a direct open space link and a logical walking connection. At present, the north end of the reserve is a cul-de-sac with no direct access to nearby streets – a situation that must be remedied when the land on the northeast side of the reserve is developed for housing. There appear to have been two alternative access options put forward.

- Firstly, the currently proposed subdivision layout[1], shows a narrow access strip from a Wi Kingi Place, a cul-de-sac street, which would require doubling back to Barrett Drive to get to Queens Road and the Waimeha Lagoon.
- Secondly, the District Plan shows a suggested pathway from the northeast corner of the reserve between private properties connecting through to Queens Road. While this would be a better option in terms of local walking routes, it would be a very long narrow walkway hemmed in closely by tall fences and a less than appealing pedestrian entry/access. The designation of this pathway route in the District Plan is currently subject to negotiation with affected property owners, the outcome of which is not known at the time of writing.

Further options for pedestrian access at this end of the reserve, with improved visual connection between the reserve and connecting street should be explored urgently before the subdivision is developed. At the same time, the potential to acquire an access strip through to Victor Grove from the northwest corner of the reserve should be investigated, as this would make a direct connection to the Waimeha Lagoon along Victor Grove. This would also provide a route to the beach via the existing walkway between Victor Grove and Whitmore Grove, along Whitmore Grove and Hastings Street, and then across to Stonewall Grove and the beach. Again, direction signs along these walking routes would greatly facilitate their use.

The pedestrian access to the beach from the main carpark passes around the end of the foredune. This is a fragile environment and must be monitored for potential over-use which could damage the vegetation cover and stability of the dune environment. If foot traffic does excessively disturb the dune vegetation, a formed (ideally boardwalk) route should be considered.

Policies

11. i The informal character of the circular route around the lagoons shall be maintained, with a formed pathway only put in place where excessive wear or ground conditions necessitate it or where foot traffic needs to be directed. Gradients and grass surfaces shall be maintained, where possible, to facilitate disabled access.

11. ii Pedestrian access to the beach across the foredune shall be controlled by way of a formed track or boardwalk if the stability of the foredune vegetation is put at risk by foot traffic.

[1] Harcourts flyer for "Kapiti Views" "15 sections, 1st release".

Action Policies

11. iii The securing of pedestrian access between the northeast corner of the reserve and the proposed housing subdivision of Tamati and Wi Kingi Places, with clear visual connection between the reserve and the connecting street, shall be pursued.

11. iv Pedestrian access from the north end of the reserve to either Queens Road and/or Victor Grove shall be investigated, including options of negotiating easement access and/or purchasing a walkway strip.

12. Vehicle Access and Parking

Approved public vehicle access is confined to an unsealed vehicle track, which enters the reserve from the end of Tutere Street. This leads to a parking area adjacent to the foredune or, alternatively, leads across the outlet arm of the lagoons to a larger area of informal parking contained by a low timber vehicle barrier. The open ground just beyond this vehicle barrier gets periodically wet and is, therefore, to be kept as a pedestrian only area to protect the ground from vehicle damage. The vehicle track is unsealed and parking not formally defined. This is in keeping with the informal beach / estuarine character but will need monitoring to ensure that vehicles are not unduly damaging vegetation cover.

Vehicles can also drive round the semi-circular sealed lane at the 'duck feeding' entrance on Tutere Street. This is not designed for parking but is nevertheless a popular stopping point for families coming to feed the ducks, in particular. The purpose and layout of the 'duck feeding' entrance site is to be reviewed and, at that time, its role as a secondary entry point to the reserve and the possibility of providing more effective parking will also be considered. (see Section 21).

Elsewhere, access is supposed to be pedestrian only but trail bikes have been a periodic problem on the lagoon berms when vehicle barriers have been damaged or missing. Trail bikes pass beyond the defined areas of vehicle access at the south end of the reserve, particularly along the river berm.

A range of vehicles drive down to the river edge from the vehicle track near the lagoon outlet and then on to the beach, particularly during whitebaiting season, although vehicles are prohibited from this part of the beach. The Council was, therefore, proposing to place vehicle barriers here[2] . However, the river edge is used for launching boats and, in particular, launching rescue boats[3] for river and sea searches. The Council will monitor the vehicle problem and consider ways to restrict vehicle access onto the beach while allowing for boat launching.

Vehicles gain access to the river edge and beach from the track round the lagoon outlet.

[2] *Draft Waimanu Lagoons Management Plan*, October 1999
[3] The Waikanae Coastguard Volunteer Search and Rescue

To reduce possible disturbance to neighbouring properties and the potential for antisocial behaviour, vehicle access at the main Tutere Street entrance is closed at dusk.

Policies

12. i Public vehicle access shall only be permitted in the areas defined by formed vehicle routes or by vehicle barriers.

12. ii Public vehicle access and parking shall be permitted in the designated areas during daylight hours only.

12. iii If excessive wear and/or damage to vegetation from vehicle use is observed in the areas where vehicles are permitted, remedial action, such as additional vehicle control measures and/or more clearly defined parking areas, shall be considered.

12. iv Vehicle barriers shall be installed at all entry points to the reserve as necessary to prevent vehicles from entering the pedestrian-only areas. Damaged vehicle barriers shall be repaired promptly.

Action Policies

12. v Options for restricting vehicle access from the reserve to the Waikanae River riverbank and the beach while still allowing for boat launching to the river shall be investigated.

12. vi The effectiveness of the existing vehicle barriers for deterring trail bikes from entering the pedestrian-only Waikanae River berm area shall be reviewed and remedial action considered, taking into account:

- The visual impact of increased barrier structures;
- The incidence of trail bike use on the river berm;
- The effectiveness of any alternative measures that might also be available.

13. Controls and Prohibitions

Public parks inevitably attract activities that are incompatible with management objectives. Although the Council's Parks and Recreation Department seeks to encourage recreation use of the reserve, it must impose certain controls to protect it from damage, maintain safety standards and promote compatible uses. The controls and prohibitions are a response to management problems that have consistently arisen over a period of years and are not simply a standard set of rules.

The Parks and Recreation Department has limited resources to patrol and enforce persistent problems such as vehicle trespass and inadequate dog control. Therefore, it must rely mainly on indirect measures such as signage and barriers.

Two issues here require some additional explanation:

13.1 Dogs

Walking and exercising dogs is recognised as a genuine recreational pursuit but the presence of dogs can be inappropriate in certain places. In reserve areas uncontrolled dogs and dog fouling can detract from the enjoyment of other recreational users. In order to manage dog control on the Kapiti Coast the Council has adopted a Dog Control Policy and Bylaw. This provides for dog access to be restricted in public places. Within these ‘dog access zones’ dogs will be prohibited, or permitted on a leash, or allowed off the leash. Some places, notably popular swimming areas on the beaches, have different winter and summer dog control zonings.

The informal character and walking opportunities of the Waimanu Lagoons Reserve provide a suitable area for dog walking throughout the year, provided that they are controlled on a leash. Therefore, under the Bylaw, the Waimanu Lagoons Reserve is a 'Controlled Zone' which means that dogs are allowed but only when under continuous control on a leash or lead. There have, nevertheless, been incidents with dogs attacking the birds in the reserve, particularly during the breeding season. Therefore, this policy needs to be made more apparent by signage. The Council's Regulations Department has placed an explanatory notice at the main Tutere Street parking area but this needs to be backed up by pictogram signs at the other reserve entrances.

13.2 Anti-social behaviour

Anti-social behaviour and vandalism is, to a large extent, beyond the control of the Council. However, it is generally recognised that poorly maintained public areas tend to attract these kinds of problems. Regular maintenance and rapid repair of damage may, therefore, have some effect in counteracting such behaviour.

It is also recognised that this type of problem occurs less where the local community is actively involved in park projects and management, or where adjacent housing overlooks a reserve, as at Waimanu Lagoons.

13.3 Public safety

In exceptional circumstances it may be necessary to close the all or part of the reserve from the public to protect public safety or to protect the reserve environment. For example, flooding (the reserve lies within the 1% flood risk zone[4]),, reparation of extensive damage (such as storm damage) or major redevelopment or prior agreed use of poisons for pest control.

13.4 Motorised Craft

In general, motorised craft are not considered compatible with other non-motorised craft or with nearby houses due to noise and/or speed. However, special permits for limited use of motorised craft may be issued for safety reasons (e.g. sailing school rescue boat).

Policies

13. i The requirements of the 'Controlled Dog Access Zone' under the Kapiti Coast District Council's Dog Control Policy at the Waimanu Lagoons Reserve shall be complied with and enforced, when necessary, under the Dog Control Bylaw 1997.

13. ii Recreational activities, such as hitting golf balls, which may damage the reserve's resources or compromise public safety, shall not be permitted.

13. iii Horse riding is prohibited.

13. iv Jet skies and motorised craft, other than model boats, are prohibited from the lagoons unless authorised by permit from the Parks and Recreation Manager. (see Section 10 also).

13. v Littering and rubbish dumping is prohibited and offenders may be prosecuted under the Litter Act 1979.

13. vi The lighting of open fires is not permitted but portable gas barbeques may be used for special events at the discretion of the Parks and Recreation Manager.

13.vii Measures to reduce and, if possible, eliminate anti-social behaviour and vandalism shall be investigated and actioned if necessary.

[4] Kapiti Coast District Plan, 1999

13. viii Activities that are damaging to reserve resources shall be restricted while appropriate protective measures are taken, or prohibited if incompatible with the aims and objectives of reserve management.

13. ix In exceptional circumstances the reserve shall be closed to the public partly or entirely, at the discretion of the Parks and Recreation Manager.

14. Buildings, Structures and Site Furniture

The design and location of buildings, structures, paving and site furniture can have a major impact upon the visual appeal of a reserve, either positive or negative. Many public reserves suffer from ad hoc development where poorly placed structures and unrelated styles and materials are unnecessarily obtrusive. As a general principle, constructed features should be complementary to the open space qualities of a reserve, achieved by:

- design appropriate to the site and unified throughout;
- locations chosen to reduce visual impact or to enhance natural features.

14.1 Buildings

The toilet building close to the main Tutere Street entrance is the only building in the reserve. To preserve the informal open space quality of the reserve, no additional buildings are envisaged. However, the existing building will need replacing or extending to provide for at least one additional toilet, a need noted in the 1997 Leisure Plan. Since it is unobtrusively located at the main focus of visitor arrival, parking and picnicking, the same site will be used for the replacement facility.

14.2 Footbridge and Jetties

The footbridge that spans the upper of the two lagoons is a feature of interest in the main bird feeding area and also provides a direct pedestrian link across the lagoon from the 'duck feeding' entrance on Tutere Street to the Marewa Place entrance. The bridge, which is of steel construction, is somewhat steep and narrow but is an appropriate scale for the site.

There are two T-shaped jetties at the south end of the lower lagoon, which are used by the Optimist Class sailing school and casual canoe groups for launching boats. In the upper lagoon two small landings extend out a short distance from the bank on the west side. The jetties are useful features because they allow visitors to gain easy, clean access to the water without damaging the banks, and they provide roosting places for birds. Some additional structures of this low-key scale and character should be considered in the future, designed with taller posts for better bird roosting and located to allow easy access to the water in areas where the banks are vulnerable to damage or where more water edge plants are to be encouraged. These could include low timber landings, parallel to the edge of the bank, to provide easy access to the water's edge where needed, while protecting the bank from damage. Early in the planning of any additional structures in the lagoons, the Flood Protection Division of the Wellington Regional Council should be consulted as structures can potentially trap debris and increase flood risk.

14.3 Site Furniture

Site furniture includes such items as seating, vehicle barriers, and rubbish bins. Although small in scale, these elements can produce visual clutter so careful thought must be given to both their design and placement. Rubbish bins, for instance, must be easily seen and placed where they will be used but are generally less obtrusive if placed against other features such as planting or structures.

Rubbish bins will be limited to the main picnic areas at the Tutere Street entrance and the duck-feeding entrance where littering is most likely to occur. These litter bins should be an unobtrusive colour but, under the Council's Dog Control Policy, orange bins have also been introduced for the disposal of dog faeces. These bins, though visually obtrusive, are to be sparingly located at strategic points around the reserve to encourage dog owners to clean up after their dogs.

The timber vehicle barriers are of an informal character appropriate to the reserve but could be integrated better if associated with blocks of planting where they currently pass across wide stretches of open ground.

A number of picnic tables are located around the reserve. In due course, as proposed planting matures, and depending upon demand, additional picnic facilities should be considered for placement where planting will provide shade and shelter. The provision of public barbecue areas should be considered at that time also. (The 1997 Leisure Plan noted the need for more picnic / barbecue facilities in the parks and reserves of the Waikanae / Waikanae Beach communities).

14.4 Maintenance of Buildings and Structures

Poorly maintained buildings and structures can detract from a reserve's image and attract anti-social behaviour such as vandalism. This applies not only to standard of repair but to the cleanliness of facilities such as toilets.

Policies

14. i Buildings within the reserve shall be limited to a toilet building at the site of the existing toilet building.

14. ii All buildings, structures and site furniture shall be designed to a high standard, which complements the character of the reserve, taking into account:
- siting to be a feature or to reduce visibility, depending on the functional requirements and visual effects of the built element;
- consistent design styles appropriate to the setting;
- appropriate and co-ordinated colour schemes.

14. iii All structures shall be regularly inspected and maintained to comply with Health and Safety standards.

14. iv The toilets shall be regularly cleaned to a high standard.

Action Policies

14. v The toilet building shall be upgraded to provide at least two toilets, designed for disabled access, as resources permit.

14.vi Special bins for disposal of dog faeces shall be located at the main Tutere Street entrance, the duck feeding entrance and at one Barrett Drive entrance.

14. vii Additional landings and jetties shall be developed, as indicated in the landscape development plan, subject to consultation with the Flood Protection Division of Wellington Regional Council, reserve users and adjacent land owners as to the specific site locations and design.

15. Signs and Interpretation

15.1 Signs

Signs are necessary in public recreation areas to;
- identify places and routes;
- inform about public use and safety;
- where appropriate, provide information of interest about the site or locality. (This is generally referred to as interpretation).

Well designed signs, used sparingly in well chosen locations, can be inviting and complement a reserve's image and intended use. Proliferation of different signs can, on the other hand, be obtrusive and off-putting. Signs in many Kapiti Coast District reserves have been erected on a rather ad hoc basis, with uncoordinated styles and physically scattered messages. To remedy this situation, a unified Parks and Recreation Department sign system is gradually being put in place through a replacement and development programme, implemented as resources permit.

At the Waimanu Lagoons Reserve, signage is limited to:

- a small sign, advising closing time, at the main Tutere Street entrance;
- four signs at the beach access carpark - three KCDC signs about dog access zones, water quality health warning, and pictograms of permitted or prohibited activities; and a DoC sign about the Kapiti Marine Reserve;
- a sign near the lagoons outlet, which identifies the lagoon as the "Waikanae Rotary Club Marina".

