Gully Reserves Management Plan

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Part 1: OVERVIEW

1 Gullies covered by the Gully Reserves Management Plan

This Gully Reserves Management Plan (GRMP) provides a strategic framework for the management of the parts of six gullies within Hamilton City that are in the administration of Hamilton City Council (HCC):

- Kirikiriroa Gully
- Waitawhiriwhiri Gully
- Mangakotukutuku Gully
- Mangaonua Gully
- Te Awa O Katapaki Esplanade
- The AJ Seeley Gully

It is intended that other areas of gullies, currently owned by or subsequently acquired by the Council, will be included in the Plan in the future.

The locations of these gullies are shown in Figure 1. The Plan incorporates 17 named reserves covering an area of approximately 103 ha. The specific details of the reserves included in this Management Plan are provided in Appendix 1.

Only publicly owned reserve land is covered by the Plan. Reserve land included ranges from recreation to local purpose (esplanade), (access way), (road), (utility) and (drainage) reserves. Where possible land identified as local purpose (road) will be reclassified for recreation. Other road reserves forming part of the gully systems will be administered as though it was reserve land even if reclassification is not possible. The land within the gully systems identified as local purpose (utility) and (drainage) will be managed for its primary drainage purpose and as part of the City's cohesive gully network with full recognition of its environmental functions.

Whilst the focus of the Plan is on the parts of these four gullies in Council ownership, their relationship to other parts of the gully system and green network is also considered. The Plan contains policies and guidance intended to be of value to private owners of gullies who wish to enhance the natural values of their own parts of the gully network.

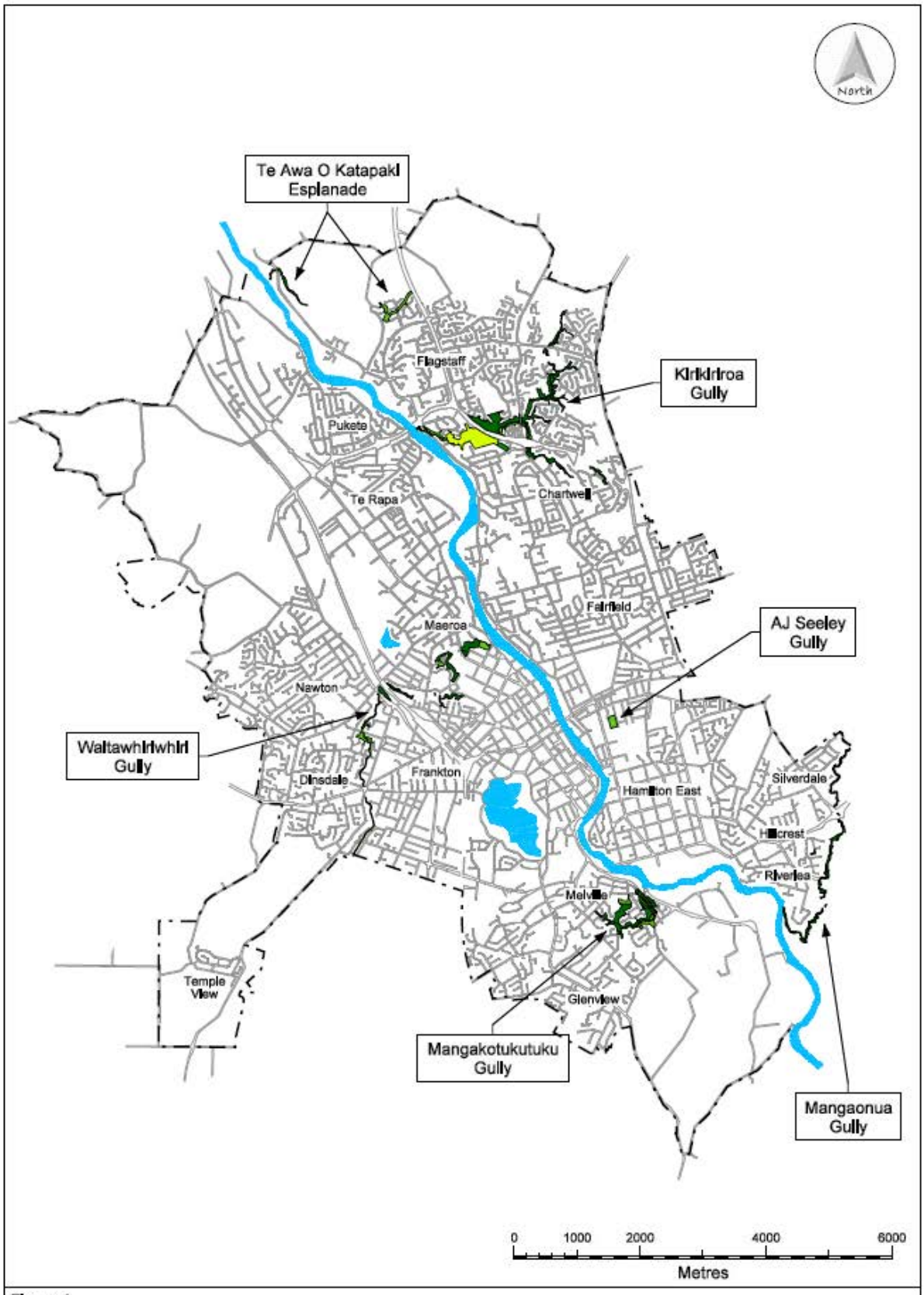


Figure 1

LOCATIONS OF GULLIES

2 Structure of the Gully Reserves Management Plan

The Plan is divided into four parts supported by a number of appendices. These are:

Part 1 Introduction:

Part 1 defines the reserves covered by the Plan, their locations and classification, the structure of the Plan, an overview of the gully reserves system and the purpose and scope of the Plan as this relates to relevant legislation and planning policy.

Part 2 Background information:

Part 2 describes the natural, recreational and cultural characteristics and values of the gullies.

Part 3 Objectives, policies and key implementation areas:

Part 3 gives details of the overall goal of the Plan (the Mission Statement) and defines the objectives, policies and key implementation areas that will provide the management framework for the gullies.

The Mission Statement defines the overall Plan goal. The objectives support the Mission Statement by providing concise statements on the principal aims of management. In doing so they define the key values and elements of the gully system that require management in order to fulfil the Mission Statement.

Policies state how it is intended to make decisions that ensure that management activities lead towards the selected objectives. In broad terms they define what will be done to ensure that the objectives are fulfilled. The policy statements are followed by a discussion section that provides, where necessary, a rationale for policy selection. The discussion section also provides broad guidance on how fulfilment of the policy might be achieved and refers to specific examples of policy application.

Objectives and policies by nature are both broad and definitive and while framed in the context of a realistic appreciation of available resources are not dependent on specific budgetary decisions. Key Implementation Areas on the other hand are discretionary and are intended to provide:

(a) an indication of some likely practical outcomes and implications of policy,

(b) immediate priorities for the implementation of policy,

(c) measurable performance indicators against which progress can be evaluated and which can provide a realistic challenge.

The Key Implementation Areas set out in this Plan are not intended to be a definitive or finite list of the actions that will need to be undertaken in order to satisfy the objectives and policies. Other Key Implementation Areas will be identified as implementation of the Plan proceeds.

Part 4 Management concept and principles

This part of the Plan defines broad management zones and sets out the key principles to be followed in their management. As part of the management concept, the priorities for restoration and management of each gully are identified. The Plan also provides exemplary gully treatments as design guides for gully management zones.

Part 4 of the Plan has been written to provide generic guidance on gully management as well as specific comment on individual gullies. It will provide useful information that can be applied to the management of other parts of the gully system, including those in private ownership.

Appendix 1

Gives legal names and areas of the reserves covered by the Plan.

Appendix 2

Is an extract from the Reserves Act 1977 that sets out the purposes of recreational reserves.

Appendix 3

Provides information on the ecology of gully systems, including native plant species that are likely to have typified the gullies before modification by man. This information is reproduced from Clarkson and Clarkson (1997).

3 Overview of the Gully Reserves System

The purpose of the gully reserves system can be described as:

"*to protect the natural character, bank stability and water quality of the river corridor and gully system for their visual, cultural and recreational values and enhance these significant natural features and their associated ecological processes.*" (Proposed Hamilton District Plan 3.1.1).

The Waikato River and adjacent gully systems are the major landscape features of Hamilton City and a significant and positive element of the City's identity and "green" image. Until relatively recently the gully systems have been undervalued and often perceived as "waste land" areas. However, apart from removing and transporting the City's stormwater drainage to the Waikato River they also perform an important amenity function providing open space and the ability to "escape" the city.

The gullies also serve as a repository for urban trees and contain remnants of indigenous vegetation. The vegetation within the gully systems protects their banks from erosion and provides habitats for wildlife. There is also the potential to create walkway/cycleway/wildlife corridors within the City that connect with the Waikato River and other parks.

There are however, negative issues associated with gullies. These include the dumping of garden and other waste, the presence of plant and animal pests and potential security risks to private properties from people using the gullies.

There are also opportunities to improve gullies, including restoration of native vegetation, re-establishment of indigenous fauna, improvement in water quality and establishment of more and better access and walkways. The gullies also afford significant opportunities for community involvement in bringing about these improvements and greater participation through education and scientific study.

This Management Plan addresses the above matters as they affect the management and development of Hamilton's gully parks, and sets out the concepts that will determine the development and management of the gully reserves for years to come. Mention of specific projects within this Plan does not mean that they will necessarily be resourced by the HCC. However projects well supported by the public through the management planning process are more likely to be endorsed and resourced through the annual planning process.

4 Legislation and Planning Policy Framework

4.1 Introduction

The framework for this Management Plan is set by an hierarchy of legislation, planning documents and policy.

The legislative requirement for management plans to be prepared for reserves is contained in the Reserves Act 1977. Accordingly, it is this legislation that provides the dominant purpose and direction in the GRMP.

However, the Reserves Act is not the only document that assists Council in guiding the protection, use and development of reserves in the City. In developing the GRMP, consideration has been given to the provisions contained in the following documents:

- Hamilton's Strategic Plan (1999) and Agenda 21 (1992)
- Hamilton's proposed Green Network and Open Space Strategies
- Resource Management Act (1991)
- City of Hamilton Transitional District Plan and Proposed District Plan (1999)
- Hamilton's Recreation and Leisure Plan (1998)
- Parks, Domains and Reserves Bylaw (1999)
- Hamilton's Walkway Strategy (under review)
- Hamilton's Cycle Network Study (1999)
- Cycling in Hamilton 2000 Policy and Strategy (2000)
- Historic Places Trust Act (1993)
- New Zealand's Biodiversity Strategy (2000)
- Proposed Regional Plan (1998)
- Regional Pest Management Strategy (1996)

4.2 Reserves Act 1977

This Act requires all reserves to have a Management Plan. The Act defines the purpose (Section 3), general form and the process of public participation required for Management Plans.

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

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

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

(ii) Wildlife; or

(iii) Indigenous flora or fauna; or

(iv) Environmental and landscape amenity or interest; or

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

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

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

The Act also requires the classification of all reserves (Part III) to ensure management and development appropriate to their principal purpose. The options specified within the Reserves Act (1977) are Recreation, Historic, Scenic, Nature, Scientific reserves, Government purpose, and Local purpose. Historic, Nature, Scientific and Scenic reserves each envisage the protection and preservation of existing qualities. The emphasis of the Gully Management Plan is on restoration and development of natural, scenic and to a lesser extent scientific qualities. Most gully reserves will also serve a recreational function. It is thought that the balance of restoration/rehabilitation of the gullies (as set out in this Plan) and their recreational use will be best served by a classification as Recreational reserve with some areas Local Purpose (Esplanade) or Local Purpose (Drainage). Appendix 2 provides an extract from the Reserves Act (1977) that sets out the purposes of the Recreational Reserves.