This signage is inadequate and poorly co-ordinated. For instance, the four signs at the beach carpark are large, obtrusive and uncoordinated in style. Moreover, it is unclear from its location and orientation, which (unnamed) waterway the health warning sign relates to. The Waikanae River Walkway, although a designated route in the District Plan, is not sign-posted on site, and way-finding signage is needed to promote the extended walking opportunities to the beach, river and Waimeha Lagoon (see Section 11).

Signage at the beach car park could be less obtrusive if presented as a co-ordinated information board. Directions about walking opportunities would also be useful.

Temporary warning signs may also be required from time to time to advise of potential safety concerns or controls, such as use of herbicides or pesticides or restrictions on public access for safety reasons (see Section 24).

15.2 Interpretation

Interpretation can add an extra dimension to our appreciation of the places we visit. We see familiar places in a new light when we find out how they used to be, how the place has come to be what it is today and what unusual or important things are associated with the place.

The Waimanu Lagoons are rich in both cultural and natural history, with several potential interpretation themes that could be developed:

- *Maori history* –the former Waimeha pa was sited on the dune immediately inland of the reserve and there is potential to develop interpretative stories about the tangata whenua and their historical associations with the area, and their traditional lifestyle associated with the former coastal environment.
- *Burial grounds* – appropriate recognition of both the European graves that were unearthed in the dredging of the lagoons and the nearby Maori burial ground .
- *The story of the lagoons* - from the former swamp environment to the diversion of the main Waimeha Stream, dredging of the Waimeha Swamp, the Waikanae Land Company's vision for a marina and subsequent development.

- *Management of the lagoons environment* – some information about current proposals and objectives with managing the lagoons environment, such as improving water quality and restoring whitebait spawning. This might also include natural history items such as illustrations to assist with bird recognition.

Policies

15. i Signs shall be upgraded or installed according to a co-ordinated Council Parks and Recreation Department sign system. Signs shall be designed, constructed and maintained to a high standard and shall be sited to be visible without being unnecessarily obtrusive.

15. ii Advertising signs or hoardings are not permitted.

Action Policies

15. iii A co-ordinated way-finding sign system shall be planned, designed and implemented, taking into account the need for:
- Waimanu Lagoons Reserve name signs at the main entrances, namely at the end of Tutere Street, the 'duck feeding' entrance on Tutere Street, and the Barrett Drive entrance adjacent to Marewa Place;
- Removal of the Rotary Club sign and possible replacement with more appropriate Council signage;
- Waimanu Lagoons Reserve direction signs at minor entrances that are difficult to recognise (such as Major Durie Place), or at nearby open spaces (such as Waimeha Lagoon and Stonewall Grove);
- Providing a map of the Waikanae River walkway and local walking opportunities in the Tutere Street entrance area); and
- The need for pictogram signs at entrances to the reserve, to reinforce dog and vehicle control policies.

15. iv The location, physical grouping and effectiveness of the existing signs at the beach car park shall be reviewed with a view to:
- Grouping and/or combining the signage so that they are less visually obtrusive;
- rewording and\or relocating the health warning sign to make more clear which waterway is involved;
- incorporating walkway / way-finding signage as per action policy 1 above.

15. v The development of on-site interpretation shall be investigated, with the objective of informing the public to :
- foster appreciation of the reserve's cultural and historic values;
- foster understanding and co-operation with the proposed management of the lagoons environment.

ECOLOGY

Ecology is about living things and their relationships with the physical environment (e.g. need for sunlight, shelter, clean water etc.) and with each other (e.g. role within the food chain.) This section of the management plan has been divided under several headings for easy reference but it must be stressed that the aquatic environment, riparian vegetation, wildlife and all other components of the environment are inter-related and actions affecting one component will also affect other components.

The lagoons are, of course, the central features of the reserve, which were dredged out to provide a recreation resource of high amenity value. They are now artificially formed water bodies - a modified environment within an urban context. Understanding and managing their ecology, and that of their riparian margins, is a critical factor to achieving the desired management objectives. It is not intended to return the lagoons to a totally natural state, that is, to remove the control gates and allow a return to an estuarine ecology formed by natural water systems, as the community wishes water levels to be maintained. However, the long-term objective is to restore a healthier ecosystem that will be more self-sustaining with fewer occurrences of the problems that have been happening. In either case, there will be a need for on-going observation and a commitment to actively monitor and manage the lagoon environment.

While the Waimanu Lagoons Reserve is classified as a recreation reserve, it must be recognised that the purpose of such reserves is to protect the natural environment as well as providing for public recreation. In this case, the reserve is an important link between two areas of recognised ecological value: - the Waimeha Lagoon and the Waikanae Estuary Scientific Reserve. Therefore, the potential for the Waimanu Lagoons to provide a suitable buffer and transition zone between the Scientific Reserve and housing development, and enhanced habitat for passage of wildlife has been recognised (see Appendix 3, District Plan Ecology Objectives).

More information on the ecology and historic management of the lagoons is contained in Part One and in the 1999 ecological survey report.[1] A brief summary of the report's key findings is also contained in Appendix 2. It is evident that there have been recurring problems with the lagoons' physical environment for a long time: principally concern about excessive aquatic plant growth, water quality, loss of whitebait spawning and, more recently, excessive midge populations. Although there is currently a stable food chain in the lagoons and reasonable water quality, there are also indicators that the ecology could be improved (e.g. smelly aquatic plants and high levels of bloodworm midge can indicate less than ideal aquatic conditions).

This section sets out the broad approach proposed for future management of the reserve's ecology, based largely upon the recommendations contained in the 1999 survey but also taking community views[2] and the preliminary effects of the tidal flushing that was reintroduced over the 1999/2000 summer, into account. It must be stressed that there is no one solution to the environmental problems at the lagoons: instead a combination of measures for both the aquatic and riparian environments is needed. The benefits of some measures, such as planting, must be viewed as long-term but other measures, such as tidal flushing or deepening parts of the lagoons, are likely to achieve more immediate results.

Monitoring and consistent record keeping will be very important to implementing the new management techniques so that the dynamics of any changes can be assessed and techniques modified if necessary. A monitoring programme was introduced over the 1999/2000 summer and autumn and this will need to be continued for several years at least for longer term trends to be recorded (see Section 30). Management policies and techniques should be reviewed and adjusted in response to monitoring results.

A landscape development plan has also been prepared and incorporated within the Management Plan to define where planting is proposed and to illustrate these concepts. This will assist with consistent planning and implementation of the recommended management techniques.

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[1] *Waimanu Lagoons Ecological Survey, 1999*

[2] These include issues raised and debated at several public meetings during 1999 and expressed in submissions received for input to the Draft Management Plan and submissions about the Draft Plan.

16. Aquatic Environment

It is evident that excessive aquatic plant growth has been a recurring problem in the lagoons for many years and various solutions have apparently been attempted although there is no clear record of when and what was carried out. More recently, two unusually hot dry summers appear to have brought on conditions favourable to the bloodworm midge, numbers of which rose to considerable nuisance proportions in the 1998/99 summer.

In both instances, it is not desirable for problem species to be eliminated altogether as they are a natural part of the aquatic environment. Instead the aim is to reduce their level of dominance. The following combination of management techniques is recommended.

16.1 Tidal flushing

Tidal flushing is a process of allowing water to flow freely in and out with the tide between an enclosed waterbody and an adjacent natural tidal system. Tidal flushing or periodic tidal flushing (i.e. for a limited duration) has been used in the management of a number of coastal waterbodies around the country. Depending on the particular circumstances, tidal flushing can improve water quality and aquatic ecology by: increasing water movement, replenishing oxygen, encouraging the re-establishment of marine micro-organisms, allowing better movement of native fish, and slowing fresh water aquatic plant growth by having water a little saltier than fresh.

There has been considerable debate about whether the lagoons should be managed as fresh or salt-water environments. Salt water was previously allowed to flush through the lagoons but this practice ceased or became much less frequent in the 1990's. In 1999, before flushing was reintroduced, the water was neither fresh nor truly brackish but the aquatic plants present were fresh water species. The flushing of the 1999/2000 summer will probably have altered the salinity again but this has yet to be measured.

16.1.1 Observations from the 1999/2000 Tidal Flushing

Residents living near the lagoons observed the following:[3]

- Water clarity improved.
- Submerged aquatic plants and midge problems were reduced.
- Submerged aquatic plants disappeared if they were exposed when the water level fell.
- Large quantities of submerged aquatic plant material was washed out during each flushing.
- Submerged aquatic plants in the deeper parts of the lagoon survived but were reduced to the lowest depth at which the water fell during flushing. Subsequent regrowth was rapid and dense.
- The current that carries out a lot of the submerged aquatic plant material would increase, the water drop further and more of the submerged aquatic plants would be exposed if the level of the outfall culvert was lower.
- The submerged aquatic plants re-establish rapidly in the shallow areas at the north end of the lower lagoon. This may be from floating plant material blown north during southerly winds and/or from plant material picked up on the keels of the sailing school yachts.

16.1.2 Frequency of Flushing

Taking into account the recommendations from the 1999 Ecology Survey and the generally favourable community views after the 1999/2000 summer flushing, the Council intends to proceed with a tidal flushing regime.

It must be noted, however, that the favourable results of the first summer's flushing should be treated with caution, as the weather was cooler than the previous unusually hot, dry summer. The extent to which the observed improvements can be attributed to the flushing or to the weather is not known, particularly as there is no base-line data available for comparison of 'before and after' results.

[3] Various public submissions on the Draft Waimanu Lagoons Management Plan

Flushing frequencies of anywhere from once a year to fully tidal have been considered.

- Annual flushing is not recommended, as allowing only one or a few tidal cycles at one time during the year may not prove to have a significant or long-lasting effect.
- On the other hand a monthly (as in the last summer) or more frequent tidal flushing may profoundly change the ecology of the lagoons to allow the growth of possibly more troublesome saltwater submerged aquatic plants.

A cautious approach is advocated. The initial aim of the periodic flushing regime is to retain the predominantly freshwater aquatic environment, but to give the lagoons a regular tidal "shock" to slow the growth of the freshwater submerged aquatic plant species. Five monthly flushes were carried out over the 1999/2000 summer and autumn but, pending another season's monitoring results, it is recommended that this be reduced a little in the 2000/2001 season. Subject to consultation with the proposed Focus Group (see Section 24) and the conditions discussed in 16.1.3. below, this should be three or four flushes during the inanga spawning season (September - April) as follows:

- once in early summer,
- once in mid-summer,
- once in early autumn.
- (Plus an extra flush during mid-summer, if the early summer temperatures are above average.)

Each flushing should be for 36 -48 hours (i.e. three – four tidal cycles) and be timed to coincide with spring tides, which is when the inanga lay their eggs and when the newly hatched young juveniles are then carried out to sea[4]. However, the level to which the water level rises at the height of the spring tide will need to be controlled to avoid flooding of the lagoon margins and adjacent low-level properties.

16.1.3 Conditions when Tidal Flushing should not Occur

There will be conditions under which a scheduled tidal flush should not take place. These are when:

- *The replacement water is dirty* – e.g. fresh or flood in the Waikanae River, contamination such as sewage, rough seas stirring up sediment on the in-coming tide;
- *The replacement water carries unwanted aquatic plant material* e.g. an algal bloom is occurring in the estuary;
- *There is insufficient replacement water* – e.g. combined low river flow and small tide action;
- *Strong southerly winds are blowing that would impede outwashing of loose plant material;*

Occasionally, it may also be necessary to open the control gates when there is a flood warning. Generally, the warning is issued before the water rises to flood levels in the lower reaches of the Waikanae River and Waimeha Stream. This allows the water level in the lagoons to be at least partially drained in anticipation of rising river levels and increased stormwater. If this occurs during the recommended months of tidal flushing, the programmed tidal flushes should occur as scheduled since floodwaters will bring a lot of sediment and debris that should be flushed away with normal flushing.

16.1.4 Monitoring

Consistent regular monitoring of the lagoons' aquatic environment will be essential to the tidal flushing regime. It should be realised that although the recommended periodic tidal flushing regime should retain the lagoons as a predominantly freshwater environment initially, it does represent a significant change from present management, and its effects cannot be completely predicted. The tidal flushing must be regarded as experimental and this reinforces the need for regular monitoring of the present environment and subsequent changes. An 'adaptive management' approach to the aquatic regime as well as other aspects of the management plan will be needed. The frequency of tidal flushing, for instance, may be need to be changed in response to monitoring results or other factors such as the location of the river mouth (see 'Other Factors for Consideration' below).

A separate Monitoring Record File will be set up and maintained as a parallel management document to this Management Plan. Further information about the monitoring programme is contained in Section 30.

16.1.5 Programming and Management of the Flushing Regime

[4] *Waikanae River Floodplain Management Plan Environmental Investigations*, p. 45

It will be important for monitoring the aquatic environment and assessing the effects of any management changes that the tidal flushing occurs as scheduled. If ad hoc changes are made to the frequency or timing of flushing, it will be much more difficult to identify trends and make valid comparisons with the monitoring results from previous years.

The tidal flushing programme should be planned over the winter once the monitoring results from the previous summer have been analysed. The coming programme should be planned in consultation with the proposed Waimanu Lagoons Focus Group (see Section 24) and the programme publicised to both the local residents and the wider community so that regular users have fair warning of the times when the lagoons will be subject to draining. Any changes to the programme (except for unavoidable last minute changes due to unfavourable conditions) should also be publicised.

16.1.6 Factors for Further Consideration

The following items have been raised in relation to the question of tidal flushing and these should be noted for further consideration or investigation as the experimental flushing progresses.

The position of the river mouth

The locality of the Waikanae River mouth is constantly moving, due to the sand bar that gradually builds across the mouth from the long shore currents that carry material south along the coast. The river mouth gradually moves southward as the sand bar builds up and, if left to itself, this southward trend continues until the river cuts directly through the sand bank in a major flood, bringing the mouth back to the north again. The Flood Protection Division of the Wellington Regional Council (WRC) monitors this cycle and, if the mouth reaches a certain critical point to the south, then WRC will artificially cut through the sand bar and redirect the river back to the northern extremity (near the Waimanu Lagoon). Cutting is required about every five years unless a major flood event intervenes. The last cut was in 1995 but the river cut through the sand bar in the October 1998 flood. This brought the river mouth about half way back to the north, postponing the need for the next cut.

View south across the estuary from the reserve with the sand bar at right of photograph. At this time, in 1999, the river mouth had migrated some distance to the south.

This cycle is an influence that needs to be considered and monitored with regard to tidal flushing of the Waimanu Lagoons because:

- When the river mouth is close to the lagoons, the influence of the incoming tide will be much more immediate and the salt content of water used for flushing may be relatively high, especially if the river level is low.
- When the river mouth is well to the south, the salt content in the water used for flushing is likely to be less, especially if the river has a good flow against the incoming tide.
- When the river mouth is in the middle part of its southward migration the Waikanae River estuary tends to become drier and stagnant because it is not receiving enough river or tidal flow. [5] This may affect the quality of the water available for flushing the Waimanu Lagoons and the possibility of 'infecting' the lagoons with submerged aquatic plant blooms that might be occurring in the estuary.

[5] *Waikanae River Environmental Strategy 1999,* p. 80

The salinity of the water in the lagoons
This is a factor that needs to be monitored in terms of long term trends (the average levels mid-way between tidal flushes, and during winter when flushing is not recommended). The level of salinity over the longer term is likely to affect the type of aquatic plants in the lagoons.

The size and level of the culverts
It has been suggested that the level of the control gate (outlet) culvert could be lowered and the culvert perhaps increased in size so that the lagoon can be drained more completely during flushing with a stronger current to carry more loose material out.

Similarly, an increased size in the culverts under Barrett Drive may improve water circulation between the two lagoons.

To avoid changing too many factors at the same time, which makes it difficult to assess the effect of each, tidal flushing using the existing gate and culvert specifications should continue for at least two more years. Then, appropriate engineering advice should be sought if is still thought that altering the culverts may be needed.

Upgrading the Control Gate

The control gate has periodically been tampered with in the past and its operation requires KCDC staff to make a special trip, often outside normal work hours to coincide with tides. If, after two – three years, tidal flushing has been successful in improving the condition of the lagoons' aquatic environment, upgrading of the control gate should be considered. Improvements to be considered include: discreet location (perhaps underground) to reduce the risk of vandalism or tampering; capacity to evacuate stormwater rapidly, perhaps pump assisted; automatic operation that can be pre-programmed or remote controlled; fish ladder.

16.1.7 Conclusion to Section 16.1 (Tidal Flushing)
Tidal flushing is to continue, as suggested in the above discussion, with careful monitoring, and a full review in 2002 when data from several years will be available.

16.2 Deepening selected shallow edge areas
Submerged aquatic plants thrive in the extensive shallows around the edges of the lagoons, where ample light and warmer water stimulates growth. Deepening selected shallow areas may be a means of reducing the amount of growth. However, this should be done with caution, on the basis of recorded field inspections during the spring to autumn months to determine where infestations are most manifest.

16.3 Modifying the substrate
The submerged aquatic plants also thrive in the soft material that occurs on the lagoon bottom (substrate), particularly where it occurs in the shallows. It is less prolific where the substrate is of coarser material such as rocks, pebbles and sand. Therefore, the addition of these coarser substrate materials is recommended as a further means of controlling excessive growth. This may also reduce the proportion of soft silty substrate that is favourable for the bloodworm midge and therefore reduce the amount of midge larvae.

Initially, this should be confined to the areas where clear access for water recreation (launching of model boats, canoes etc.) is needed. Coarser bottom materials would also strengthen the substrate for any physical access into the water.

16.4 Revegetating lagoon edges

This involves revegetating areas of the lagoon edges with the lower-growing native species that naturally occur around lake edges in the area, including both the bank edges immediately above water and the submerged edges up to about a metre out from the bank. These species include sedges, rushes, flax and carex grasses. Revegetating edges would aim to:

- diversify the vegetation growing in the lagoons, thereby introducing competition for the existing submerged aquatic plants and reducing their dominance;
- reduce the visibility of the existing submerged aquatic plants which will continue to grow around the lagoon edges;
- provide habitat for fish, invertebrate and bird life by providing shelter, food and breeding places. In particular, the inanga[6] lay their eggs on sedges, rushes and grasses that are growing close enough to or in the water to be inundated during the spring tides in which the inanga spawn;
- reduce the potential to stir up sediments (adversely affecting water clarity) by baffling wave movement in the shallow margins;
- screen houses from midge view by providing an immediate skyline silhouette;
- filter water and absorb nutrient contaminants from overland flows from the grass and garden lagoon surrounds.

More detail about the proposed planting is outlined in the section on landscape development.

Some edge vegetation does already occur in places around the lagoons. This could be diversified and extended to other selected parts of the lagoon edges.

16.5 Clearing of submerged aquatic plants

It has been found that large quantities of the submerged aquatic plants are carried out of the lagoons when the control gate is opened for flushing. If this is inadequate to keep the submerged aquatic plant growth from nuisance levels, then additional clearing methods may be needed. However, this is not recommended until after the proposed 2002 review of the lagoons' aquatic management except as a last

[6] *Waikanae River Floodplain Management Plan Environmental Investigations*, p. 46

resort response. This is because it is difficult to assess the effects of methods if several are introduced or changed at the same time.

Loose submerged aquatic plant material and scum collects along Barrett Drive, driven by wind.. More overhanging edge plants and shallow water plants would help conceal this.

Chemical control is not recommended because of its potential to harm other species, and biological control through the introduction of carp is also not recommended because of the potential to disturb the lagoons' ecology (see Appendix 2). Manual clearing is therefore proposed but, as it is labour intensive, would be recommended only when there are indications of excessive growth developing or when tidal flushing has left large quantities of dying plant material. These indications are most likely to present in the spring or early summer when the weather warms up and growth can be observed. This is also the time of inanga spawning (September –April) so any manual clearance must be kept well clear of the edge vegetation where the inanga lay their eggs. The cleared plant material must be removed to avoid odour and insect problems, preferably to an organic matter recycling operation.

16.6 Stormwater

Stormwater can be a source of contaminants that adversely affect water quality and ecosystem health such as:

- bacteria from sewage overflows if stormwater and sewage disposal systems combine (as can happen during high rainfall periods in particular);
- chemicals and heavy metals from road run-off and high levels of nutrients in run-off from gardens where fertiliser has been applied.

Potential sewage contamination is monitored by regular Council water testing (see Appendix 1) and if levels unacceptable for secondary contact recreation are detected, the Council's Operational Services Department would be alerted to investigate sources and solutions. In addition, education of residents to foster awareness of the potential effects of stormwater contamination and encourage wise disposal of wastes is also proposed (see Section 19). The proposed increase in riparian vegetation should, with time, provide some filtering of potential contaminants from overland flow. However, it should be noted that the free draining nature of most of the soils in the catchment would, to some extent, mitigate the potential severity of these problems.

Policies

16. i When tidal flushing has left significant areas of dying plant material or there is excessive submerged aquatic plant growth, despite the tidal flushing programme, manual clearance shall be considered, in consultation with the volunteer monitoring group and proposed Waimanu Lagoons Focus Group. The manual clearance shall only be carried out as a last resort and shall be confined to:
    - submerged aquatic plants occurring 1 meter or more from the bank where the lagoon edge is to be revegetated; or
    - close to the bank where the lagoon is to be kept directly accessible from the bank.

16. ii Submerged aquatic plants shall not be controlled by the use of herbicides without first consulting and exploring alternatives with the local community and tangata whenua about alternative methods and the necessity for herbicide use.

16. iii Grass carp shall not be introduced to control submerged aquatic plants in the lagoons without prior public notification and a thorough assessment of effects through the resource consent application process.

16. iv The Kapiti Coast District Council shall be responsible for raising and lowering of the control gate for tidal flushing.

Action Policies

16. v A regular tidal flushing regime shall be implemented by opening the control gate at appropriate times as described in the tidal flushing section above or as otherwise determined in response to monitoring results.

16.vi An annual flushing programme shall be prepared no later than October every year, in consultation with the proposed Waimanu Lagoons Focus Group, taking into account, but not limited to:

- the dates of spring tides;
- the monitoring results from the previous summer.

The programme shall be notified to all property owners whose properties adjoin the reserve and published in the Kapiti Coast community newspaper.

16. vii The effects of tidal flushing shall be observed through the monitoring programme (see Section 30) and the frequency adjusted if necessary to achieve the benefits of submerged aquatic plant control, midge control, water clarity and fish diversification.

16. viii Shallow areas shall be identified from field checking at low tide flushing. The addition of coarse substrate material, and possible future deepening shall be considered, taking into account monitoring results and available funding. Any actions taken shall be recorded in the Monitoring Record File, including timing and showing the location on aerial photo.

16. ix The control gate shall be modified as necessary to improve the efficiency and security of its operation, provided that tidal flushing has been found to be an effective management technique after 3 years' trial.

16. x The importance of shallow aquatic vegetated areas in the lagoon ecology shall be recognised and protected by allowing the development of naturally occurring shallow water vegetation and/or introducing a programme of revegetation in the shallow lagoon edge areas identified in the landscape development plan (see Sections 17 & 21 also).

17. Riparian Vegetation Management

Since the lagoons were first constructed, most of the riparian margins and much of the berm area further back have been kept mainly clear of vegetation. In many places grass is currently mown right to the water's edge with any overhanging growth on the bank, such as grass and annual weeds, trimmed back. Taller plants are generally kept back from the water's edge or confined to isolated clumps.

More vegetation is proposed, as set out in the landscape development plan, for the following reasons:

- more upright vegetation close to the water will benefit the ecology of both the lagoons and stream channel by shading the shallow margins (reducing the light and warmth ideal for the submerged aquatic plants) and diversifying the riparian habitat for bird and invertebrate life;
- it is thought that the lack of upright riparian vegetation at Waimanu may well contribute to the swarming problems experienced in neighbouring houses[7];
- vegetation around waterbodies contributes to maintaining water quality by absorbing and filtering run-off: - at Waimanu Lagoons, from the grassed areas in the reserve, and from the gardens and paved areas in adjacent properties, which have been developed rapidly in recent years;
- mowing requirements can be reduced by vegetating areas that are difficult to mow such as sloping or uneven ground (see Section22, Maintenance) or damp / collapsing water edges.

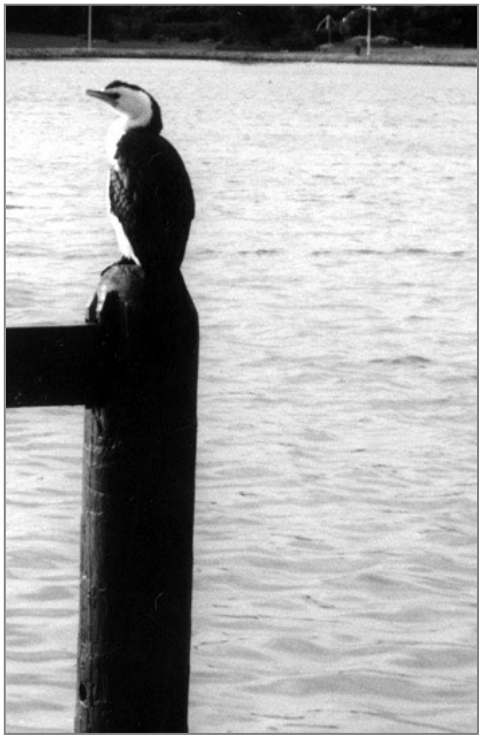
A list of recommended species for planting is contained in Appendix 4. This comprises a simple palette of plants, based principally on species that are native to the Kapiti dunelands. These species are not only adapted to the local conditions and are, therefore, more likely to thrive but also reflect the unique character of the Kapiti Coast.

Action Policies

17.i A framework of vegetation designed to improve riparian habitat, enhance amenity values and reduce mowing requirements is to be established, as set out in the landscape development plan, and developed in consultation with the proposed Waimanu Lagoons Focus Group.

18. Wildlife

Birdlife is a feature enjoyed by many visitors to the Waimanu Lagoons. Ducks and swans are long-term inhabitants that some visitors enjoy feeding, but other birds such as heron, shags and stilts are probably shorter-term visitors from the nearby estuary and Waimeha Lagoon. The reserve is strategically located between these two wildlife areas and there is potential to enhance its role as a bird corridor by providing more vegetation cover and roosting places.



[7] *Waimanu Lagoons Ecology Survey, 1999*

In 1999, a group of feral geese at the reserve were causing concern. Geese are noisy and can become aggressive when their numbers build up.[8] Moreover, grassed areas become fouled from their droppings and their browsing on new shoots can inhibit grass growth. Sometimes these birds will simply stay for a period and then move on but any increase in numbers for long periods presents a nuisance problem that is incompatible with the recreation use of the reserve.

It should be noted that there are two particular birds (a black swan and a white goose) that are long-term inhabitants at the reserve. "Thomas" and "Henrietta," as they are known, have attracted popular recognition and veterinary treatment from regular visitors and any culling of the feral geese should not include these birds.

Pest animals such as rats, feral cats, and mustelids can adversely affect bird life at the reserve through preying on eggs and young birds. Rabbits and hares can damage vegetation and grass surfaces. Therefore, obvious increases in pest animal numbers and/or signs of their adverse effects should trigger control measures[9]. As these pests can also have adverse effects on the adjacent Waikanae Estuary Scientific Reserve, the Council should contact the Department of Conservation, Kapiti Conservancy, to co-ordinate pest control measures.

Policies

18. i The role of the Waimanu Lagoons Reserve as a wildlife corridor between the Waimeha Lagoon Wildlife Sanctuary and the Waikanae Estuary Scientific Reserve shall be protected and enhanced by providing more vegetation cover and appropriate bird roosts within the reserve. (These items are covered under other policies in the management plan).

Action Policies

18. ii If feral geese numbers increase to more than one, steps shall be taken by the Council or its authorised agent to either catch or relocate them to a suitable alternative site or to eliminate them. This shall be carried out, as necessary, by 1 August and 1 December every year (before and after the breeding season.)

18. iii If there is evidence that the pest animals such as rats, feral cats, mustelids, mice, rabbits and hares are causing damage to birdlife and/or vegetation in the reserve, measures to control them shall be taken, in consultation with the Department of Conservation and Wellington Regional Council, consistent with the WRC *Pest Animal Management Strategy*.

19. Education

The Waimanu Lagoons receive most of the stormwater and run-off from the housing area south of Te Moana Road at Waikanae Beach (see Section 16.6). Consequently, the lagoons are affected by what happens in this catchment. Water quality, in particular, may be adversely affected by chemicals and waste products that are disposed of through the stormwater system, or by run-off from gardens and paved surfaces. As urban development increases in the catchment, stormwater run-off will also increase as more land is covered by hard surfaces.

The opportunity for increasing riparian vegetation as a filter for run-off is constrained by the narrow margins round much of the Waimanu Lagoons and, in any event, much of the stormwater is discharged directly into the lagoons without any filtering process. Therefore, education may be the most effective way to manage the quality of the water being discharged into the stormwater system. This means promoting awareness that every property is part of the local catchment and that stormwater, although piped underground, feeds directly into the local waterways: - in this case, the inter-connecting Waimeha stream, the Waimeha lagoon and the Waimanu Lagoons.

[8] Fish and Game Council advice.
[9] Note: the Wellington Regional Council provides an advisory and information service on animal pest control. See the WRC website: - http://www.wrc.govt.nz/lm, which includes guidance on control techniques in the *Pest Animal Management Strategy* for the Wellington Region.