The main purpose of recreational reserves is to provide areas for recreation and/or the physical welfare and enjoyment of the public whilst protecting the natural environment, while local purpose reserves provide areas for specific purposes, in this case drainage. To achieve the intent of the reserve classifications is the overriding philosophy contained in this Management Plan. It is also reflected in objectives and policies relating to gully bank stability, natural character, bird and fish populations, access and vegetation management. The Reserves Act 1977 requires this Management Plan to be reviewed regularly after it becomes operative. Monitoring the effectiveness of measures implemented to meet the objectives of the Plan will therefore be important.

4.3 Strategic Plan and Agenda 21

Hamilton's Strategic Plan is currently under review (2001) and was last reviewed in 1999. It will continue to be reviewed regularly by Council, particularly with respect to its policy and financial implications. The Strategic Plan is a vision for the Hamilton of the future and addresses broad issues rather than specific reserves policy. The Plan contains a number of key goals that are particularly relevant to the GRMP:

- Goal 2 — Healthy ecosystems displaying improved biodiversity, with a strong indigenous component.
- Goal 5 — A full range of land, facilities and services is available to meet the community's recreation and leisure needs.
- Goal 15 - A compact city with a well distributed mix of residential, employment and service activities, interconnected through an effective and sustainable transport system.

Council also recognises, through its policy documents, Agenda 21 which was produced by the 1992 Rio Earth Summit. Agenda 21 is a global plan for sustainable development in the 21st century. Sustainable development is defined as "*development which meets the needs of the present without compromising the ability of future generations to meet their needs*". Agenda 21 also recognises that global issues need to be addressed at the local level - i.e. "*think globally, act locally*". Hamilton's Strategic Plan is also its Local Agenda 21 plan for achieving sustainable development.

The Gully Reserves Management Plan is one of the ways in which the principles of Agenda 21 can be implemented at a local level.

4.4 Hamilton's Open Space Strategy and the Green Network Strategy

Hamilton's Open Space Strategy will be formulated after the proposed District Plan becomes operative. The Open Space Strategy will draw heavily on the Green Network Strategy, a document produced in the course of the preparation of the Proposed (as at June 2001) District Plan. The Green Network strategy aims to link the Waikato River, the gully systems, peat lands and remnants of indigenous vegetation into a continuous natural corridor and to restore them over time as a part of an integrated, healthy ecosystem.

The Open Space Strategy and Green Network Strategies (in draft form as at 2001) are instruments that address many of the Council's wider Agenda 21 goals. The Open Space Strategy does this through the definition of the kinds of open space that should be in public ownership and how they should be acquired and managed, while the Green Network Strategy focuses on linking the City's natural values and elements into a coherent whole. The gully reserves network will form an important component of the City's Green Network, and the gullies that are the subject of this Plan are already physically linked to the Waikato River, providing continuity of open space.

4.5 Resource Management Act 1991 (RMA)

The purpose of this Act (Section 5) is to promote the sustainable management of natural and physical resources, by managing the use, development and protection of natural and physical resources in a way, or at a rate which enables people and communities to provide for their

social, economic and cultural well-being and for their health and safety, while satisfying the matters set out in paragraphs (a), (b) and (c) which are:

(a) sustaining the potential of natural and physical resources (excluding minerals) to meet the reasonably foreseeable needs of future generations; and

(b) safeguarding the life-supporting capacity of air, water, soil, and ecosystems; and

(c) avoiding, remedying, or mitigating any adverse effects of activities on the environment.

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

- the preservation and natural character of ... rivers and their margins ... from inappropriate subdivision, use and development (Section 6 (a) RMA and Section 3 (a) and (c) Reserves Act).
- the protection of areas of significant indigenous vegetation and significant habitats of indigenous fauna (Section 6 (c) RMA and section 3 (b) Reserves Act).
- the maintenance and enhancement of public access to and along ... rivers ... (section 6 (d) RMA and Section 3 (c) Reserves Act.
- the relationship of Maori and their culture and traditions with their ancestral lands, water, sites, Waahi tapu and other taonga (Section 6 (e) RMA).
- the efficient use and development of natural and physical resources (Section 7 (b) RMA).
- the maintenance and enhancement of amenity value (Section 7 (c) RMA).
- the intrinsic values of ecosystems (Section 7 (d) RMA).
- the maintenance and enhancement of the quality of the environment (Section 7 (f) RMA).

4.6 Hamilton's Recreation and Leisure Plan

Hamilton's Recreation and Leisure Plan is the Council's Action Plan for recreation and leisure. The Plan identifies strategic goals for recreation and leisure in the City and these are supported by key objectives and strategies. Objective 1.3 is particularly pertinent to the GRMP:

"To manage, retain and enhance the open space network by encouraging community use, protecting environmental values and creating linkages".

To support this objective the Council states in the Plan that it will implement the following relevant strategies:

- 1.3.3 — "Continue to develop Hamilton's riverside, parks and gully systems for walking, cycling, and other casual activities."
- 1.3.4 — "Protect the ecological, historical, cultural and intrinsic qualities of open space through the Green Network Strategy."

4.7 City of Hamilton Transitional District Plan and Proposed District Plan

The Transitional District Plan was prepared under the provisions of the now repealed Town and Country Planning Act 1977 and became operative in 1992. The Proposed District Plan has been developed under the provisions of the Resource Management Act 1991 and was publicly notified in October 1999. The Proposed Plan was open for public submissions for a period of 3 months.

The Proposed District Plan has zoned most of the gully areas subject to this Plan as "Recreation Environment". This zone covers parks that have actual or potential environmental value and recognises their value in terms of providing amenity, open space, buffering between activities and their contribution to defining city form. Accordingly, there is an emphasis on the protection of conservation values, and activities provided for in Recreational Zones are generally informal or passive. In addition to the Recreation Environment zoning most of the gully areas are also subject to the Environmental Protection Overlay that recognises the fragile nature of these areas and provides for limited development only.

The zoning of the reserves links into their classifications under the Reserve Act 1977. There are two main purposes to the zoning of the reserves in the District Plan:

(a) Zones bundle activities of like effects and formulate rules to manage effects of those activities on neighbouring uses. The resource consent process provides for public consultation in the situation where activities or buildings are likely to have adverse effects outside the boundaries of the reserve (e.g. noise, hours of use, height of buildings). This is one of the functions of the Resource Management Act 1991.

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

4.8 New Zealand's Biodiversity Strategy

The decline of New Zealand's indigenous biodiversity is described in the State of New Zealand's Environment report as "our most pervasive environmental issue". In order to "turn the tide" in favour of indigenous flora and fauna New Zealand's Biodiversity Strategy establishes a framework for action, to conserve and sustainably manage biodiversity. Halting the decline in New Zealand's biodiversity and involvement of the community and individual action in its management are key central goals of the Strategy. The restoration of indigenous flora and fauna to the gully system in the City is a major opportunity for the people of Hamilton to play their part in fulfilling these goals.

4.9 Other Relevant Documents

The legislation and policy outlined above have set the framework, philosophy and process for this Management Plan, including its policy for the future use, development and maintenance of gully reserves. The Plan also seeks to be compatible with other policy documents as it will in turn influence other policy, bylaws, Annual Plan priorities and service delivery agreements and standards. Other policy documents needing mention are:

4.9.1 Parks, Domains and Reserves Bylaw 1999

The Parks, Domains and Reserves Bylaw 1999 is a document designed to assist with the administration and operation of reserve land controlled by the HCC or the Hamilton Domain Board.

4.9.2 Hamilton's Walkway Strategy

Hamilton's Walkway Strategy is being reviewed concurrently with the preparation of the GRMP. The walkway strategy was initially established under the Hamilton City Comprehensive Development Plan (HCCDP) 1974. Its review is identified as an outcome of Hamilton's Recreation and Leisure Plan 1998.

The focus of the walkway strategy is to define and foster the role that walkways play in enhancing the city's open space network by encouraging use, creating linkages and protecting environmental values.

Walkways provide opportunities for people to have free access to more active lifestyles without direct charges and many neighbourhoods can access existing walkways without having to use transport. Walkways can link open space areas and extend perceived size and remoteness of open space areas without requiring large amounts of land to be acquired. Given the lineal nature of gully reserves they lend themselves well to the development of walkways.

The polices of the HCCDP identified the desirability of establishing walkways separate from streets and of providing continuity/linkages between neighbourhoods, rural areas, the city centre and other facilities. Furthermore, walkways should provide for pedestrians and cyclists where appropriate safety factors can be incorporated in the design and should emphasise major physical features within Hamilton, particularly the Waikato River and gullies.

The City of Hamilton Transitional District Plan also contains specific objectives relating to walkways:

- *"To achieve a continuous public walkway along the riverbanks within the City boundary as part of the City's walkway system" (1.2.3);*
- *"To achieve a pleasant and safe walkway system…. where possible linking reserves, open spaces, community uses, shopping centres, and emphasising the City's natural features including the river, gullies and areas of natural beauty" (1.2.13)* **.**
- *"To require walkways in the development of new areas on the City fringe to be established at the time of subdivision" (1.2.13).*

Due to the change of emphasis in preparing the proposed District Plan (under the auspices of the Resource Management Act 1991) the new plan does not contain specific provisions for walkways. A separate Walkway Strategy is another method of implementing the objectives and policies of the proposed District Plan.

4.9.3 Cycling in Hamilton 2000 Policy and Strategy

HCC's cycling policy and strategy is contained in "Cycling in Hamilton 2000" (CiH 2000) that was approved in March 2000 and became operative in April 2000. A key background document to CiH 2000 is the Cycle Network Strategy Study Report (Opus, March 1999). The proposed cycle network contained in this document has been adopted by HCC although resource availability may constrain full implementation for some time.

The network proposals identify a network of potential off-road cycle routes. This network includes sections of all the gullies covered by this Management Plan.

4.9.4 Regional Pest Management Strategy

The Regional Pest Management Strategy (1996) identifies which plants and animals are declared pests within the Waikato Region. It gives details as to why they are pests and how they are to be controlled within the region. A number of plant pests listed in the currently operational Strategy are found within the gullies. The Strategy is currently under a review that may lead to additional species being identified as pests. Landowners, including councils, are required to control pests on land in their ownership, to the standards set out Part II of the Strategy. The Gullies Reserves Management Plan provides a management framework within which the Council can fulfil its responsibilities in accordance with the Strategy for the gullies covered by the Plan.

4.9.5 Historic Places Trust Act 1993

The Historic Places Trust Act 1993 overrides any of the provisions of this Management Plan or the Reserves Act 1977, with respect to the protection and preservation of Waahi tapu and archaeological sites. Users of this Management Plan should refer to Section 10 for policies and Key Implementation Areas relating to consultation with Tangata Whenua prior to carrying out works on a pa or Waahi tapu site.

4.9.6 Proposed Regional Plan

The Proposed Regional Plan (1998) is intended to provide direction on the use, development and protection of natural and physical resources within the Region. It covers key components of the environment for which the Waikato Regional Council has responsibility under s30 of the RMA, being water, river and lake beds, land and soil, air and geothermal resources. Gully restoration and management activities must comply with the Regional Plan and some activities may require resource consents before they can proceed.

Part 2: BACKGROUND INFORMATION

5 The Gully Environment: Characteristics and Values

5.1 Physical

Gullies are a unique feature of the landscape of Hamilton and its immediate environs. The gullies can be grouped into about 6 systems each of which has an outlet to the Waikato River (McCraw, 2000).

The Waikato River has been a major factor influencing the formation of Hamilton's gullies. Returning to the Waikato Basin about 20,000 years ago, the river followed numerous courses between the hills. Finally, about 14,000 years ago it became entrenched in its current position and began to excavate the trench it flows in today (McCraw, 1967). As the river channel deepened it cut down through lenses of impermeable silt that had been previously deposited by the river on the flood plains. Water seeping from the extensive peat swamps that occurred within the Waikato Basin at the time flowed along these impermeable layers and emerged as springs along the riverbank. The springs caused undermining and slips leading to the formation of gullies that quickly cut back towards their water source. This process is known as 'spring-sapping'. As more aquifers were cut numerous tributary gullies were formed eventually leading to the development of an intricate pattern of branching gullies (McCraw, 2000).

Clarkson & Clarkson (1997) define two principal landform units within the gullies:

- Narrow gully floors characterised by colluvium (soil and debris collected at the foot of the gully wall), rhyolitic sand (volcanic in origin), silt and gravel plus organic matter. Typically such areas are poorly drained and flat.
- Terrace scarps and gully sides characterised by Hinuera Formation rhyolitic sands and gravel. Such areas are generally well drained and have steep slopes.

Steep walls/sides are a consistent feature of the Hamilton's gullies and many retain their depth almost throughout their length (McCraw, J., 2000).

5.2 Drainage and water quality

The gully streams are an essential part of Hamilton's drainage network. This land drainage function is a natural feature of the gullies. However, catchment modification through urbanisation has changed the flow regime and the quality of water entering the gullies. Although the effects of these changes on Hamilton's streams have not been fully assessed, it is highly likely that their biology has been substantially modified as a consequence. Furthermore, direct modification of the gullies has also created conditions that are unfavourable to many forms of aquatic life.

Research to date suggests that whilst water quality of Hamilton's streams, in common with other urban watercourses, is far from optimal, the quality of urban runoff may not be the only factor limiting to aquatic life. Wilding (1998) reporting on the state of Hamilton's streams, concluded that Hamilton City streams displayed poor water quality when compared to forested streams. However, with the exception of higher bacteria and ammoniacal nitrogen

levels, most other water quality parameters were not found to be significantly worse than those found in rural streams. The quality of water in streams that enter from rural areas has already been compromised. Furthermore, iron floc, which coats the substrates of a number of streams, notably of those covered in this Plan the Waitawhiriwhiri and parts of the Kirikiriroa, may limit invertebrate diversity. However, this is a natural phenomenon.

One factor that is likely to significantly affect the aquatic biology of Hamilton's streams is high water temperature due to lack of shading. The effects of this are discussed further in Section 5.3.3.

Williamson (1993) suggests that modifications to the catchment drainage system are probably the single greatest impact of urbanisation on streams. Wilding's (1998) review of the effects of urbanisation on stream flow concludes that extensive networks of artificial drainage systems and impervious surfaces result in a runoff rate that is much faster than natural systems. This can lead to increased peak flows and altered hydrological regimes. Increased peak flows can destabilise stream substrates and cause increases in channel incision and widening. Impervious surfaces also result in decreased infiltration that can result in decreased base flows.

Scouring, undercut banks, slumped banks, deep channel incision and widening can all be observed within the gullies, although significant erosion is very localised. It is probable that high peak flows do increase erosion and alter the biology of the stream. However, it is difficult to differentiate where the "natural state" ends and the effects of increased peak flows begin. It must also be remembered that some effects of erosion can be beneficial to stream life e.g. undercut banks provide habitat for fish.

The need to accommodate peak storm water flows also leads to a requirement to modify the gullies in order to transport water efficiently through means such as canalisation and lining with perforated concrete (Gobi Blocks). This creates an environment that has very limited habitat for aquatic life. However, use of this approach in Hamilton is largely limited to the sections of the Waitawhiriwhiri between Lincoln Street and the City boundary. Most other sections of stream follow a natural course.

5.3 Ecological

5.3.1 Gullies in the context of the Hamilton Ecological District

Hamilton lies within the Hamilton Ecological District (HED) which itself is a part of the Waikato Ecological Region. The HED is defined by a major inland basin that is characterised by alluvial plains with extensive Holocene peatlands, together with a number of minor lakes (McEwen, 1987). The topography is essentially flat, although some relief is provided by low, rolling hills and ridges. The Waikato River is a major natural feature within the HED, and historically has had a significant influence on the development of ecosystems within the area. Numerous tributaries feed into the Waikato through an extensive network of gullies. Before the arrival of man the Waikato basin was characterised by extensive podocarp forests and wetlands. However, today the landscape is radically different.

Modification of the ecosystems within the HED began with the arrival of the Maori who significantly transformed the landscape by fire and cultivation (Downs et. al.,

2000). More extensive changes to the landscape occurred with the arrival of Europeans in the area approximately 150 years ago. Since that time, agricultural development, urbanisation with associated infrastructure and other land uses have modified the landscape to such an extent that little remains of the natural character of the area. Very little natural habitat or indigenous vegetation now remains within the HED. The gullies, together with the Waikato River corridor, small lakes and tiny fragments of kahikatea forest constitute the few features that still retain some of their natural values. In most cases the physical characteristics and biology of these features have been substantially modified by human activities. Furthermore, they continue to be threatened by non-point source pollution, drainage and management of adjacent land, competition from exotic plants, degradation by animal pests and catchment development.

Despite the highly modified nature of the HED, these gullies, rivers, streams and lakes still support small amounts of indigenous vegetation together with populations of native and exotic birds and native fish. They are therefore of high ecological value in the context of the Hamilton City and the Waikato Basin.

Because the physical structure of large parts of the Hamilton's gully system remains intact, they represent an outstanding opportunity to restore native flora and fauna to the City and the wider Waikato area.

5.3.2 Vegetation

This section describes the vegetation of the sections of gully covered by this GRMP. However, many of the characteristics attributed to the gullies described in this Plan will also be representative of gullies in other parts of the system.

In general the vegetation of the gullies is highly modified. Little or no native vegetation remains and exotic species dominate almost throughout. In substantial parts of the system the vegetation can be described as exotic forest. Grey willow (*Salix cinerea*), is often the principal canopy species in these exotic forests, although crack willow (*Salix fragilis*) and other tree and shrub species also occur. The presence of serious plant pest species in such areas can be relatively low and native sedge and ferns species sometimes occur beneath the canopy.

Other parts of the gully system are dominated by vines and shrubs and present a substantial restoration challenge. Species that typify such areas are gorse (*Ulex europaeus*), blackberry (*Rubus fruticosus agg.*), Japanese honeysuckle (*Loniceria japonica*), privet (*Ligustrum spp.*), pink bindweed and convolvulus. A number of these species are listed as plant pests of regional significance (Environment Waikato, 1996). Despite the dominance of pest species, such areas can support limited amounts of native vegetation, with pockets of mature tree fern being a particularly obvious feature in some areas.

Elsewhere, low growing weed and grass communities occur. Such communities tend to be less extensive and are often indicative of land clearance in the recent past.

Plantations of exotic tree species are also a significant feature of gully vegetation, with pine and poplar being the most abundant species. The Mangakotukutuku stands out as supporting a high proportion of this vegetation type. Under some of these plantation canopies native species form an understorey. However, in many areas *Tradescantia fluminensis* forms continuous carpets on the plantation floor.

Stands of native vegetation are largely confined to relatively new plantings, although in time these should provide a significant contribution to the restoration of native forest to the gullies. There are some notable exceptions to this including a number of pockets of mature native vegetation in the Mangaonua system and a notable stand of maturing replanted native vegetation within the Mangakotukutuku system.

Most mature stands of native vegetation within the gullies have been identified in the Key Ecological Sites survey that has recently been conducted by the University of Waikato's Centre for Biodiversity and Ecological Research on behalf of the HCC. The survey found a total of 67 Key ecological sites covering a total area of 126.9ha. survey. Of this 31.4 ha. lie within gullies (Downs et al., 2000).

Where the limited stands of native forest still occur in the gullies, the forest is mainly secondary or induced and the composition and structure of the vegetation is rather different to that of pre-settlement (Clarkson, pers. com.). The structure and composition of the vegetation that typified the gullies before modification by man is sparsely documented. However, it has been reconstructed in Clarkson & Clarkson (1997) (see Appendix 3). Weed species threaten most of these areas with *Tradescantia* being a notable problem species beneath native bush canopy.

Locally wetlands occur within the gullies. These are characterised by low growing vegetation and are often dominated by exotic species. However, tussocks of native sedge and rush also occur in such areas.

5.3.3 Fauna

Birds

The gullies support a number of native bird species including silvereye, fantail, New Zealand kingfisher, harrier, pukeko and morepork. All these species appear to survive well in highly modified environments dominated by exotic vegetation. Other native species such as tui and New Zealand pigeon occur infrequently in Hamilton and are rare within the gully system. Bellbird occurs on Pirongia, and near Waingaro, but is absent from the City. The reasons why such species are not resident within the gully system are not fully understood and research is needed to address this question (J. Innes, Hamilton 2000). A study undertaken by Clarkson (2000) suggests that lack of suitable native forest is likely to be an important factor. The results of Clarkson's study suggest that at least 100 ha. of native forest would need to be established within the City before tui are likely to become re-established as a resident species.

Predators may also be adversely affecting the bird populations within the gullies. The predator community in the gullies is complex and likely to impact on bird populations. It includes a range of bird and mammalian predator species with ship rats and possums known to be key predators of forest bird species (J. Innes, Hamilton 2000).

There are also introduced species that add to the diversity of the bird life found within the gullies. These include blackbird, song thrush, goldfinch, chaffinch and greenfinch.

A key objective of the Plan will be to maintain and enhance the gullies for birds with particular emphasis on enhancing habitats to encourage a greater range of native bird species.

Fish

An electric fishing survey of Hamilton's streams conducted in January 1997 found a number of fish species. Shortfinned eel occurred in all the main streams and longfinned in some. Common smelt were recorded in the Mangakotukutuku and both common smelt and common bully in the Waitawhiriwhiri near Edgecumbe Street (Wilding, 1998).

Detailed quantitative data is not available on the fish communities in Hamilton's streams. However, from the information available it would appear that eels dominate the fish fauna with a low incidence of other species. This is probably the result of a number of factors including poor access to the Waikato River due to man made barriers such as culverts, lack of shading of the watercourse leading to high water temperatures, lack of habitat structure and poor water quality. The predominance of eels is probably the result of them being a relatively robust species, tolerant of high water temperatures and able to negotiate significant obstacles (Hicks pers. com.).

Addressing these issues through management of the gullies provides a major opportunity to create conditions in the streams to favour galaxiid species that are threatened.

Invertebrates

Little is known about terrestrial invertebrates within the gullies and there are no known studies of this group. Downs et. al. (2000) found no studies relating to this fauna group for Hamilton's gullies.

Somewhat more is known about aquatic macroinvertebrates. Wilding (1998), based on sampling conducted in December 1996 and January 1997, concludes that the macroinvertebrate communities in Hamilton's streams are dominated by pollution tolerant taxa.

More surveys are needed to establish adequate baseline information on the invertebrate communities found within Hamilton's gullies and research and analysis is required to assess how to manage the gullies for this group.

5.4 Landscape and aesthetic

The gullies are a major topographic feature of the City and an important part of the landscape. However, whilst the visual qualities of gullies may be of value to adjacent property owners, many sections of the gully remain hidden from general public view. This obscurity is partly the result of the topographic nature of gullies and partly due to the presence of intervening properties and vegetation. Nevertheless some visually appealing parts of the gully system can be viewed from the exterior either from roads or adjacent public land. A notable example is the Tauhara Park section of the Kirikiriroa Gully. This is a broad open section of gully that can be viewed from a number of elevated vantage points.