Communicating this simple message about the potential effects of waste disposal into the stormwater system, along with good practice guidelines, should be explored as another way (in addition to the aquatic and vegetation management measures proposed) to improve and manage water quality at the Waimanu Lagoons. Such a message could be communicated via a pamphlet that is sent out periodically with the rates demand notice to all the households in the catchment.

Any education initiatives should be planned in conjunction with the Wellington Regional Council and tangata whenua. The Regional Council administers the Wellington Region Freshwater Plan and the Waikanae River Floodplain Management Plan, and has a partnership agreement with tangata whenua, in accordance with Treaty obligations, regarding long term river maintenance resource consents[10]. (Note: a similar local education exercise is being introduced at Otaihanga through partnership between the Kapiti Coast District Council, Wellington Regional Council and tangata whenua). Regard shall also be given to the ratified *Policy Statement on the Disposal and Treatment of Effluent* prepared by Kapakapanui.

The Wellington Regional Council is also developing an Environmental Education Programme, which includes assisting interested communities or community groups to become actively involved in aspects of managing their local environments. This is a new initiative that is still being set up but the Waimanu Lagoons Reserve could well be a suitable pilot project.

Action Policies

19. i Options for educating householders in the Waimanu Lagoons catchment shall be explored, in consultation with the Kapiti Coast District Council's Drainage Department, the Wellington Regional Council and tangata whenua.

19. ii The Council and the proposed Waimanu Lagoons Focus Group shall, together, investigate the possibility of the Waimanu Lagoons Reserve becoming a pilot community care project under the Wellington Regional Council's Environmental Education Programme.

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[10] Partnership protocols on the long term maintenance resource consents for the Waikanae River.

LANDSCAPE

20. Landscape Character

The Waimanu Lagoons Reserve consists of four main character areas:

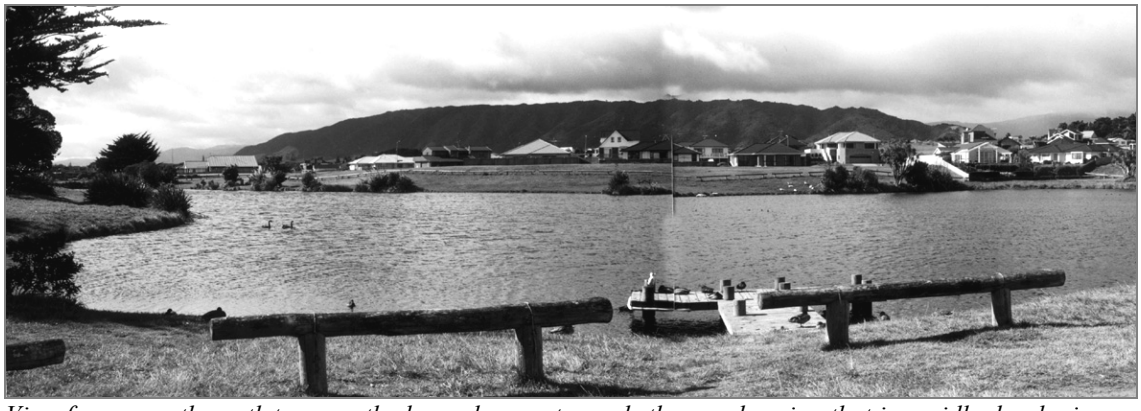
1. *The stream area*

This is a secluded triangle at the northern end, bisected by the stream that flows from the Waimeha Lagoon and feeds the Waimanu lagoons. The area appears to be little used except for the circular walking route beside the stream, is less overlooked by the neighbouring properties and has a less managed appearance. The ground is quite low-lying and tends to be boggy along the stream margins. This, together with the uneven ground, including a mound of fill in the middle of the triangle, makes mowing difficult.

This area is contiguous with an area of open land to the northeast of Barrett Drive and the upper lagoon. At present this area is of a similar landscape character to the stream area but is outside the reserve and zoned for residential subdivision.

2. *The lagoons*

This area includes the lagoons and the comparatively narrow strip of land around them between the water's edge and the adjacent housing. A park setting of mown grass and scattered trees and shrubs is prevalent with a much more managed appearance than in the stream area. Here, many of the adjacent houses overlook the lagoons, with low fencing to demarcate the reserve boundary so that there is a close visual relationship between the reserve and the private gardens.

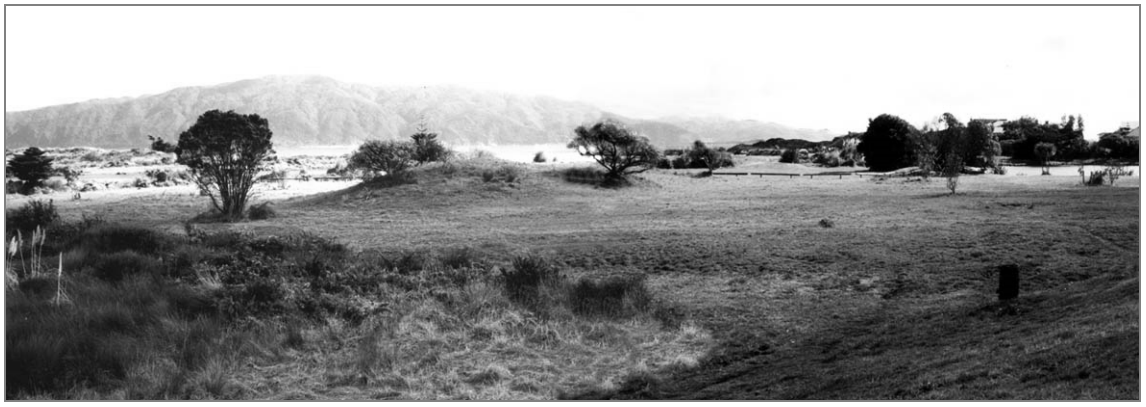


View from near the outlet across the lower lagoon towards the new housing that is rapidly developing on the east side of the reserve.

On the east (inland) side, new housing is developing rapidly. These new houses tend to cover more of their sites so the garden spaces are often smaller and, as yet, have less established planting. The higher elevation, larger size and smaller garden space means that these houses may prove to be a more visible element from within the reserve even after private gardens establish. On the lower lying west side, the houses are tend to be smaller with quite a lot of garden space around them.

Grass berms, low post and rail fences and a close visual relationship with adjacent private properties, is typical of the lagoons character..

3. *The estuarine edge* – At the south end the reserve opens out from the encircling housing and the influence of the estuary and nearby beach becomes a feature. Salt marsh vegetation on the river edge and wide views over the estuary and river mouth to Kapiti Island, give this area a more natural character than the lagoon or stream areas. Although there are large areas of mown grass the uneven ground and more exposed conditions are such that this area has a less managed appearance.



4. *The foredune* -

Seaward of the control gate outlet, is the main car parking area of the reserve with pedestrian access beyond that to the beach. The car park area is managed in mown grass with some scattered trees, similar to the other areas of the reserve but the foredune is vegetated in marram grass with scattered lupin and taupata. It has a less managed appearance than the lagoons margins, with a strong estuarine / beach influence.

The estuarine edge and foredune character areas (3 & 4) lie within the Waikanae Estuary / Coastline Outstanding Landscape area defined in the District Plan (see Figure 3). This landscape was identified for its combination of high habitat, scenic and recreation values, although it was noted that this is being

severely compromised by urban development and needs improvement by the creation of a suitable setting and buffer area[1]. Landscape enhancement within the reserve needs to take account of this.

Overall, there are two consistent landscape elements that provide consistent linking themes through the reserve:

- the water bodies (stream, lagoon, estuary), and
- the vegetation (typically local native species such as ngaio, cabbage trees, taupata and flax).

Submissions were invited before the Draft Management Plan was prepared and a number of these called for enhancement planting to improve the appearance of the reserve and/or to improve habitats and ecology. Taking these views into account, and the suggestions for environmental improvement in the 1999 Ecological Survey, a substantial amount of new planting was proposed in the Draft Plan. These proposals attracted a lot of comment and, while a majority supported the general concept of more planting, there was significant opposition specifically to proposed "structural screen planting". It was felt that this taller planting would obstruct views, shade adjacent properties and compromise security. Much of this opposition came from neighbouring property owners who felt that their private amenity and property values would be compromised by the tall planting.

It must be recognised that the Waimanu Lagoons Reserve is public land to be managed for *public* recreation and benefit. Nevertheless, it is also apparent that regular recreational users value the openness of the grassy berms around the lagoons and that the adjacent gardens are a feature of interest. The role of neighbouring property owners in assisting with surveillance and maintenance of the reserve must also be acknowledged. Therefore, the extent of proposed new planting has been reduced from that of the Draft Plan, placing the initial emphasis on establishing water margin vegetation and converting difficult mowing areas to other vegetation cover.

The areas proposed for new planting and/or changes in vegetation management are indicated in the landscape development plan (Figures 5a – 5c), the detailed implementation of which, will need to be planned in consultation with the proposed Waimanu Lagoons Focus Group and adjacent property owners (See Section 24 also).

Policies

20. i The landscape character of the reserve shall be managed and developed to enhance the natural qualities and appearance of the stream and lagoons while providing an appropriate and attractive setting for passive recreation.

20. ii Transitional buffer planting shall be introduced in the estuarine edge character area to enhance the values relating to the Outstanding Landscape and Ecological Site zonings which apply in this part of the reserve.

21. Landscape Development Plan

The conceptual landscape development plan has been prepared to provide a basis for consistent implementation as resources permit. The proposals aim to enhance the recreational amenity values and ecological values of the reserve, having regard to the previous relevant policy sections on these values. In general, the proposals provide for:

- areas to be specifically managed for informal recreational use, with regularly mown grass, picnic facilities and pedestrian access to the water's edge;
- increased riparian vegetation to improve water quality and appearance, and to diversify habitats;
- revegetation of areas that are unsuitable for mowing and, in particular, are suitable locations for buffer planting between open space areas and adjacent housing development.

21.1 Planting Proposals

The vegetation proposals are summarised for each of the character areas described in the previous section.

[1] Works Consultancy Services (1994) *Kapiti Coast District Council Landscape Assessment*

There are two types of proposed planting around the lagoons.

1. Shallow water / edge planting
Plants that grow in the water and/or around its edges (such as reeds, rushes and sedges) are recommended to diversify aquatic habitats, increase whitebait breeding places and reduce the visual dominance of submerged aquatic plants.

These shallow water / water margin plants can provide attractive edges beside mown grass and, once established, can conceal currently muddy edges or slumping banks which are difficult to mow. Several of these types of plants already occur in isolated places around the lagoons. Grouped together, these plants have potential to be visually appealing features around the lagoons edges, while also providing other water quality and habitat benefits. The low sedge/rush/reed type of plants are low enough not to obstruct views across the lagoons and can provide a contrast with the mown edges (see photo on page 44) that will still be maintained around areas of the lagoons for direct access to the water.

Shallow muddy edges at Waimanu are difficult to mow and could be converted to water margin plants, such as those pictured, but growing in groups rather than isolated specimens.

Sea rushes (Juncus maritimus) provide a neat edge between mown grass and tidal lagoon at Papakowhai, forming an attractive golden border when viewed at both close range and across the water.

Carex secta, the pale 'tussock' growing at the bank edge in centre photo, is an ideal plant for providing safer bird habitat, as it will grow out from the water's edge, forming little 'islands'. Isolated plants already occur in both lagoons, demonstrating its ability to establish if encouraged.

The species recommended in Appendix 4 are tolerant of changing water levels and a range of salinity conditions. Species such as *Juncus maritimus* (pictured previous page) may be particularly suited to the proposed tidal flushing regime.

The margins recommended for aquatic planting have been identified because they were found to be particularly shallow in the ecological survey and/or because they are visually unappealing at the moment, having low muddy edges prone to duck and mower damage.

2. Riparian edge planting

These areas are proposed to introduce more vegetation cover as bird to incorporate existing isolated specimens, such as flax that are difficult and time consuming to mow around, into larger areas of planting with simpler mowing edges.

The species recommended in Appendix 4 include plants with a range of heights from shrub height to medium size trees. These can be selected to suit particular locations. Some submitters commented adversely about the flax and cabbage trees that are included in the list because they perceived these plants to be untidy and noted that the strappy leaves get tangled in the mower. However, if placed in the middle of planting areas with smaller leafed plants around the edges, these problems can be largely alleviated. Both species are native to the local area and provide useful bird habitat[1].

[1] The *Waikanae River Environmental Strategy, 1999* recommends that more groups of flax and cabbage trees should be planted around the margins of Waimanu Lagoon to provide more bird habitat. (p. 80-81)

KEY

- Revegetation, Estuary buffer or North corner
- Riparian edge planting
- Shallow water margin planting
- Walking routes
- Pedestrian jetties or landings
- Vehicle barrier

Note: see Appendix 4 for Recommended Plant Lists.