To fully appreciate the aesthetic qualities of most sections of gully they must be experienced from within. Views within the gullies can be limited by the presence of vegetation, however in sections of the gullies with broad bases, namely the Mangakotukutuku and Kirikiriroa, relatively substantial views can be found. Even within some of the narrow, heavily vegetated sections of gully, riverine views occur. In places the visual qualities of gullies are compromised by a variety of intrusive features including garden, domestic and building waste, poorly kept backs to properties, drainage structures and extensive weed infestation.

The aesthetic qualities of the gullies are not only visual but relate to a range of user experiences such as "contact with nature" and the quiet ambience found in many parts of the gully system. It is intended that through the implementation of this Management Plan these aesthetic qualities will be preserved and enhanced.

5.5 Recreational and community

The gullies are used for a variety of recreational activities. Walking, including with dogs, is probably the predominant activity and occurs throughout the system where access is possible. Some sections of the system are regularly used by people commuting between locations separated by the gullies, in particular the Kirikiriroa (Raungawari Drive to Hukanui School) and Mangakotukutuku (Lewis Street to Bader Street). Improvement of access and walkways will be a key objective of the Plan. Cycling also occurs where access is suitable and informal play is evidently taking place at a number of sites.

Kayaking and jet skiing occur only in the Mangaonua. The other gullies are not suitable for such activities due to their small size and the presence of culverts preventing continuous access. Furthermore, jet skiing is not a desirable activity in such small rivers due to the impact of wash on bank stability.

The gullies represent a significant community resource. Public consultation has indicated a large body of support for the development of gullies as a community resource. Local individuals and community groups, including private owners of gullies, are already involved in the restoration of parts of the gully system. There is a substantial opportunity for the local community to be involved in implementation of the GRMP. Indeed, public support and involvement will be essential if the objectives are to be met.

5.6 Historical and cultural

Historically the gullies were an important resource for Maori providing medicinal herbs, plant products and areas to catch fish, particularly eel. Traditionally these were also important areas for growing crops. The gullies therefore have a variety of values to Maori and are important both spiritually and culturally.

Significant archaeological, historic and cultural sites within Hamilton City are identified within the proposed District Plan. Whilst none of these sites lies within land covered under this Management Plan, a number are adjacent.

5.7 Educational and research

The gullies provide an important educational and scientific resource. Participation in restoration of gullies, which some local schools are already involved with, is an excellent way of introducing children to ecological principles and giving them a sense of ownership of gullies. There will be considerable scope for involving children in gully restoration as the Plan is implemented.

The gullies are already the subject of scientific study and various papers and reports have been published concerning them. However, there is still a great deal to learn about their ecology and cultural values to Maori. As a result they represent a substantial local resource for research that will increase as the Plan takes effect.

5.8 Summary of values

The values of gullies are many and varied and mean different things to different people. However, their main values can be summarised as follows. They are:

- A unique feature providing an opportunity to enhance Hamilton's identity.
- Of high cultural importance to Maori.
- The major drainage units within the City, now and in the future.
- Important refuges for the City's remaining biodiversity with significant potential to be enhanced and restored.
- Sites for significant opportunities to re-establish certain elements of native fauna that are currently rare or absent.
- Unique features of the landscape with important aesthetic qualities that are becoming increasingly valued by the public.
- Important for passive recreational pursuits, notably walking.
- The means of providing continuity and connectivity with the Waikato River corridor and are natural/logical linkages.
- A substantial opportunity for community involvement in restoration and enhancement of one of the City's major assets.
- Of significant potential for scientific research and education.

Part 3: OBJECTIVES, POLICIES AND KEY IMPLEMENTATION AREAS

Mission Statement

The overall goal in establishing the gully reserves and preparing this Management Plan can be summarised in the following statement:

"To provide a framework for the management of the gully systems covered by the Plan to conserve and enhance their natural, physical, recreational, cultural, historical and spiritual values for the benefit of the community and to support Hamilton City Council's commitment to sustainable development as defined by Agenda 21".

6 Sustaining Gully Side and Stream Bank Stability

6.1 Objective

- To maintain and enhance gully slope and stream bank stability whilst enhancing natural values.

6.2 Policies

- Existing vegetation cover will be maintained or progressively replaced to preserve bank stability.
- Exposed slopes will be stabilised by planting mostly native trees and shrubs.
- Where vegetation needs removal it will be undertaken in a way that does not compromise slope stability.
- Over mature trees that threaten gully slope stability will be removed.
- Bare slopes beneath mature tree canopies will be stabilised by planting an under storey.
- Trees, shrubs and tree ferns will be used to stabilise stream banks.
- Where feasible, and particularly in green field subdivisions, the Council will seek to promote attenuation of stormwater flows before waters enter the gully systems in order to reduce stream scour, erosion and suspended sediments. The Council will also seek to work with the surrounding districts to achieve attenuation at or before the city's boundaries.
- Where practical, and where the drainage function of the gullies is not significantly compromised, the Council will seek to promote drainage management practices that minimise adverse effects on the stream environment.

6.3 Discussion

Exposed slopes provide potential for erosion resulting in a number of adverse effects on the gully systems. They create potentially unstable areas that may be susceptible to slumping and in extreme cases these can threaten properties. Eroded material can contribute to the sediment loading of the stream thus adversely affecting water quality. Bare slopes can also create visually intrusive features.

Serious erosion is not a major feature of the gullies at present, although there are potential problems in some localities and some areas may be at risk in the future. Exposed cliffs,

comprising relatively soft sediments, and large mature trees, particularly at the top of gully slopes, are examples of potential threats to gully slope stability.

There are denuded areas where vegetation needs to be re-established, including bare ground beneath plantations. Policies have therefore been included to promote this. Certain management practices such as weed control using herbicide can if over applied strip areas of vegetation completely, promoting erosion within the gullies. Such management practices need to be modified to ensure that application of herbicide does not lead to erosion problems.

Significant areas of stream bank erosion are localised. However, there appears to be a high level of scour throughout the system. To some extent this may be a natural phenomenon, but it is likely to be exacerbated by high peak flows from upstream rural and urban areas. Hence there is a need to attenuate peak storm water flows. This problem is likely to increase as urbanisation extends unless measures are implemented to attenuate the additional flows generated. Trees and tree ferns can be effective in stabilising stream bank erosion and have the added advantage of providing habitat for fish amongst those roots that enter the stream.

A more stable gully and stream environment should result in improvements in water quality and flow regime and provide a more hospitable environment for aquatic life. The emphasis on using native species will also support the objective of restoring native vegetation to the gullies (see Section 7).

6.4 Key Implementation Areas

- Denuded gully slopes will be replanted with mostly native vegetation and where appropriate underplanting of plantations will be carried out.
- Training will be given to Council field staff to ensure that herbicide use and other control measures are targeted and that restoration and vegetation management methods maintain gully slope stability.
- An audit of stream bank and gully slope stability will be undertaken to identify at risk areas, trees threatening stability and to determine the remedial measures required.
- A review of drainage management practices will be undertaken to determine if more ecologically sympathetic management methods could be practicably employed within the gully system.

7 Conservation and Enhancement of Gully Vegetation

7.1 Objectives

- To make native forest the dominant vegetation type within those areas of gully defined as natural zones.
- To utilise native species, where possible of local provenance, to provide vegetation diversity and structure within those areas defined as parkland or pasture zone.
- To initiate weed control programmes particularly for those species identified as Regional Plant Pest Species and others that are a significant threat to native biodiversity e.g. Convolvulus and Tradescantia.
- To preserve the natural physical form of the gullies as far as this is practical and consistent with the need to restore and manage the gullies.

7.2 Policies

- Areas of existing native vegetation will be protected and enhanced.
- Most areas currently dominated by exotic species that are selected to be natural gully zones will be progressively restored to native forest, with priorities reflecting the quality of the existing exotic vegetation, amongst other factors.
- Emphasis will be placed on using restoration of native forest cover as a primary means of weed control.
- Weed control effort will be targeted initially towards those areas where existing native vegetation is established or is in the process of being established.
- Emphasis will be placed on creating a dominance of evergreen species that will promote suppression of weed growth.
- Encouragement and support will be given to adjacent landowners to control weeds on their properties.
- When possible only plants of local provenance will be used to restore the gullies.
- Ecologically appropriate species, indigenous to the Ecological District, will be selected to reflect the particular characteristics of each growing site (soil, aspect, moisture).
- As far as possible the species used in restoration will be selected to represent the forest vegetation type believed to have existed in pre-settlement times.
- Where there is a demonstrated need, access to sensitive parts of the gullies by people or domestic animals will be controlled or prohibited.
- Council staff and others involved in the restoration of gullies will be trained in gully restoration and management techniques to ensure a best practice approach.
- There will be a presumption in favour of the use of native plants in new planting within Parkland Gully Zones and Pasture Gully Zones.
- The success of restoration will be monitored to ensure that successful approaches continue to be fostered whilst unsuccessful methods are eliminated.
- Adverse effects on the natural physical form of the gullies will be avoided or minimised during restoration and management.
- Maintenance contracts will reflect desirable practices.

7.3 Discussion

The scarcity of native vegetation within the gully system means that protection of remaining areas is a priority. In addition to their high intrinsic value they will be useful foci for future restoration efforts. Extensive areas of the gullies contain little or no native vegetation and are dominated by exotic species, many of which are plant pests. There is therefore considerable scope for a programme of progressive restoration to extend the native forest cover within the City.

The areas available for restoration cover a considerable area of the gullies (see Section 16.4) and their re-vegetation with native forest needs to be approached with a long-term vision and commitment. Similarly, plant pest and weed problems associated with many parts of the gully system are very substantial. It is therefore sensible to approach the restoration of gullies in a progressive way, viewing restoration of evergreen native forest and weed control as complementary activities.

The enormity of the weed and plant pest problem presented by the gullies means that resources are at present insufficient to fully control the problem within a short time span. However, once established, evergreen native forest, although not inhibiting weed growth entirely, suppresses regeneration and growth of many species, thus reducing the input required to control undesirable species. The policies therefore seek to focus weed control effort on assisting establishment of native forest and protecting areas of existing forest. As more forest becomes established the extent of cover by undesirable species will diminish.

The progressive approach to restoration also seeks to ensure that adequate resources are available to ensure establishment of existing new planting before extending native cover to new areas. Aftercare is important to ensure restoration success and if not adequately resourced can lead to complete failure.

It also makes sense to use existing stands and pockets of native vegetation as the focus for restoration effort since the larger the area of forest the more sustainable and viable it becomes. Furthermore, pockets of vegetation such as mature tree ferns can give immediate structure and interest to newly planted areas.

The use of plants from local genetic stock is important for two reasons:

- Such plants are now often scarce in the Waikato and propagating from such material helps to preserve the unique genetic characteristics of plants originating in this area.
- Plants originating in the Waikato are often better adapted to local conditions than those from other regions.

However, in adopting this policy a pragmatic approach will be required since for a variety of reasons it is not always possible to obtain plants from local genetic stock.

As far as possible, the species and composition of vegetation will be restored to reflect natural forest ecosystems, and in particular, that likely to be representative of gully systems (Clarkson & Clarkson, 1997). However, this will need to be achieved in stages, establishing early pioneer species first and then progressively introducing later successional species.

There will be a general presumption to allow public access, where practical, to all parts of the gully system. However, there may be benefits from excluding unauthorised access to limited parts of the system and indeed it may be necessary where access would present a significant threat to the natural or cultural integrity of the gullies. Policy has therefore been included to facilitate this.

The weeds and plant pests within the gullies present a threat to the properties of adjacent landowners and vice-versa. The restoration of gullies presents an opportunity to eradicate or significantly deplete weeds and plant pests within localities. It will be important that where restoration initiatives are underway co-operation is sought from and support given to adjacent landowners.

Although it is intended that most areas of Natural Zone currently occupied by exotic species will be restored to native forest, in some areas, for a variety of reasons, this may not occur. For example, it may not be desirable or practical to remove exotic plantations e.g. pines and redwoods, in all cases. In some locations establishment of native wetland may be more

appropriate than native forest. It may also be desirable to create mown grassland glades in some parts of the Natural Zone.

Measurement of the success of restoration efforts in achieving their objectives will be an important part of the process. Through a programme of monitoring and analysis of the data gathered it should be possible to identify those approaches that are successful in meeting restoration objectives and those that are not.

Whilst the emphasis of this Plan is on the conservation and enhancement of vegetation in the gullies situations may arise where trees need to be removed for reasons of public safety. The Reserves Act 1977 places an obligation on the Council to preserve vegetation but it may, and will, remove trees that are dangerous, or dead/diseased and likely to become dangerous. The decision to remove trees that may threaten public safety or properties will only be taken following inspection by an appropriately qualified arborist. Almost all trees likely to fall into this category will be exotic trees such as pine.

The natural physical form and structure of the gullies is an important part of their intrinsic value. In many situations their physical form has also provided a natural barrier to development and this has allowed the current extent of the system to remain. Protection of the physical form and structure of the gullies is therefore important. Protection from inappropriate development is provided through the proposed District Plan through the Environmental Protection Overlay. However, it is also important that adverse effects from management and restoration activities are avoided or minimised.

7.4 Key Implementation Areas

- A programme of progressive restoration of native vegetation within the gullies will be developed and implemented, with particular emphasis given to protecting and enhancing existing areas of native vegetation.
- A programme of weed control will be developed as part of restoration planning.
- Encouragement and support will be given to adjacent land owners to control weeds on their properties
- When possible only plants derived from locally sourced material will be used.
- Where necessary for the protection of natural or cultural values access to sensitive parts of the gully system by people or domestic animals will be controlled.
- All Council personnel involved in establishment and management of gully vegetation will be trained to ensure a best practice approach.
- Baseline surveys of vegetation will be undertaken prior to restoration and initiation of management.
- A vegetation monitoring programme will be developed and implemented.

8 Enhancement of the Gullies for Native Fauna

8.1 Objectives

- To create a favourable environment for native birds, particularly the indicator species tui and New Zealand pigeon.

- To create favourable conditions for the return of smelt, inanga and banded kokopu to the gully system.
- To manage the flow regimes within the streams in order to provide a favourable environment for aquatic fauna.

8.2 Policies

- Fruit and nectar bearing trees and shrubs will be included in restoration planting.
- Mammalian pests will be controlled in order to reduce predation of birds, with particular focus on ship rats and possums.
- Obstacles to fish passage in streams will be removed or modified where practicable and desirable.
- Future drainage infrastructure work will take account of the need to allow fish passage.
- Tree planting design will allow for shading sections of streams in order to lower stream temperatures and provide habitat for fish.
- Exclusion of public access, including domestic animals, from sensitive areas will be undertaken where there is a demonstrated need to protect fauna from disturbance.
- The effectiveness of the Plan in improving habitat for fauna will be monitored.
- Where feasible the Council will promote attenuation of stormwater flows before water enters the gully system, particularly for green field sites, and will seek to work with the surrounding districts to achieve attenuation at or before the city's boundaries (see section 6).
- The Council will foster a multi-disciplinary approach to gully management that will allow management of the gullies' drainage functions to be considered in parallel with the management of the gullies' ecological values.
- Channel clearance and deepening to "improve" drainage will be minimised and the natural character of streams will be preserved to the maximum extent consistent with flood control.

8.3 Discussion

A number of common native bird species occur in the gullies in reasonable numbers - e.g. fantail, silvereye, pukeko and New Zealand kingfisher. The absence of native vegetation does not appear to be a limiting factor for these species. Tui and New Zealand pigeon, by contrast, are at best rare visitors to the gullies. Both species require extensive tracts of primary or secondary native bush for their survival, or proximity and corridors to this type of habitat. Restoration of native forest to the gullies and inclusion of fruit and nectar bearing trees and shrubs favoured as food sources by these species will increase likelihood of visits by them. In time sufficient linked habitat may be established along the City's gullies and river corridor for these birds to be re-established within the City. However, the amount of forest habitat required is at least an order of magnitude greater than exists at present (June 2000).

Bellbird may also benefit from habitat improvements. However, given that the species is currently not found within the City it may prove much more difficult to encourage into the gullies. As a result it is not considered to be a key indicator species at the present time.

Possums and ship rats represent a major threat to native birds. Possums also damage native vegetation. A programme of control will be an essential component of gully management.

High temperatures are known to be a feature of Hamilton's streams. This is the result of a lack of shade throughout much of the system. By shading the streams with trees, shrubs and tree ferns stream temperatures will be lowered to levels more favourable for galaxiid fish species. It is difficult to predict from existing knowledge the level of shading required and more research is needed in this area. Based on what is currently known it is suggested that 5% or less available light be the target to promote conditions for banded kokopu. In situations where the stream is wide and subject to heating upstream then achieving a shaded condition of 20-30% available light would give some protection from solar heating (Hicks, pers. com.).

There is a number of structures within Hamilton's streams which may inhibit fish movement. This is particularly the case for the Waitawhiriwhiri and the Mangakotukutuku where culverts with drops or high velocity outfalls occur. It is important that where possible and economic, current obstacles to fish passage are modified and that in future drainage structures and culverts are designed to allow fish passage.

There will be a general presumption to allow public access, where practical, to all parts of the gully system, unless public access presents a significant threat to the natural or cultural integrity of the gullies. In circumstances where there is a demonstrated and significant threat to species of fauna it may be necessary to temporarily or permanently restrict access to limited sections of the gully. The most vulnerable group to human disturbance are ground nesting species such as pukeko, in particular when people are accompanied by dogs. In situations where these species are present consideration will be given to creating good cover and safe refuges. Exclusion of access would only be used as a last resort.

In addition to monitoring vegetation restoration success (see Section 7) it will be important to obtain baseline data on fauna populations and subsequently to monitor these to assess the effectiveness of management and restoration in increasing populations. The initial emphasis will be on birds and fish as the habitat requirements of these groups are reasonable well known. However, baseline survey work and research will be needed to determine the management requirements for invertebrates (also see Section 14).

Attenuation of stormwater flows before water enters the gully system is a potential mechanism for controlling flow regimes within the streams. New developments present particularly good opportunities to promote this approach. However, this needs to be achieved through the RMA planning and consent processes rather than through the Gully Reserves Management Plan. It should further be noted that reduction of peak flows in developed urban areas is both difficult and expensive. The need to control stormwater discharges in order to create a more favourable environment for aquatic life emphasises the importance of having a multi-disciplinary approach to gully management. This includes working with the District Councils on flow attenuation initiatives within their respective areas of jurisdiction.

As well as creating a more favourable flow regime within the streams it will be important to ensure that management of the streams to fulfil their stormwater drainage function is undertaken in a way that minimises the impact on aquatic habitat. Activities such as stream channel clearance and installation of drainage or flood protection structures should be

undertaken in a way that recognises the natural values of the streams and seeks to retain habitat features. Use of mechanical channel clearance should be avoided where possible.

8.4 Key Implementation Areas

- Fruit and nectar bearing trees and shrubs will be included in restoration planting.
- A programme of mammalian pest control will be developed and implemented.
- An audit of existing obstacles to fish passage will be undertaken and where appropriate and economic remedial measures will be undertaken.
- Shading of sections of streams will be included in restoration plans.
- Baseline surveys of birds and fish will be undertaken as the Plan is implemented and monitoring will be undertaken at appropriate intervals thereafter.
- A review of drainage management methods and programmes will be undertaken to assess the effects on stream ecology and identify measures that could be used to minimise adverse effects and promote positive effects.

9 Maintaining and Improving Water Quality within the Gullies

9.1 Objectives

- To improve water quality within the streams.

9.2 Policies

- Measures will be implemented to maintain gully slope and stream bank stability (see section 6 above)
- The Council will encourage implementation of measures to improve water quality before runoff from the urban environment enters the gullies.

9.3 Discussion

Policies to stabilise gully side and river banks will support the objective of improving water quality by reducing erosion and thereby the sediment loads in the streams.

The Council is keen to examine means of improving water quality within streams in the City and at the time of preparation of this Management Plan was undertaking studies to assess the impact of stormwater relative to the condition of the streams at the point they enter the city. It should be recognised that whilst urbanisation does result in the discharge of contaminants into streams published studies to date indicate that for most parameters urban streams are not significantly worse than rural streams (Wilding, 1998). Since many of Hamilton's streams originate in rural areas simply treating urban runoff may not be enough to significantly improve water quality.

Urban stormwater is known to contain contaminants although impacts on aquatic life are not fully understood and further research is needed to determine the significant effects and identify appropriate and cost effective methods of treatment. The Roads and Traffic Unit are currently working to improve catchpit design and have engaged Landcare Research to assist with this initiative.

9.4 Key Implementation Areas

- Review existing stormwater treatment practices and identify options for improving the quality of stormwater discharged into gully streams in the light of current and ongoing research.

10 Conserving Tangata Whenua Values

10.1 Objectives

- To identify, preserve and where appropriate enhance Tangata Whenua values within the gully system.

10.2 Policies

- Areas for cultivation of plants for rongoa by interested Maori groups will be delineated.
- Mechanisms to control harvesting of plants within the gullies for medicinal and other purposes will be established.
- Archaeological finds (e.g. ko iwi) within the gullies will be dealt with in consultation with Tangata Whenua.
- Methods to represent Tangata Whenua cultural values within gullies will be developed in consultation with Tangata Whenua.

10.3 Discussion

Many of the traditional plants used by Maori for medicinal and other purposes (rongoa) have either been lost or are now rare within the gullies. Furthermore, remaining plants are threatened by over harvesting. The restoration of the gullies will re-introduce and greatly expand the quantities of plant material available for cultural uses. However, in order to provide areas where rongoa can be cultivated and harvested in a controlled and focussed way areas will be identified and set aside for this specific purpose. It is envisaged that two areas may be set aside for this purpose, one as a demonstration area and another where harvesting can take place.

Due to the interest in rongoa and the potential for over exploitation it is considered important that harvesting of plants is undertaken in a controlled manner. The Council will therefore co-operate with Tangata Whenua to introduce mechanisms to control harvesting.

Artefacts and features of archaeological or cultural significance to Maori may be discovered in the gullies from time to time as restoration and development work takes place. In order to ensure that such instances are dealt with in an appropriate manner protocols with representative Maori groups such as Nga Mana Toopu O Kirikiriroa (NAMTOK) have been established.

Restoring and developing the recreational potential of the gullies provides an opportunity to promote Maori cultural values within the gullies.

10.4 Key Implementation Areas

- Two areas specifically for the cultivation of rongoa will be delineated in consultation with representative Maori groups.

11 Enhancing Recreational Values

11.1 Objectives

- To enhance and promote recreational use of gullies for passive recreation in a way that maintains the special ambience and aesthetic qualities of the gully experience.

11.2 Policies

- Provide access to the gullies wherever practical and where this does not conflict with the need to protect the natural and cultural values of the gullies.
- Develop a system of walkways within the gully system, including links to other green corridors and open space.
- Provide joint cycling and walking paths within the gullies in those sections where "potential off-road cycle routes" have been identified (Opus, 1999), where this is feasible and does not conflict with the need to protect the natural and cultural values of the gullies.
- Provide information notices within the gully systems giving details of walkway routes, access and information on features and issues of interest.
- Establish car parking, picnic areas and toilets where appropriate and where this does not compromise the natural values of the gullies.
- Prevent motor vehicle access to the gullies except vehicles authorised for maintenance purposes.
- Forbid horse riding in gullies except in those areas specifically identified for the purpose.
- Produce and distribute promotional literature for each of the gullies.
- Develop and provide links to nodes e.g. playing fields and parklands.
- Tracks and other facilities to be designed to be in keeping with their environment, with most tracks designed to a standard that allows access by disabled users.