Revision

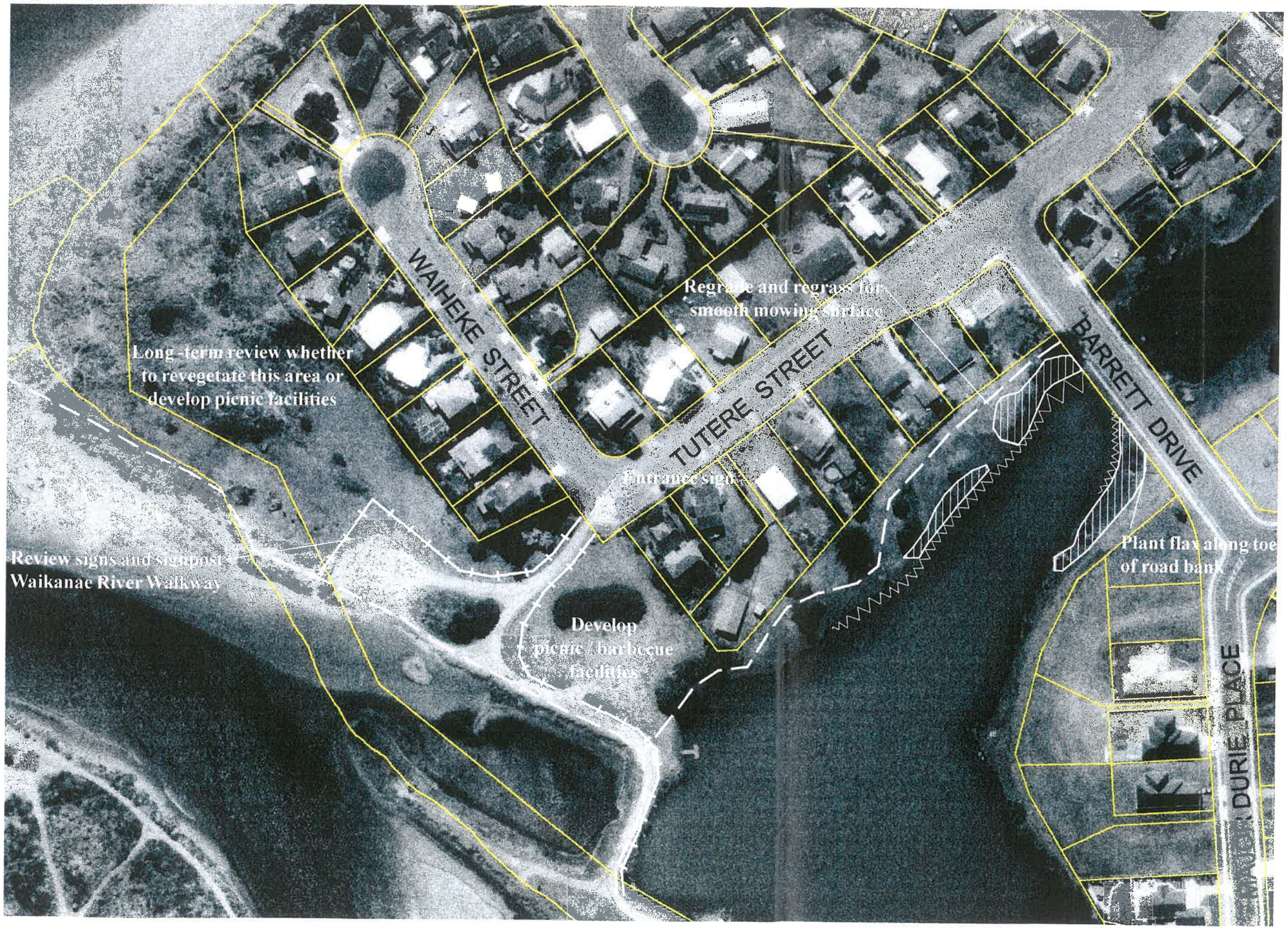
Waimanu Lagoons Management Plan

Figure 5a
Landscape Development Plan
Upper Lagoon

Scale: 1:1500 (Approx A3)
Date: June 2000

BOFFA MISKELL
planning design ecology

KAPITI COAST DISTRICT COUNCIL
there's a future here



KEY

- Revegetation, Estuary buffer or North corner
- Riparian edge planting
- Shallow water margin planting
- Walking routes
- Pedestrian jetties or landings
- Vehicle barrier

Note: see Appendix 4 for Recommended Plant Lists.

Revision

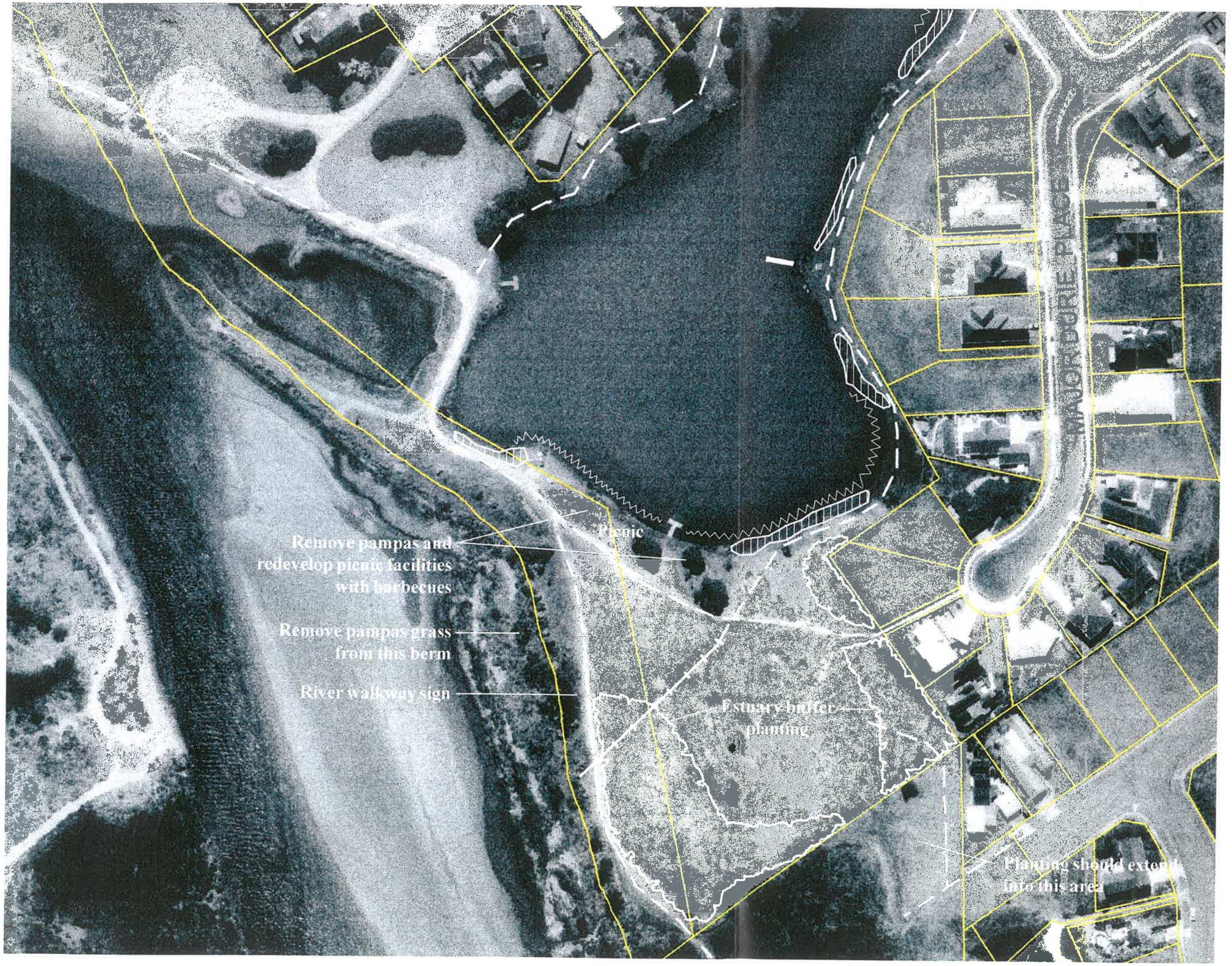
Waimanu Lagoons Management Plan

Figure 5b
Landscape Development Plan
Lower Lagoon / Estuarine Edge

Scale: 1:1500 (Approx A3)
Date: June 2000

BOFFA MISKELL
planning design ecology

there's a future here
KAPITI COAST
DISTRICT COUNCIL



KEY

- Revegetation, Estuary buffer or North corner
- Riparian edge planting
- Shallow water margin planting
- Walking routes
- Pedestrian jetties or landings
- Vehicle barrier

Note: see Appendix 4 for Recommended Plant Lists.

Revision

Waimanu Lagoons Management Plan

Figure 5c
Landscape Development Plan
Lower Lagoon / Estuarine Edge

Scale: 1:1500 (Approx A3)
Date: June 2000

BOFFA MISKELL
planning design ecology

KAPITI COAST DISTRICT COUNCIL
there's a future here

Plants with more compact form and smaller leaves can be planted around edges for easier maintenance, with the strappy-leaved flax and cabbage trees in the centre of plant groups.

21.1.3 The estuarine edge **(see Figure 5(c))**

It is proposed that the mound near the river berm and the slopes below the adjacent housing be planted , to introduce a vegetation buffer on the edge of the estuary for both visual and habitat reasons, and to reduce the amount of mowing. This is consistent with the recommendations in the *Waikanae River Environmental Strategy, 1999*[2]*,* which include*:*

- "increasing planting on the berm near Waimanu Lagoon to diversify habitats and provide buffer screening between the river and new housing.
- Revegetate the river face of the dune inland of Waimanu Lagoon with local native species typical of the dune environment.
- Plant a buffer of local coastal species such as ngaio, cabbage tree and taupata near the riverside boundaries of new houses currently being developed beside Waimanu Lagoon."

As noted earlier this part of the reserve lies within the Waikanae Estuary Ecological Site and Outstanding Landscape. Species indigenous to this area are recommended to strengthen the natural character and because these species are adapted to local conditions. It is also envisaged that improved shelter and enclosure will enhance the open ground between the proposed planting areas for potential picnic / recreation use.

The species recommended in Appendix 4 include a range of heights. This means that lower-growing species can be located at the top of the slope near the houses to alleviate concerns about shading, outlook and security.

21.1.4 The foredune (see Figure 5 (c)

No immediate change to the vegetation in this area is proposed, as the existing vegetation is providing adequate sand-binding and is of an appropriate informal character. However, at the next review of this management plan, the mown hollow between the current car park and adjacent housing should be reviewed as to whether picnic facilities should be developed or the area revegetated with suitable dune vegetation.

[2] *Waikanae River Environmental Strategy, 1999, p. 80-81*

21.2 Planting approach

Recommended plant species for the different types of proposed planting are listed in Appendix 4. These are native species that occur naturally in the local dune environment because these species are adapted to the local conditions (provided they are chosen to match site conditions such as wetland or dry dune) and are an important part of the Kapiti Coast's special natural character. See Appendix 4 also for useful reference sources on local native plants. It should be noted that a reasonably limited palette of plants is recommended. This is partly to ensure that there is a consistent visual planting theme throughout the reserve but, more importantly, it is because the recommended plants already occur and do well at the reserve or are known to be suited to the revegetation planting approach.

Recognised revegetation techniques are recommended for nearly all the planting. That is, close planting (maximum of 1 metre spacing) of small (root trainer or similar size) plants. Small plants adapt quickly to site conditions and tend to grow quickly. The plants are close planted so that they provide shelter for each other and so that the plant canopies close over the ground within 3 – 4 years, blocking light and thereby reducing weed growth. Mulching is also recommended at the Waimanu Lagoons site because it will help to reduce drying out of the free-draining soil and inhibit weed competition initially.

The success of any planting, however, depends upon thorough site preparation and a commitment to maintain the planting until it becomes well established. This is particularly so at Waimanu Lagoons, where gorse and other invasive plants are present. Herbicides, for instance, may well have to be used for site preparation to reduce initial weed competition after planting.

The *Revegetation Manual Using New Zealand Native Plants*[3]and *Native Forest Restoration, A Practical Guide to Landowners*[4]*,* are recommended as references with very practical and well illustrated guidelines for this type of planting and for pest plant control.

Points to Remember about Planting / Revegetation Projects

- Do *not* start any planting / revegetation project unless there are adequate resources available to implement it properly, including thorough site preparation and specific follow-up maintenance for several years.
- If resources are limited, it is more efficient to use them on just a few areas and do those areas well than to embark on an overly ambitious scope of work which is then inadequately maintained.
- Consider site factors carefully at the planning stage. At Waimanu Lagoons, for instance, most of the soil has been reworked as a result of the original dredging operations and probably has poor soil structure and low fertility. While the recommended planting species are reasonably robust, consideration should be given to adding slow-release fertiliser when planting to help plants establish.
- Another factor to consider is that water margin plants may be vulnerable to damage from water birds, especially ducks, when the plants are still small, so that some form of protective cover may be necessary to begin with.
- There will be an element of experimentation with the water margin planting, in particular, due to the trial tidal flushing. However, as stated earlier, the recommended species are tolerant of a range of conditions so some trial planting is worthwhile.

21.3 Other features

Other features that have also been identified in the development plan for implementation include:

- minor re-grading of uneven ground;
- basic signage needs (note that interpretation and way-finding signage should be planned and implemented as a separate project);
- additional small jetties or landings;
- additional picnic facilities.

[3] Evans, Boyden (1983) *Revegetation Manual using New Zealand Native Plants*, for Queen Elizabeth II National Trust

[4] Porteous, Tim (1993) *Native Forest Restoration, A Practical Guide to Landowners,* Queen Elizabeth II National Trust

In terms of priority, only those items that are management problems (such as need for ground re-grading) would be regarded as high priority. The other items could be planned for longer-term implementation once other proposals of more immediate priority (such as monitoring and planting) have been implemented.

Several areas have been identified for more detailed review and possible redesign / development – again as longer term projects. These are:

- the mown hollow beside the main carpark – as mentioned earlier in this section (under 'Foredune');
- the duck-feeding entrance off Tutere Street, where alternative provision for parking could be considered;
- the sunken 'keyhole' area on the lower lagoon edge, which could be redeveloped and incorporated into a specifically designed picnic area or boat launching point with a landing on the water's edge.

Policies

21. i Species used for planting shall be selected from the Plant List in Appendix 4, taking into account the recommendations for plants best adapted to the particular site conditions. At least 90% of new planting shall be of the recommended native species.

21. ii Sound horticultural practices shall be applied in the maintenance and management of the reserve vegetation. Council personnel or their agents, who are skilled in tree care, shall only carry out tree pruning. Planting shall be carried out by or supervised by Council personnel or their agents, who have proven experience in successful revegetation planting projects.

21. iii Proven and recognised revegetation techniques shall be used for the planting and maintenance of proposed planting areas[5].

21. iv Native plant material shall be eco-sourced from within the Foxton ecological district if possible.

21.v The community and proposed Waimanu Lagoons Focus Group shall be consulted about any significant proposed variation to the landscape development plan.

.21. vi Assistance from the community to help with maintaining new planting until established shall be encouraged.

Action Policies

21. vii The conceptual landscape development plan (Figures 5(a) – 5 (c)) is to be implemented as resources permit and according to the priorities set out in the Implementation Plan.

21. viii Adjacent property owners and the proposed Waimanu Lagoons Focus Group shall be consulted about the detailed planting site locations and species when planning planting projects.

20. Maintenance

The general appearance and upkeep of reserves, particularly in suburban locations, is a common issue of public concern. Waimanu is no exception and a number of the submissions that were received before and after the Draft Management Plan expressed concerns about maintenance standards. Concerns included mowing, rubbish disposal, noxious weed control and ground conditions.

[5] see Evans, B. (1983) *Revegetation Manual Using New Zealand Native Plants,* QEII Trust

The Amount of Maintenance

The Council needs to set an example of sound environmental management on its reserves. At the same time, it has limited resources that must be distributed fairly around the many reserves in the district.

At Waimanu the existing maintenance regime is comparatively labour-intensive due to the large extent of mown grass with a great deal of 'edge': - the long edges around the lagoons and boundaries, and fiddly edges around scattered specimen trees or clumps of vegetation. These edges require slower, more detailed maintenance, often with a smaller mower. Mowing is also more difficult on areas of sloping ground and uneven surface. It should also be noted, that mowing some of the larger areas (such as the northern triangle and the estuary berms) is barely justified in terms of the recreational use that these areas attract.

Much of the proposed planting in the landscape development plan is aimed at reducing the amount of mowing and confining it to areas where mown grass is most easily maintained and appropriate for recreational use. It is also recommended that the amount of mown 'edge' should be reduced, by combining scattered clumps and trees into larger planting areas with simpler, more easily mown edges and revegetating parts of the waters' edge. (There are also environmental management benefits as discussed in Sections 17 and 21).

The sandy soil and uneven ground surfaces in places makes for difficult mowing conditions where grass cover is hard to retain.

The issue of maintenance standards is also tied to available resources. At Waimanu, some local residents consider that the quality of mowing and its frequency is inadequate. To clarify this issue a mowing standard needs to be set, taking into account the maintenance requirements of the other reserves that the Council manages. The Parks and Reserves Department is about to conduct a comprehensive review of mowing and maintenance standards for all its reserves. This will take into account the purpose(s) and related maintenance needs of each reserve and specify standards for each in the context of all Council reserve maintenance responsibilities.

Maintenance methods
Maintenance methods must be carefully considered and controlled to ensure the safety and protection of reserve users and adjacent residents; in particular, the use of herbicides, pesticides and fertilisers, and the use of heavy equipment.

Efficiency and suitability of equipment is also an important factor. There has been debate between the Council and some residents about the suitability of the mower equipment. These residents consider that the mower has been too heavy, contributing to bank subsidence, poor mowing results and damage to the ground in places. The issue of mowing equipment will be considered during the reserves maintenance review mentioned above and a specification set.

Pest Control
There are number of pest animals that, although not currently a management problem, have potential to become so. When there are signs of damage to vegetation or birdlife from an animal pest, control measures are to be investigated (see Section 18, Action Policy 18. Iii)).

Plant pests present at Waimanu include pampas grass, black wattle, gorse and blackberry, all of which are identified as pest plants in the Wellington Regional Council's *Pest Plant Management Strategy for the Wellington Region, 1999.*[6]

The need for control of these species is particularly important at Waimanu Lagoons because of their potential to compete with proposed new planting and to spread into the adjacent Scientific Reserve. (Conversely, the Scientific Reserve may be a source of pest plants to the lagoons, so co-ordination between the Department of Conservation and the Parks and Reserves Department would make pest plant control efforts on both sides more effective.)

The invasive nature of these plants means that on-going vigilance is needed to control their spread and their re-growth after control measures have been taken. Elimination of existing pest plants is best carried out while there are still comparatively few of them (for example the black wattle) and should be followed up by removal of regrowth or seedlings on a regular check. (This also will be subject to the Parks and Recreation reserves maintenance review.)

Any pest plant control programmes must be subject to strict safety controls.

It is proposed to reduce the large areas of mowing along the estuary edge by revegetating the sloping ground (below houses middle photo) and hillocky areas. Pampas grass is a persistent pest plant in this area.

Policies

22. i The reserve shall be maintained regularly to the standard(s) set in the forthcoming Parks and Reserves Department Reserves Mowing and Maintenance Review.

22. ii Damage or environmental problems shall be rectified promptly.

22. iii Rubbish bins shall be provided at the river mouth / control gate parking area, duck feeding entrance on Tutere Street, and Barrett Drive crossing. These bins shall be emptied regularly. Additional rubbish receptacles and disposal shall be provided for special events. (see Sections 13 & 14 also).

22. iv Herbicides and pesticides shall be used as little as possible, in terms of both area and frequency; shall be used strictly to comply with the New Zealand Code of Practice; and shall be applied only by registered applicators. Interested parties (see Section 24 on consultation) shall be notified prior to use and temporary warning signs shall be erected in the immediate vicinity of the area where the herbicide or pesticide is to be used during the time of application and for a minimum of two weeks after.

[6] Summary information can be found on the WRC website: - http://www.wrc.govt.nz/lm. The full *Strategy,* which describes recommended control techniques, can also be downloaded from this website.

Action Policies

22. v The mowing and general maintenance standards of the Waimanu Lagoons Reserve shall be reviewed and specified in the forthcoming Parks and Reserves Department Reserves Mowing and Maintenance Review.

22. vi The levels of pest plants, as listed in the "*Pest Plant Management Strategy for the Wellington Region*", and other plants that are locally invasive at Waimanu Lagoons shall be checked annually and, when necessary, measures taken to control or, if possible, eliminate the pest plants.

ADMINISTRATION AND MANAGEMENT

23. Administration

This management plan and the *Waimanu Lagoons Monitoring Record*, are to be the primary references for decision-making with regard to managing the Waimanu Lagoons Reserve. However, any activity that does not comply with the classified purpose of the reserve, as stated in the Reserves Act 1977, must be considered under the provisions of the Kapiti Coast District Plan. Regional Council or District Council resource consents may also be required for activities that affect watercourses, such as earthworks, or for structures involving building permits.

Waimanu Lagoons Reserve is administered by the Parks and Recreation Department of the Kapiti Coast District Council under the direction of the Parks and Recreation Manager. Administration includes organising both the day-to-day management of the reserve and the longer term financing and development planning. Specialist expertise may be sought on occasion to provide advice or specialist service on specific management issues such as revegetation techniques or design of information boards.

The Reserves Act requires that a reserve management plan be kept under continuous review and be updated according to significant changes of circumstances. The 'adaptive management approach' (see Section 30) recommended for managing the lagoons environment, involves on-going monitoring and review, and it is anticipated that an annual review of implementation and monitoring results will be required for some years, tied in with the Council's Annual Plan budgeting process. A more comprehensive review of the entire management plan is proposed five years after this plan becomes operational because, by then, it should be possible to assess the effectiveness of the new management approaches, backed up by several years of consistent monitoring records.

Policies

23. i The Waimanu Lagoons Reserve shall be managed to achieve the purposes of Recreation Reserves and Esplanade Reserves, as defined under the Reserves Act 1977 and the Resource Management Act, 1991, respectively.

23. ii Requirements for resource consents under the District Plan, Regional Soil Plan and Fresh Water Plan shall be complied with for activities that require resource consents under those plans and/or for activities that do not comply with the provisions of this management plan.

23. iii The reserve shall be administered and managed by the Parks and Recreation Department of the Kapiti Coast District Council.

23. iv No activity or action that is contrary to the policies or descriptive paragraphs in this management plan shall be undertaken without the express permission of the Parks and Recreation Manager.

23. v Specialist expertise shall be sought when required to ensure a high standard of reserve management.

23. vi The management plan shall be reviewed five yearly and amended where necessary in accordance with the requirements of the Reserves Act 1977.

24. Consultation and Public Participation

Liaison with the local community and user groups must be an integral part of reserve management if the Council is to be responsive to user needs and local concerns. The reserve is something of a 'secret haven' at Waikanae Beach but nevertheless attracts considerable recreational use from the local and wider community. It is likely to attract more use as the Waikanae Beach community grows, particularly from the housing that is being currently developed on the landward side of the reserve. Interested parties include:

- individuals who use the Waimanu Lagoons Reserve and the immediate Waikanae river / estuary edge area for informal recreation;
- neighbouring property owners, many of whom enjoy the open space outlook over the lagoons;
- other local residents who may be affected by activities at the reserve;
- individuals and groups from the wider Kapiti Coast community such as the Guardians of Waikanae Estuary and Friends of the Waikanae River, who have interests in the natural and cultural heritage of the reserve; and
- organised groups with specific interests such as the Rotary Club children's sailing group.

In addition, the District Plan requires that the principles of the Treaty of Waitangi be taken into account when managing the resources of the Kapiti Coast[1], in particular recognising and providing for the relationship of Maori with their ancestral lands, having regard to kaitiakitanga, and consulting with Te Runanga a Ati awa ki Whakarongotai (through Kapakapanui) on resource management issues.

Over the years local residents and users have periodically had concerns about management issues at Waimanu Lagoons and in the 1998/99 summer the neighbouring property owners formed a group[2] as a means of expressing shared concerns to the Council. The Council recognises that there is strong community interest in the management of the reserve and intends to investigate establishing a Waimanu Lagoons Focus Group to improve Council/community communication and look at ways in which the community could assist the Council with managing the reserve. The form of this group would need to be determined by discussion with interested parties, being more or less formal in structure as desired[3]. This idea was supported in the public submissions on the Draft Management Plan with expressions of interest in helping to form the group. However, several submissions also made it clear that the proposed Group needs to be representative of the wider community. There was concern that the Group might be dominated by neighbouring property owners (or perceived to be). Therefore, the following initial terms of reference for the Group are proposed for further discussion between the Council and those interested in forming the Group.

☼ *Membership* of the Group to be open to anyone who is interested;

☼ *A core group* of no more than 10 members be formed to represent the Group as required, comprising at least:

- 2 neighbouring property owners;
- 2 other Waikanae Beach / Waikanae residents;
- 2 representatives of community groups with an interest in the lagoons;
- 1 tangata whenua representative.

In addition, representatives of both the Wellington Regional Council and Department of Conservation (Kapiti office) should be invited to meetings and kept informed of the Group's activities, because of the overlapping / complementary responsibilities of these agencies (see Section 25 also).

☼ *Two main purposes* of the Group are suggested:

☼ To provide a forum for regular two-way *communication* with the Parks and Recreation Department (i.e. exchange of information, discussion of concerns & issues, discussion of detailed implementation of the landscape development plan and related special projects);

[1] C.6.1
[2] the Neighbours of Waimanu Lagoon Reserve
[3] Examples of similar groups include the Friends of Waikanae River, Friends of the Wellington Botanic Gardens, Trelissick Park Working Group and Guardians of Pauatahanui Inlet.

☼ To assist the Council with practical management of the reserve, in particular:
- *monitoring* (already well under way. The Council thanks volunteers for their enthusiastic support over the first 1999/2000 summer!) This might also be tied in with the WRC Community Care Programme (see Section 19);
- *assisting with special enhancement programmes* (e.g. watering young plants during dry spells);
- *formulating recommendations* to the Waikanae Community Board of items for inclusion in the Annual Plan;
- seeking *funding* from alternative sources to supplement Council funding if necessary. Council resources are limited, especially where capital-intensive development is anticipated.

The active role that the local community already plays in helping to manage the lagoon should also be acknowledged. Regular users have, on occasion, taken steps to protect birds and birds nests from dogs and children, and taken injured birds for treatment when necessary. Neighbouring residents assist with clearing rubbish from the lagoons and trim longer grass and weeds from around fences and bushes, where the Council mower cannot reach. Over the last summer, volunteers committed time and energy to carrying out the monitoring programme. Information about what's planned at the reserve and, in particular, the scheduled times of tidal flushing and mowing, will foster this valuable voluntary effort. It is envisaged that the proposed Focus Group would provide a suitable avenue for this.

Policies

24. i The Waikanae Community Board, local residents, reserve users, tangata whenua and interested community groups shall be:
- kept informed of reserve management developments,
- consulted about management actions that differ from the management plan,
- encouraged to participate in reserve protection and special projects.

24. ii Any significant proposed changes to the management principles and proposals, or implementation programme, in this management plan shall be publicly notified[4].

24. iii Tangata whenua shall be consulted about any proposed activities that involve earthworks, removal of native vegetation, disturbance to the waterbodies in the Waimanu Lagoons Reserve or development on or near sites of importance to Maori.

24. iv Adjacent land owners, reserve users, and tangata whenua shall be consulted about proposed use of herbicides or pesticides at the Waimanu Lagoons Reserve (see Section 22 also).

Action Policies

24. v Interest in forming a Waimanu Lagoons Focus Group in partnership with the Parks and Recreation Department of the Kapiti Coast District Council shall be invited. The purpose of the focus group shall be to facilitate regular exchange of information between the Council and the community, and to foster community participation in implementing and monitoring the effects of the proposed management regimes set out in this plan.

24. vi The Council shall review the results of every summer's monitoring during the following winter, in consultation with the proposed Waiman Lagoons Focus Group and/or the monitoring programme volunteers, and prepare a schedule of proposed tidal flushing times for the following summer. This shall be distributed to all owners of properties neighbouring the reserve, be made otherwise available on request and publicised in the Kapiti Coast community newspaper.(see also Sections 16 and 30).

[4] Note: this means that formal submissions will be invited.

24. vii The Council shall inform neighbouring residents when possible (via one residents' contact person) a week before forthcoming mowing at the reserve so that residents can assist with preparatory trimming.

25. Adjacent Land Use

The character and management of public open space can be affected by adjacent land uses and, conversely, adjacent properties can be affected by the open space. Concerns for nearby residents can arise from noise, effects of adjacent vegetation, animals and other factors such as smell, user behaviour in the reserve, and fencing requirements.

Most of the Waimanu Lagoons Reserve is immediately bounded by existing or to-be-developed residential housing land. Many of the adjacent property owners clearly enjoy the open space outlook and some properties have a close visual relationship with the reserve land. This close relationship can be useful in providing a valuable watching role with regard to preventing anti-social behaviour and in assisting with reserve maintenance and monitoring, which a number of residents have been undertaking. At the same time, adjoining property owners need to be aware also of the potential effects of their actions such as dumping garden rubbish, or blurring the distinction between public and private land.

In order to retain the existing informal character and avoid having the narrow berms dominated by tall unsightly fences, the Council has required that the boundaries of the new adjacent subdivisions be marked by the low post and rail timber barriers already used around the reserve[5]. (Note: this policy was inadvertently overlooked for one stage of the adjacent subdivision where other fence types can be seen.) Additional screening on the boundary or within the reserve is to be achieved by use of planting.

The more recent subdivisions on the east side of the lagoons are on higher ground and tend to have larger houses (compared to the earlier subdivisions on the west side). These houses are therefore likely to be more visually dominant from within the reserve. Therefore, dispensations from the District Plan building line requirements to extend buildings closer to the reserve should be declined.

Public agencies are also involved. The Wellington Regional Council has a specific interest in the management of land within the Waikanae River corridor, which abuts the reserve land, and the Department of Conservation is responsible for managing the Waikanae Estuary Scientific Reserve immediately adjacent to the Waimanu Lagoons Reserve. Activities in the reserve could potentially affect the management of these adjacent special purpose areas and, moreover, there is potential for all three agencies (KCDC, WRC & DoC) to co-operate in the management of these closely related areas to achieve common or complementary objectives. These complementary objectives include control of animal and plant pests, flood protection, water quality management, visual and habitat buffer planting.

The Waikanae Estuary Scientific Reserve immediately to the south of the lagoons has high ecological and landscape values, which may be affected by management of the Waimanu lagoons.

[5] Most adjacent properties are covenanted with the fencing conditions.

Policies

25. i The co-operation and assistance of adjacent landowners shall be encouraged through regular liaison and dissemination of relevant information (see Section 24 also).

25. ii Tall boundary fences on the boundary between the reserve and adjacent properties shall not be permitted where this is a condition of the subdivision resource consent, and low timber post and rail fences shall be used to mark the boundary instead. Where subdivision conditions to this effect do not apply, the Council shall encourage the property owners to use similar low boundary fencing or planting.