11.3 Discussion

The emphasis of gully management will be on passive recreation i.e. walking and cycling. Where safe and practical there will be a general presumption that the public will have access to all parts of the gully system except where there is an overriding conflict that threatens to significantly compromise the natural or cultural values of part of a gully.

In developing a walkway system within the gullies establishing links to the Waikato River corridor will be particularly important.

Car parks, picnic areas and toilets may not be provided in all gullies. However, there are situations where they are warranted, particularly in the more formal areas of the larger systems such as the Kirikiriroa.

The location of access points and parking facilities will take account of the gully systems' features of interest and the nature of the local roading network and its roading hierarchy, to ensure that potential congestion and safety problems are avoided. In most cases parking demand will be accommodated off-road.

A number of potential off-road cycle routes have already been identified within the Cycle Network Strategy Report (Opus, 1999). Where feasible and where this does not conflict with the need to protect the natural and cultural values of the gullies, the Council will seek to develop these routes.

Signage and promotional literature will be used as means of informing the public of the values of gullies, how they can make best use of them and how they can contribute to their restoration and management.

Provision of easier access and encouragement of greater public use of the gullies raises concerns about personal and property security amongst some adjoining landowners. However, it needs to be recognised that individuals with criminal intentions already have or could easily gain access to many parts of the gully system covered by the Plan. Restoration offers an opportunity to address security issues e.g. mutually acceptable fencing can be erected and costs shared under the provisions of the Fencing Act (1978) with equal contributions from the Council and neighbour. Planting patterns and path locations can also be designed to improve security.

11.4 Key Implementation Areas

- Provision/improvement of access.
- Improvement and development of walkways/cycleways.
- Provision of signage and promotional literature.

12 Promoting Links to other parts of the Green Network

12.1 Objective

- To preserve, create and enhance linkages between gullies and other parts of Hamilton's Green Network.

12.2 Policies

- Preserve existing green links with other parts of the green network, with particular emphasis on links to the Waikato River corridor.
- Make additions to the gully network in public ownership through land acquisition, where feasible and cost effective, in order to complete linkages and provide for effective management of key sections of gully.

12.3 Discussion

One of the strategic objectives of the proposed Green Network Strategy is to create a physically linked network of green corridors and open space. Hamilton's Gully Reserves will be an important component of the City's network of green corridors. The policies set out above will help to maximise their values as part of this network with an emphasis on preserving existing green links and creating new publicly accessible links through acquisition.

12.4 Key Implementation Areas

- Identification and acquisition of key gully areas and linkages.

13 Preserving and Enhancing Landscape and Aesthetic Qualities

13.1 Objectives

- To preserve and enhance the landscape and aesthetic qualities of the gully reserves.

13.2 Policies

- Preserve and enhance key views into, out of and within the gullies.
- Develop and implement a programme for removal and recycling of waste materials from the gullies.
- Discourage tipping of waste materials and where necessary undertake enforcement action.
- Design and construct future drainage structures to minimise their impact on the visual qualities of the gullies.
- So far as possible and cost effective, treat existing drainage structures that are visually intrusive so that they blend into their surroundings.
- Minimise the visual impact of buildings on the gullies.

13.3 Discussion

Although, views into, out of and within gullies are limited in number they are an important aspect of the value of gullies and their enjoyment by users. Where possible key views will be preserved and/or enhanced. It will be particularly important to consider this when developing restoration plans.

The gullies and streams contain varying amounts and types of refuse and waste material including garden waste and building materials. The presence of this material detracts from the aesthetic qualities of the gullies. Systematic removal of this material is required to address the problem and steps also need to be taken to minimise this problem in the future.

Drainage structures can be visually intrusive. Future design of such structures will therefore take account of their impact on the aesthetic qualities of the gullies and measures will be implemented to minimise this impact. Similarly steps also need to be taken to minimise the visual impact of existing drainage structures.

13.4 Key Implementation Areas

- Identification and inclusion of key public views in restoration plans.
- Development and implementation of a programme to systematically remove waste material from the gullies and streams.
- Audit of existing drainage structures to determine visual impact and identify remedial measures required.
- Screening of properties that are visually intrusive from within the gullies by appropriate planting.

14 Education and Research

14.1 Objective

- To promote the gullies as an educational resource.
- To encourage the use of the gullies as a research resource and utilise the results of research to deliver better management.

14.2 Policies

- Promote the educational values and opportunities provided by gullies to local schools and educational institutions.
- Encourage participation in restoration of the gullies by local schools and community groups.
- Promote active research into the ecology, cultural and recreational characteristics and values of gullies.

14.3 Discussion

The gullies represent an outstanding educational resource and the Plan is a significant tool for achieving the wider educational objectives of the Green Network and Hamilton's Strategic Plan through community involvement in gully management and restoration. The educational opportunities presented by the gullies will require promotion to the community. This could include provision of information packs to local schools, the Polytechnic and University.

An important means of educating children about the gullies is by involving them in restoration. Not only do they learn about the ecology and values of gullies through this process but by participating they take some ownership of the gullies. Some schools have already been involved in gully restoration. It is hoped that this approach can be extended.

Although the gullies have been the subject of research there is still a great deal to learn about their ecology and restoration. For example although there is a reasonable amount of anecdotal evidence on what constitutes best practice for gully restoration no critical analysis of the effectiveness of restoration efforts has been undertaken to date. There are also considerable knowledge gaps for many faunal groups, particularly invertebrates, but also for better known groups such as birds. The gullies therefore represent an opportunity for local educational institutions to get involved in research projects with high relevance to betterment of the local environment.

14.4 Key Implementation Areas

- Promotion of school involvement.
- Development and distribution of educational literature.
- Promotion of research to local educational institutions.

15 Encouraging Community Participation in Gully Management and Restoration

15.1 Objectives

- To encourage public participation in the management and restoration of the gullies.

15.2 Policies

- Encourage involvement of the community in the restoration and management of gullies including those in private ownership.
- Establish partnerships with community groups and adjoining landowners to facilitate management and restoration of gullies.
- Provide support, information and incentives to private owners of gullies to assist restoration.
- Encourage corporate sponsorship of gully restoration and management initiatives.
- Provide information to the local community on the values of the gullies and how they may participate in their management and restoration.
- Explore the viability of assisting in the provision of native plants for private gully restoration initiatives.

15.3 Discussion

There is a substantial opportunity for the local community to be involved in implementation of the GRMP. Indeed, public support and involvement will be essential if the objectives of the Plan are to be met.

A variety of initiatives will be needed to facilitate public participation in gully management and restoration. This is likely to involve both individuals and community groups. Importantly, this will need to include private owners of gullies. A substantial proportion of gullies in Hamilton still remains in private ownership and has the potential to contribute significantly to returning native biodiversity to Hamilton.

Such initiatives could include:

- providing information on best practice techniques for restoration and management;
- running training workshops on best practice techniques for restoration and management;
- providing native plant stock to private gully owners involved in restoration of gullies adjoining reserves;
- providing information to the local community on the values of gullies and how they might get involved in management and restoration.

Part of the information provided will be directed towards encouraging the local community to refrain from tipping waste materials, including garden waste, into the gullies.

Resourcing the restoration of the gullies represents a significant challenge. Corporate sponsorship may be one means by which some of the capital required could be raised.

The Council is keen to explore provision of native plants from nursery stock or by other means (e.g. partnership with community organisations) as an option for assisting private landowners restore their gullies. However, the practicality of this approach and resource requirements need further investigation before a full commitment to this can be made.

15.4 Key Implementation Areas

- Hold bi-annual training workshop on best practice methods for gully restoration and management.
- Develop and distribute information to the local community on the values of gullies and how they can assist in preserving and enhancing these values.
- Make suitable plants available from nursery stock or by other means (e.g. partnership with community organisations) to private gully restoration initiatives.
- Establish a co-ordinating body for gully restoration and management through partnership with local community groups.
- Investigate opportunities for corporate sponsorship of gully restoration.
- Environmental Initiatives Team involvement.

Part 4 MANAGEMENT CONCEPTS AND PRINCIPLES

16 Gully management zones

Figures 2 to 4 show examples of before and after treatments for the gully zones described below.

16.1 Natural gully zones

Natural gully zones are those parts of the gully currently dominated by native vegetation or where domination by native bush is desirable. The purpose of such zones is to provide for the protection and enhancement of native vegetation and in so doing provide habitat for native fauna. An important function of natural zones will be to provide for protection and enhancement of Key Ecological Sites that occur in the gullies (Downs et al., 2000). Such zones will also include riparian margins of streams where native trees, shrubs and tree ferns will be used create shading and provide habitat for fish. As well as providing for protection and enhancement of the City's biodiversity, these zones will improve the natural ambience of the gullies for users.

In encouraging the dominance of native vegetation, and in particular native evergreens, it is intended to create an environment that is generally hostile to undesirable weed species. It is hoped that over time the management effort needed to control weed cover will be substantially reduced, though it is recognised that some weed control will always be necessary.

Where practical access to or adjacent to sensitive natural gully zones will be provided via paths or by boardwalks in sensitive areas. Management of natural gully areas will be undertaken in such a way as to avoid stands of dense vegetation adjacent to paths. Raising the canopy of trees to improve visibility will be used where appropriate to give greater user comfort.

16.2 Parkland zones

Parkland zones are areas where a more formal character to the gully is the desired outcome. Such areas will consist of mown grass and plantings of individual and/or stands of trees. New planting will be of native species although existing exotic trees considered to be of value will be retained. Some areas may lend themselves to inclusion of stands of native vegetation within a more formal planting structure.

In most situations parkland areas will accommodate walkway and/or cycle tracks. The emphasis will be on providing public access and passive recreation opportunities. Such areas may lend themselves to the inclusion of facilities such as picnic areas.

In practice most parkland zones will exist alongside natural zones. They lend themselves to situations where the base of the gully is broad and flat such as parts of the Mangakotukutuku. In these situations the final outcome will be a formal mown and landscaped area, providing safe public access, with a "natural" bush backdrop (Figure 2).

16.3 Pasture zones

The pasture zone is a unique feature of the Kirikiriroa Gully system. This area will be retained as pasture for grazing and training horses. However, further fencing and reclamation of part of the area may be required to accommodate a walkway. The vision for this area is to retain the open landscape and its current function, but restore native vegetation to the riparian margin and gully slopes. This will result in a pastoral landscape set in a framework of native bush and riparian forest (Figure 3).

16.4 Zoning within the gullies

Figures 5 to 9 show the locations of natural, parkland and pasture zones within the gullies covered by this Plan. The maps have been drawn from existing information. From these maps it is possible to estimate the extent of the various zones as follows:

- Natural Zone c.50 ha.
- Parkland Zone c.19 ha.
- Pasture Zone c.16 ha.

The figure of 50 ha. may be regarded as an approximate target for the ultimate cover of native forest within the gullies currently covered by this Plan. However, for a variety of reasons native forest cover may not be achievable or desirable in all parts of the Natural Zone. For example, it needs to be recognised that many areas within Natural Zones that are currently occupied by exotic plantations e.g. pines, are likely to remain so for some time. Some, such as the redwood trees in Edgecumbe Park may, in effect, remain permanently, only being removed if they become hazardous once mature. The area occupied by Natural Zone is therefore unlikely to reflect exactly the area restored to native forest. Conversely any planting undertaken within the Parkland and Pasture Zones is likely to be dominated by native species, thus adding to the overall area of native vegetation within the gullies.