25. iii The Parks and Recreation Department shall oppose applications for dispensations from the District Plan building line requirements that would allow buildings on adjacent land to extend closer to the reserve boundary than permitted in the District Plan.

25. iv Co-operative relationships shall be maintained and developed with the Wellington Regional Council and Department of Conservation to ensure co-ordinated management of overlapping or inter-related areas of management responsibility.

26. Archaeological Sites

The long history of Maori occupation and early European settlement means that archaeological sites could be uncovered by development activities at the reserve. Tangata whenua and the Historic Places Trust must, therefore, be consulted about proposed earthworks before work begins. The site can then be specifically assessed and procedures put in place for monitoring the work and taking appropriate steps if an archaeological site is uncovered.

Policies

26. i Tangata whenua and the Historic Places Trust shall be consulted about proposed earthworks prior to work commencing, according to the provisions of the General Heritage Objective, Policy 2 of the Kapiti Coast District Plan.

26. ii Any contract for earthworks at the park shall include the recommended clause in the District Plan (Permitted Activity Standards, D.6.2., Earthworks (iii)) relating to the unearthing of cultural sites during earthworks operations.

27. Commercial Use

Commercial use is not generally considered to be compatible with the peaceful, informal character of the Waimanu Lagoons Reserve. However, temporary demand for commercial uses, such as food outlets, may arise at special events that are regarded to be appropriate occasional uses, such as fetes or small boat regattas (see Section 10). As this can contribute to the success and public enjoyment of special events, this type of commercial use is allowed.

Policies

27. i Commercial uses shall not be permitted in the reserve unless they are of short term duration associated with approved special events, which contribute to appropriate public use and enjoyment of the reserve, and do not damage the reserve. Such uses shall be subject to prior written approval of the Parks and Recreation Manager, and adjacent property owners shall be notified at least one week before the approved use is to occur.

28. Leases and Licenses

Leases and licences relating to public reserves are issued for uses considered compatible with the aims and objectives of the particular reserve. These are generally related to formal recreation of some sort (such as sports club rooms). There are no leases or licences relating to Waimanu Lagoons Reserve currently, and the appropriateness of any future application would need to be considered in the context of the emphasis on informal recreation at Waimanu.

Policies

28. i As a general principle, uses by individuals or groups that exclude or limit public access to a part of the reserve will not be permitted.

28. ii Applications for leases or licences relating to specialist facilities will, however, be considered if the associated use is compatible with and/or enhances the character and informal recreational uses of the reserve.

28. iii All applications for leases or licences shall be notified for public comment and consultation.

29. Funding

- The Kapiti Coast District Council funds the management and maintenance of the Waimanu Lagoons Reserve. An annual budget is allocated for routine maintenance operations and any capital expenditure items are itemised in the Council's Financial Strategy or Asset Management Plan. Capital works funding for Management Plan development has been allocated at $15,000 per year for the next three years.

Note; both the routine operations budget and capital works items are subject to the Annual Plan process every year.

The management proposals in this plan have considerable funding implications because they require immediate commitment of resources to, at the minimum, setting up and maintaining some basic environmental monitoring and managing a trial tidal flushing regime. It is also recommended that some of the proposed planting, at least, (see Section 21.2 comments about resources needed for planting) should proceed as soon as possible because it takes time for plants to establish. Other items have also been identified, such as signage, vehicle barriers, picnic facilities, toilet upgrade and picnic facilities.

The allocation of capital expenditure should be reviewed according to the priorities indicated in the implementation section of this plan. Nevertheless, it is unlikely that there will be full funding available for the recommended measures that are likely to make a significant difference to the environmental quality of the reserve, given the Council's other district-wide responsibilities. Alternative funding sources should be investigated. These might include:

- joint projects with the Wellington Regional Council, where resource management responsibilities overlap. The Regional Council has suggested co-ordinating in-house funding where both councils have complementary responsibilities (e.g. water quality monitoring), and/or co-ordinating applications for external funding for potential joint projects;
- grants from funding organisations such as the Lotteries Board or philanthropic trusts, such as the Balivean Trust (administered by Sir Charles Fleming's family);
- community funding from groups such as Rotary or Lions.

As noted in Section 24, the proposed Waimanu Lagoons Focus Group could well assist with seeking external funding, particularly as philanthropic grants are often directed specifically towards community groups.

Action Policies

29. i The Council shall review the allocation of future funding for capital works at the reserve, in the context of the management regime and priorities proposed for the reserve.

29.ii The Parks and Reserves Manager shall meet with representatives of the Wellington Regional Council to discuss any overlapping areas of management responsibility relating to the reserve and the potential for co-ordinating management activities and funding for mutually efficient use of resources, including the potential for joint applications for special project funding where appropriate.

29. iii Funding from sources external to the Kapiti Coast District Council for special improvement projects at the Waimanu Lagoons Reserve shall be investigated, in consultation with the proposed Waimanu Lagoons Focus Group, and, where appropriate, applications submitted.

PART FIVE: IMPLEMENTATION AND MONITORING

30. Monitoring Programme

A monitoring programme will be essential to implementing the proposed management changes, particularly those relating to the aquatic environment. It is important to note that the recommended changes are essentially manipulations of the existing environment, intended to restrict habitat opportunities for problem species such as submerged aquatic plants and midges rather than fundamentally changing the existing ecology. The effects of the new management tools will need to be closely watched and some standard monitoring conducted so that consistent records will be available to reveal trends and results.

A cautious approach has been taken to changes in the aquatic regime, so that initially only 3-4 tidal flushing cycles per year are proposed, with possible deepening and/or addition of small areas of coarse substrate material to the lagoon bottom to be considered only if necessary. The effects of these changes need to be monitored before further changes to the lagoon bottom including dredging, changes to the culverts between the lagoons or more frequent tidal flushing cycles are considered. This type of approach is termed an 'adaptive management' approach.

Monitoring need not be excessively complicated and, as has already been demonstrated in the 1999/2000 summer, local volunteers can carry out much of it out if they are available. The "basic monitoring" schedule can be carried out entirely by volunteers, with basic training in common submerged aquatic plant identification. The "higher level monitoring" schedule could be carried out, at least in part, by trained volunteers but will need to be professionally supported.

30. 1 Basic monitoring

The following monitoring was carried out over the 1999 –2000 summer primarily by volunteers from amongst the local residents, assisted by Council staff, after an initial training session.

- Weekly assessment of problem submerged aquatic plants over whole lagoon area based upon visual observation of plant presence and assessed on a simple three level ranking (1. insignificant/minor; 2. moderate; 3. severe).
  Requirements:- train willing volunteers in species recognition;
  - establish assessment parameters;
  - establish set points for observation.

- Daily (midday) 24 maximum / minimum lagoon water temperature, during spring and summer.
  Requirements: - willing volunteer close to lagoons.

- Regular recording (as necessary according to seasonal fluctuations) of nuisance level midge swarms and locations (e.g. upper or lower lagoon, east or west margins, on lagoon margins or in adjacent houses, day or night). Assessed on basis of simple three tier ranking (1. present but not significant; 2. quite noticeable but minor irritation; 3. definite nuisance levels).
  Requirements: - willing volunteers;
  - liaison system with neighbouring residents to gain information;
  - establish parameters for observation.

Standard record sheets are provided for each type of monitoring.

30.2 Higher level monitoring

The basic monitoring will provide useful indicative information but is based upon observer assessment, which may differ according to perceptions. Therefore, to provide some more objective data, additional quantitative monitoring is also recommended. This would require additional training of volunteers or the assistance of trained personnel. Factors that could be monitored include:

- Quantitative submerged aquatic plant sampling (monthly November to January), as described in the *Waimanu Lagoons Ecological Survey,* Monitoring Section, p. 20.

- Quantitative midge larval sampling (monthly November to January), as described in the *Waimanu Lagoons Ecological Survey*,Monitoring Section, p. 20.

- Fish and aquatic invertebrate sampling (monthly or bi-monthly during year as described in the *Waimanu Lagoons Ecological Survey*, Aquatic Fauna Methodology, p. 22.

- Water salinity, monthly at same time of tidal cycle, at set points.

- Water nutrient levels.

The basic level monitoring is the minimum needed to record gross trends in submerged aquatic plant growth and midge infestation, and would also allow emergency reaction to an emerging midge "crisis" if threshold levels were exceeded. To track the ecological health of the lagoons more rigorously, however, and particularly provide a consistent information base to record trends and fluctuations, starting with the 1999 ecological survey already conducted, the higher level monitoring would be needed. At the very least, higher level monitoring once a year in mid-winter, when the 1999 ecological survey was done, should be considered. This would provide some consistent long-term trends of comparison with the pre-tidal flushing situation.

30.3 Waimanau Lagoons Monitoring Record

The monitoring record sheets and analyses are held in a separate Monitoring Record at the Council offices and are available for public inspection. This will be continually updated as new observations are gathered. Once a year, at the end of the summer monitoring programme, the results will be analysed and compared to previous years' results. The Council and the proposed Focus Group (or monitoring volunteers if the Focus Group does not eventuate) will then decide whether any adjustments to the tidal flushing and other related management techniques (such as adding coarse substrate material) are needed. A programme of tidal flushing will then be prepared for the next summer and publicised (see Sections 16 and 24 also).

Suitably qualified expertise will be required to analyse the monitoring results and advise the Council / Focus Group / volunteer group.

Action Policies

30. i The basic level monitoring programme shall continue to be carried out over the summer months from October to April every year.

30. ii The Council shall investigate setting up a higher level monitoring programme to commence as soon as possible, taking into account funding sources and the availability of suitably qualified personnel within the Council or other agencies.

31. Implementation

This section is a summary of the Actions Policies in the management plan:- those policies that require specific actions to be initiated (see also Section 2, Management Plan Format). Relative priorities are indicated but, as future resource availability and annual budgeting cannot be predicted, a set time frame has not been given. There are some actions, however, that are recommended for immediate and on-going implementation and these will need funding successively.

Actions that are basically one task

Action Policy	**Priority 1**	**Priority 2**	**Priority 3**	**Action Policy No.**
Pedestrian access to new subdivision	#			11. iii
Pedestrian access to Queens Road and/or Victor Grove		#		11. iv
Investigate options for vehicle barriers to estuary & beach	#			12. v
Review vehicle barriers on river berm		#		12. vi
Upgrade toilet building			#	14. v
Provide special dog faeces bins	#			14. vi
Additional landings and jetties			#	14. vii
Way-finding sign system			#	15. iii
Review existing carpark signs			#	15. iv
Develop on-site interpretation			#	15. v
Consider deepening shallows /addition of coarse substrate material			#	16. viii
Upgrade control gate			#	16. ix
Education programme re stormwater		#		19. i
Investigate pilot WRC project	#			19. ii
Review mowing and maintenance standards	#			22. vi
Invite interest in focus group	#			24. v
Review existing budget allocations	#			29. i
Meet with WRC re overlapping responsibilities	#			29. ii
Investigate external funding sources	#			29. iii

Actions that are on-going, either because they should be repeated regularly or because they will need gradual implementation over a period of years or commitment to subsequent maintenance.

Action Policy	**Priority 1** →	**Action Policy No.**
Continue regular tidal flushing	*Seasonal every year*	16. v
Annual flushing programme published	*By October every year*	16. vi
Assess effects of tidal flushing annually	*Winter every year*	16. vii & 24. vi
Programme of shallow edge revegetation	*Gradual over years*	16. x
Riparian planting	*Gradual over years*	17. i
Review feral geese numbers and remove as necessary	*Bi-annual check*	18. ii

Pest animal control as necessary	*Annual check or response to damage*	18. iii
Landscape development plan and consultation	*Gradual over years*	21. vii & 21. viii
Pest plant control as necessary	*Annual check or response to damage*	22. vi
Inform residents of forthcoming mowing	*Regular through year*	24.vii
Continue basic monitoring programme	*Seasonal every year*	30. i
Investigate higher level monitoring programme	*Potentially seasonal every year*	30. ii

Note: in terms of implementing the proposed planting, which will be done incrementally as resources permit, the following priorities are recommended:

1. The wetland planting along the damp stream edges, to reduce difficult mowing;
2. Shallow water edge planting in the lagoons to assist enhancement of aquatic environment;
3. The estuary buffer planting, to enhance Outstanding Landscape and Ecological site values;
4. Revegetation of the northern triangle, to eliminate little-used mown area.

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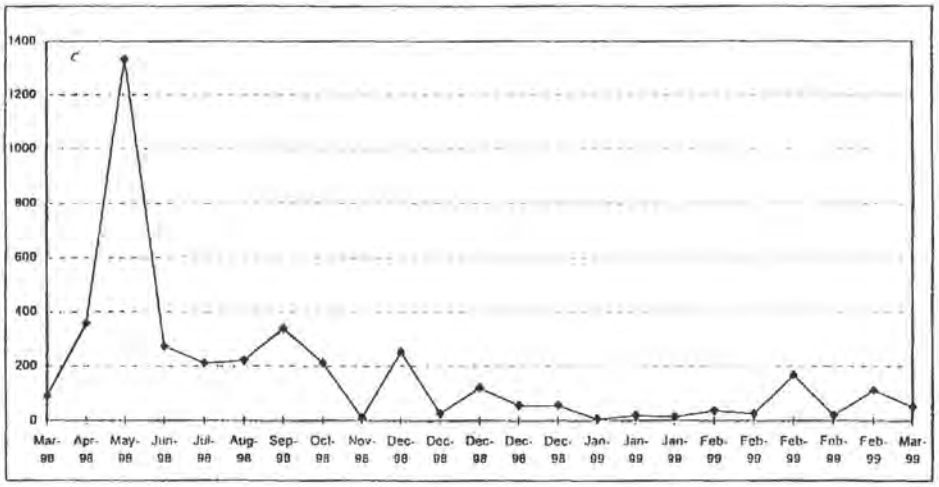
APPENDIX 1. WAIMANU LAGOONS COLIFORM TESTING RESULTS

APPENDIX 1. WAIMANU LAGOONS COLIFORM TESTING RESULTS

Waikanae Marina Lagoons

	FColi / 100ml
Mar-98	90
Apr-98	355
May-98	1330
Jun-98	270
Jul-98	210
Aug-98	220
Sep-98	335
Oct-98	210
Nov-98	10
Dec-98	250
Dec-98	25
Dec-98	120
Dec-98	55
Dec-98	55
Jan-99	5
Jan-99	20
Jan-99	15
Feb-99	35
Feb-99	25
Feb-99	165
Feb-99	20
Feb-99	110
Mar-99	50
Median	90
Max	1330
Min	5
No.	23
Exceed Alert Mode	3
Exceed Action Mode	1



Fresh water Guidelines for Bacteriological Water Quality running median = 126 / 100ml

APPENDIX 2. SUMMARY OF THE WAIMANU LAGOONS ECOLOGICAL SURVEY, 1999

The study was commissioned by the Kapiti Coast District Council identify the current ecological condition of the lagoons and address the range of issues and concerns that both the public and the Council have regarding the management of the lagoons. The main report includes the following:

- the historic condition, issues and management;
- description of the lagoons' physical habitat features;
- description of the terrestrial vegetation;
- description of the aquatic vegetation;
- findings of invertebrate and fish survey to establish estimates of species diversity, community structure, appropriateness and population levels;
- assessment of the main ecological processes affecting the site;
- identification of a range of management options to enhance the lagoons ecologically and remedy current issues.

Key Findings

- The water in the lagoons is neither fresh water nor brackish. I.e. the salinity is more than the fresh water level but less than for brackish water.
- There were two aquatic plants present at the time of survey, *Nitella* in the lower lagoon and blunt pond weed in the upper lagoon. The slight difference in salnity levels between the two lagoons may account for this different distribution. Both of these are native species and provide aquatic habitat.
- The extensive shallows, lack of riparian cover vegetation, and soft base material of the lagoons encourages submerged and surface aquatic plants to develop.
- The water does not contain excessive nutrients. (The waters of Waimeha Lagoon are, in fact, richer in nutrient.)
- Where the lagoon bottom is rocky or of coarser sand material, there appears to be less submerged aquatic plant development and less midge larvae.
- Midges usually mate in tall riparian vegetation. They are attracted to silhouettes against the sky which would normally be such vegetation. At Waimanu, where there is a lack of tall riparian vegetation or of screening vegetation between the lagoons and neighbouring houses, the midges are instead attracted towards the outline of houses as the alternative tall feature.
- There is a stable food web in the lagoons, although of limited species, including six species of native fish. The shallow aquatic vegetation is an important part of this.

Management Solutions that have been Proposed

Grass / silver carp

Introduction of carp has been proposed as a means controlling submerged aquatic plant growth in the lagoons. The use of carp is still controversial because, while they can be highly effective for this purpose, the removal of aquatic vegetation can also disturb the balance of the aquatic environment, with potential loss of native fisheries; loss of invertebrate populations; loss of bird resources as a consequence; increase in nutrient availability (fish faeces); and possible reduction in water quality. The removal of submerged aquatic plants could leave the lagoons open to re-colonisation by other more aggressive species (e.g. exotic species.)

Saltwater flushing

This involves the reintroduction of salt water flushing and/or large volume changes allowing low water periods. Historical evidence suggests that the submerged aquatic plant problem was more pronounced

(and of different - harder to control species) when the waters of the lagoon were brackish and periodically salt. Furthermore, the issues of aesthetics, rotting plant material and low tide smells, ocean rubbish and nutrient re-suspension from the substrate are all factors to consider. Tidal flushing would only be appropriate if the community could accept a move to an open estuary situation. This would require acceptance of estuarine mud, estuarine vegetation (similar to the adjacent Waikanae Estuary Scientific Reserve) and related wildlife, loss of consistent water levels and related aesthetic issues.

Creation of dry periods
This option suggests that by managing the control gate, low levels of water within the lagoon (low tide levels) could be achieved and maintained for periods that would allow significant areas of lagoon edge to dry up. In theory this would result in plant desiccation and death. However, likely associated adverse effects include loss of aesthetic quality(at least short term), smell, loss of the main aquatic invertebrate habitat zone and the potential for a fly species population explosion.

Recommended Management Approach

In order to maintain the current native wildlife (native invertebrates, native fish and birds) and the existing food web, and to avoid the risk of creating an open niche for new and possibly more aggressive, unsightly or ecologically detrimental (exotic) species, control options that remove all of the *Nitella* and blunt pond weed (as well as any species of minor note) should not be considered.

Rather, manipulation of the existing habitat as well as better understanding of the ecological values and potential of the lagoons could better mitigate the effects of the submerged aquatic plants and midges in and around the lagoons.

These manipulations and management tools are designed to encourage both a new way of looking at the lagoons, and to restrict habitat opportunities for midges and the submerged aquatic plants. It is recommended, however, that some of the submerged aquatic plants should be retained as it is important wildlife habitat. Midges are a natural part of any such lowland wetland/lagoon situation so reduction of numbers rather than eradication is recommended. One solution is unlikely to be found - instead a combination of tools should be considered. Some of these should achieve benefits rapidly and some (such as enhancement planting) will be longer term improvements. The combination of management tools recommended follow.

Seasonal saltwater flushing
A return to frequent tidal flushing is not recommended, as the aquatic plant species would simply change to reflect the resulting brackish nature of the water, and there would be other associated problems (see above). However, an annual high spring tide opening of the control gate to allow a seasonal flushing is recommended. This would result in a sudden shock to the lagoon system which may result in short term reductions in submerged aquatic plant growth but allow the lagoons to quickly return to a fresher state precluding brackish water plant development. It seems that the slight saltiness of the water currently, may be helping to restrict the existing submerged aquatic plant populations to the few species observed. This annual tidal flush would also allow native fish such as young eel, inanga and kokopu, to enter the lagoons.

Deepening of the lagoons
Deepen some areas of the shallower edges to reduce the potential for submerged aquatic plant growth.

Manual control of submerged aquatic plants
Carry out small scale manual cutting and removal prior to the summer season in targeted areas to reduce potential summer growth.

Modification of the edge substrate
Add rocks, pebbles and coarse sands to the shallow areas within 5m of the lagoon edge to reduce potential submerged aquatic plant growth.

Establish and enhance tall riparian vegetation
Introduce tall riparian vegetation, located strategically to screen houses from midges and provide alternative breeding sites. Establish tall riparian vegetation to eventually shade the drain and, thereby, reduce the growing conditions required by problem weeds there.

Encouraging more emergent edge vegetation
Revegetate the lagoon edges (including 1m into the water) to visually enhance the bare edges, improve habitat for both aquatic and bird life, and reduce the visibility and dominance of submerged aquatic plant in the shallows where it tends to thrive.

Chemical control of submerged aquatic plants
Consider herbicide use for short-term control in problem areas, (e.g. the open drain) if necessary.

Improved water access
Improve water access for recreational users (while improving the lagoon bottom) by creating specific water entry areas with stony bottoms and open lagoon edges. Additionally, extending the jetties further out would give better direct access for canoeists and model boat operators to deeper water.

Monitoring
Ecological systems fluctuate naturally and, in recent seasons, fluctuations have no doubt been accentuated by the hot dry summers. Monitoring will be needed to determine the impacts of any management regime undertaken and to provide an on-going information base for future reference. The lack of documented information to date has made management decisions more difficult.

Monitoring will also be useful to observe imminent problems that might be particularly susceptible to seasonal variations (such as midge swarms or extreme submerged aquatic plant growth) so that short-term measures can be taken until a more stable longer-term regime has been established.

A simple monitoring programme is recommended for the early - mid summer period to assess levels of midge larvae and submerged aquatic plant distribution.

APPENDIX 3. RELEVANT DISTRICT PLAN PROVISIONS

C.6 TANGATA WHENUA

- **Objective 1.0.** Take into account the principles of the Treaty of Waitangi when managing the resources of the Kapiti Coast, have particular regard to Kaitiakitanga in the management of the district's resources and ensure the relationship of the tangata whenua with the natural environment is recognised and provided for.

C.8 HERITAGE

- **Objective 1.** To identify and protect heritage features of significance to the Kapiti Coast District.
- **Objective 2.** To recognise the relationship a heritage resource may have with the land surrounding the resource.

C.9 COASTAL ENVIRONMENT

- **Objective 1.** To protect and enhance the natural character, natural values and associated amenity values of the coastal environment.
- **Objective 2.** To facilitate public access to and along the coast.
- **Objective 3.** To recognise and provide for the relationship of tangata whenua with the coastal environment.

C.10 LANDSCAPE

- **Objective 1.** That the district's outstanding landscapes are identified and protected from the adverse environmental effects of subdivision, use and development.

C.11.1 ECOLOGY OBJECTIVES AND POLICIES

A. Natural Environment

- **Policy 2.** Ensure that the potential or adverse effects on the natural environment from subdivision, use and development are avoided, remedied or mitigated.
- **Policy 8.** Encourage planting of locally sourced indigenous species adjacent to water bodies and other areas that will restore linkages and ecological corridors.
- **Policy 9.** Encourage restoration of degraded habitats with locally sourced (genetically appropriate) native vegetation.
- **Policy 10.** Advocate for the protection of areas identified as suitable for providing linking corridors for fauna.
- **Policy 12.** Ensure that appropriate buffer zones are provided around areas of significant natural value and that wider ecological processes are considered when making decisions about significant sites.

  Policy 14. Encourage treatment of surface water and stormwater run-off in subdivisions.

B. ***Tangata Whenua***

- **Policy 1.** Provide for Tangata Whenua input into the decision-making process, regarding proposals affecting policies and the natural resources of importance to Tangata Whenua.
- **Policy 3.** Recognise and provide for Kaitiakitanga by Tangata Whenua in the management of the natural environment.

C.12 OPEN SPACES AND RESERVES

- **Objective 1.** To identify, maintain and enhance the open space and recreation resources of the district to ensure that the present and future needs of the district for recreational opportunities and open areas are met without adverse effects on the physical values of the natural environment.
- **Policy 1.** Recognise the open space amenity value of reserves and areas of significant scenic, ecological, scientific and national importance, including native trees, significant landforms and natural character.

- **Policy 2.** Identify and ensure the development of a walking and cycleway system in co-operation with landowners and other agencies, linking areas of open space, ecological reserves, schools, commercial and community facilities, public transport and residential adjoining landowners.
- **Policy 3.** Provide for a wide range of recreational activities while ensuring that adverse effects on the environment are avoided or mitigated.

- **Objective 2.** Ensure the preservation of the natural environment of the margins of waterbodies and the enhancement of public access to the margins of those waterbodies through the [provision of esplanade reserves, esplanade strips and access strips.

APPENDIX 4. RECOMMENDED PLANT LISTS

(See Landscape Development Plans, Figures 5(a) – (c))
(Note: heights given are a guide only shown as estimated 10 year – maturity size. Growth rates will vary according to site conditions.)

REVEGETATION

• Estuary Buffer Planting

Common names	Species	Height guide
Akeake	*Dodonaea viscosa*	4m – 7m
Cabbage tree	*Cordyline australis*	5m – 12m
Corokia	*Corokia cotoneaster*	2m – 3m
Kanuka	*Kunzia ericoides* (drier sandier sites)	5m – 10m
Karamu	*Coprosma robusta*	1.5m– 1.5m
Ngaio	*Myoporum laetum*	2m – 7m
Pohuehue	*Muehlenbeckia complexa*	0.8m –0.8m
Taupata	*Coprosma repens*	6m – 6m
Toe toe	*Cortaderia fulvida*	1.5m– 1.5m
Toe toe	*Cortaderia toetoe*	2m – 2m

• North Corner

Common names	Species	Height guide
Akiraho	*Oleria paniculata*	2m – 4m
Cabbage tree	*Cordyline australis*	5m – 12m
Corokia	*Corokia cotoneaster*	2m – 3m
Karaka	*Corynocarpus laevigatus*	6m – 12m
Karamu	*Coprosma robusta*	1.5m- 1.5m
Kohuhu	*Pittosporum tenuifolium*	5m – 12m
Kowhai	*Sophora microphylla*	3m – 5m
Mahoe	*Melicytus ramiflorus*	3m – 7m
Mapou	*Myrsine ausralis*	2m – 5m
Matai	*Prumnopitys taxifolia*	3m – 25m
Ngaio	*Myoporum laetum*	2m – 7m
Taupata	*Coprosma repens*	6m – 6m
Toe toe	*Cortaderia fulvida*	1.5m- 1.5m
Toe toe	*Cortaderia toetoe*	2m –2m

RIPARIAN EDGES

• Raised Ground On The Stream Or Lagoon Margins

Note: along the stream, the lower growing species are adequate to shade the water. Around the lagoon margins taller growing species should be used as well to increase the distance out from the bank that will be shaded. Note also that planting on the north side of the lagoon will have the most shading effect on the water.

Common names	Species	Height guide
Cabbage tree	*Cordyline australis*	5m – 12m
Harakeke, Swamp flax	*Phormium tenax*	2.5m– 2.5m
Karamu	*Coprosma robusta*	1.5m– 1.5m
Mingimingi	*Coprosma propinqua* (note: very slow growing)	3m – 3m
Corokia	*Corokia cotoneaster*	2m – 3m
Kowhai	*Sophora microphylla* (stream or upper lagoon only)	3m – 5m
Manuka	*Leptospermum scoparium*	3.5m – 4m
Ngaio	*Myoporum laetum*	2m – 7m
Pukio	*Carex secta* (plant on damp edges only)	1m – 1m
Plagianthus divaricatus	*Saltmarsh ribbonwood*	2m – 2m
Swamp sedge	*Carex virgata* (plant on damp edges only)	1m – 1m
Toe toe	*Cortaderia fulvida*	1.5m- 1.5m
Toe toe	*Cortaderia toetoe*	2m – 2m

• Boggy Ground Adjacent To The Stream

Common names	Species	Height guide
Cabbage tree	*Cordyline australis*	5m – 12m
Harakeke	*Phormium tenax*	2.5m– 2.5m
Kahikatea	*Dacrycarpus dacrydioides* (only where there is shelter provided by other plants close by)	5m – 40m
Kohuhu	*Pittosporum tenuifolium* (drier edges)	5m – 12m
Mingimingi	*Coprosma propinqua* (note: very slow growing)	3m – 3m
Toe toe	*Cortaderia toetoe*	2m –2m

SHALLOW WATER MARGINS

Note: these species are to be planted in the water along the lagoon or stream margins up to 1 metre horizontal distance out from the bank and in water depths of 100mm or less. It is envisaged that, once established, these plants will naturally multiply in the shallows where the water depth is suitable.

(Note: all these species will grow to 1m or less in height)

Common names	**Species**
Oioi, jointed wire rush	*Leptocarpus similis*
Pukio	*Carex secta*
Swamp sedge	*Carex virgata*
Wiwi, sea rush	*Juncus maritimus*
	Schoenoplectus pungens

Note: there are a lot of other species that grow naturally in the local duneland areas which have not been included because they are not ideal for first establishment of vegetation. For instance, kawakawa occurs in the reserve under well established trees but prefers shaded conditions so is better to introduce into established plantings in due course unless (as is likely) they naturally develop within new plantings from bird-carried seed.

Useful references with Information about Plants that are Indigenous to the Kapiti Coast

Growing Native Plants in Kapiti, Kapiti Coast District Council (June 1999)

A Strategy for Restoring the Indigenous Ecology of the Waikanae River Corridor, Dr Geoff Park, for Wellington Regional Council and Kapakapanui (October 1999)

Wellington Regional Native Plant Guide, Wellington Regional Council (October 1999)