Figure 2 - Natural/Parkland Zone: Exemplary Treatment

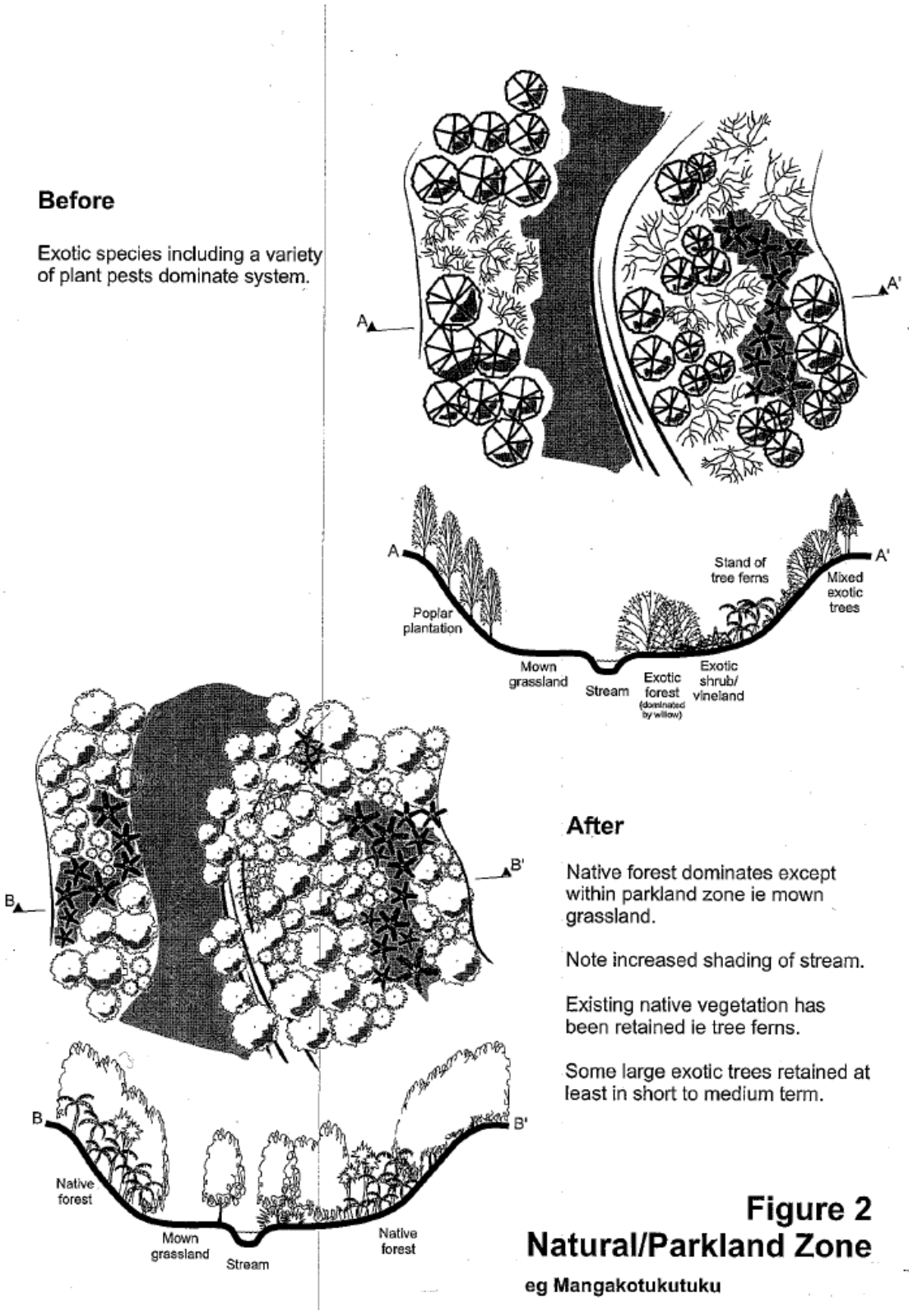


Figure 3 - Natural/Pasture Zone: Exemplary Treatment

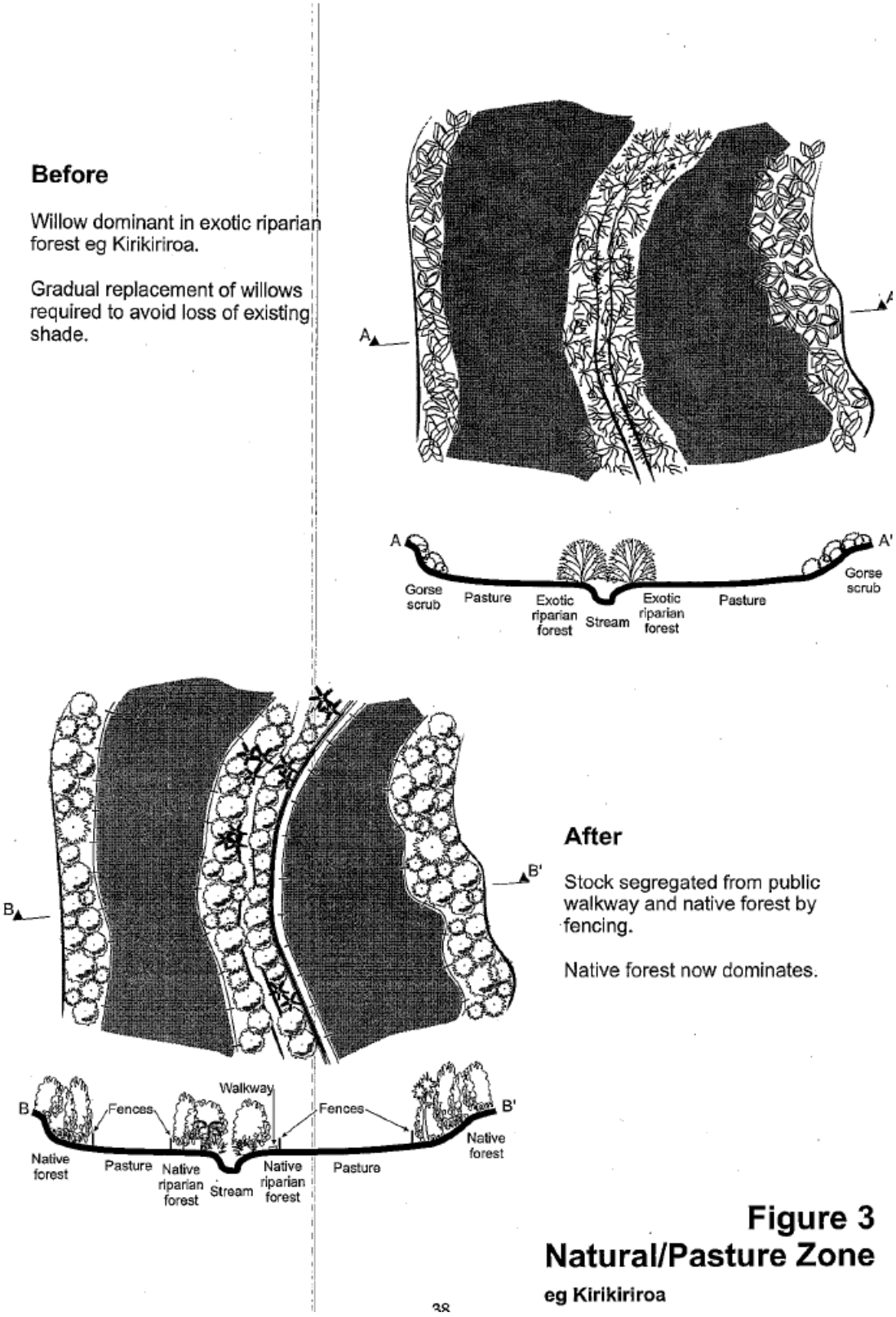
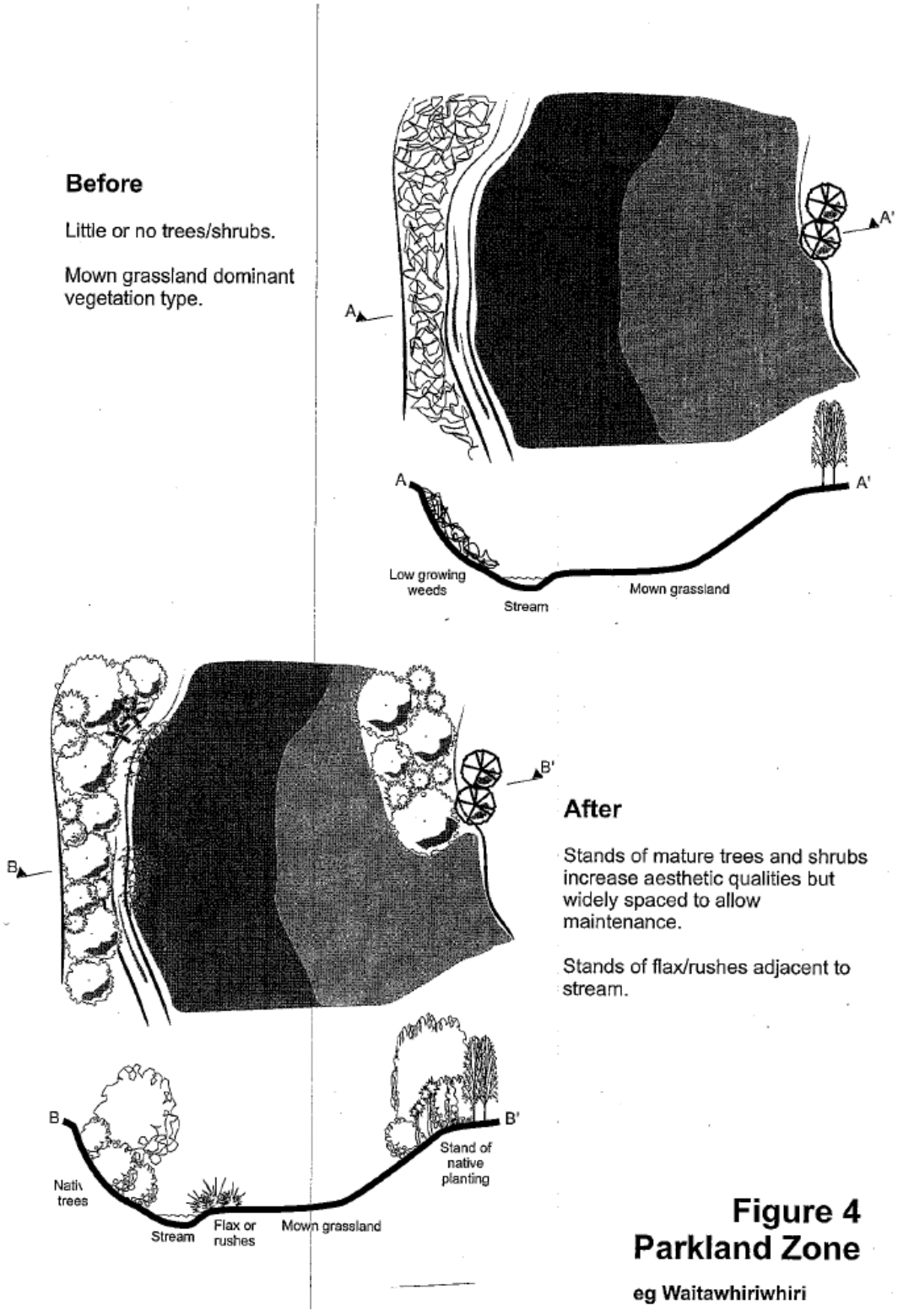


Figure 4 - Parkland Zone: Exemplary Treatment



Figures 5 & 6: Gully Management Zones: Te Awa O Katapaki Esplanade & Kirikiriroa Gully (1)

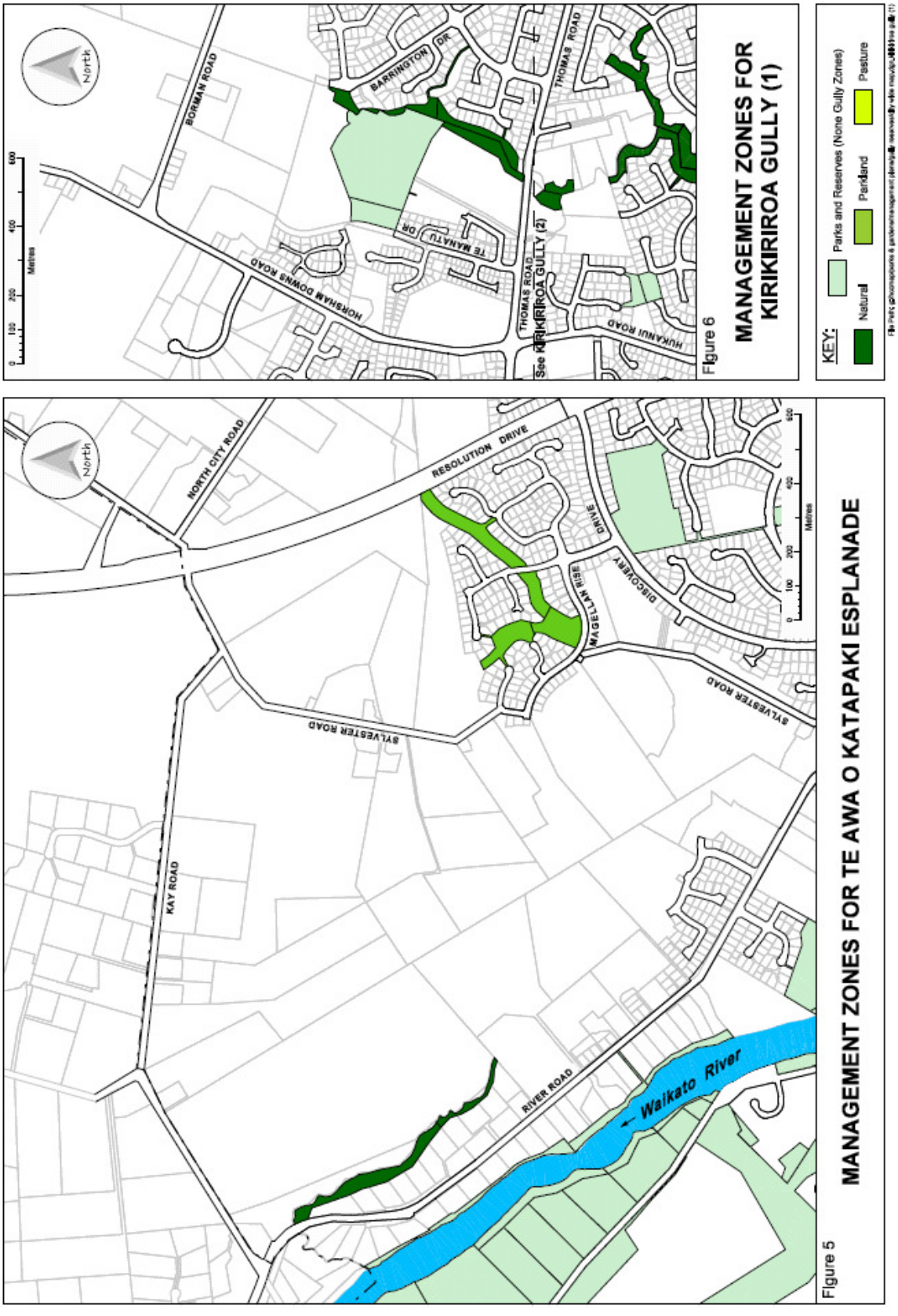


Figure 7: Gully Management Zones: Kirikiriroa Gully (2)

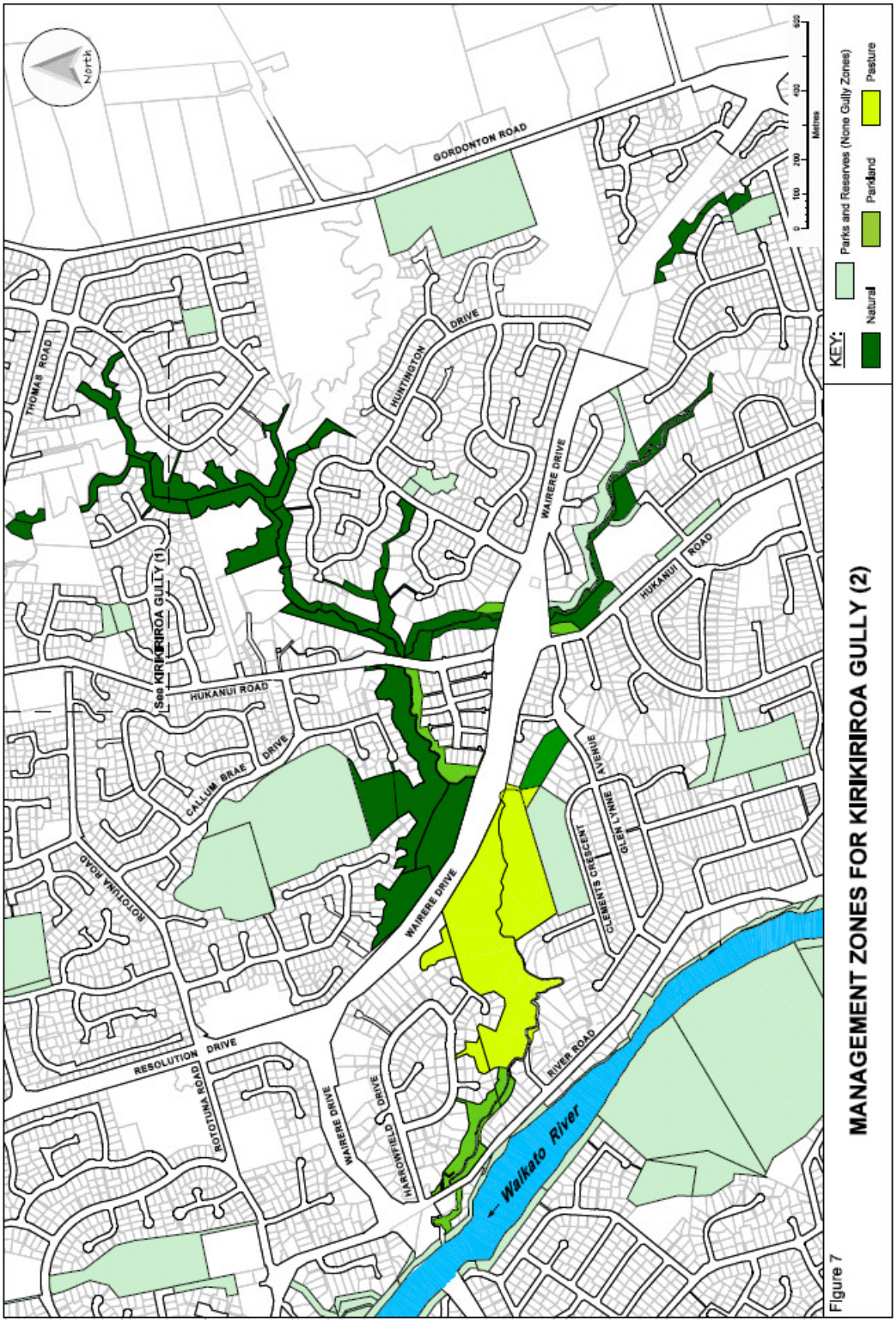


Figure 8: Gully Management Zones: Waitawhiriwhiri Gully (1)

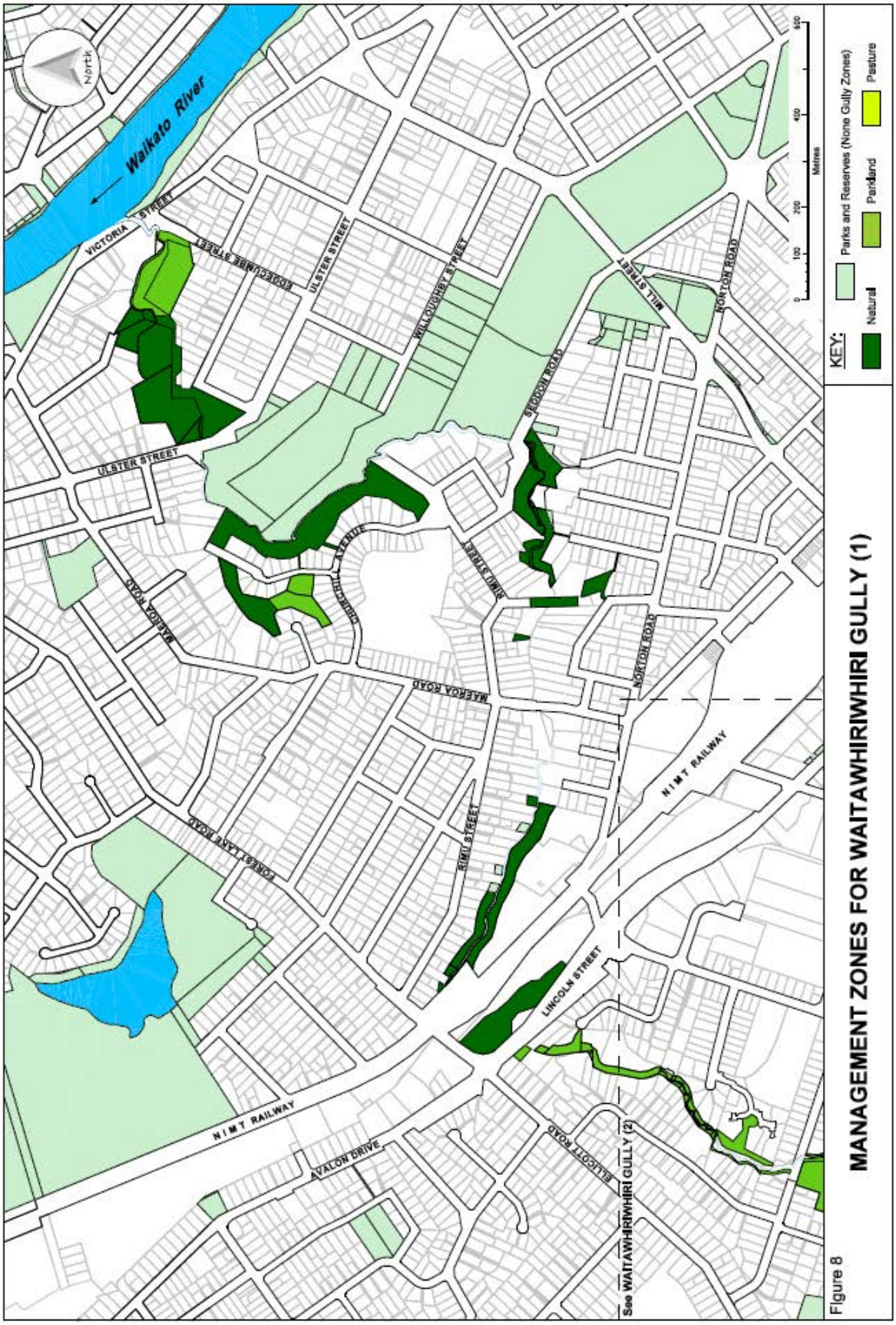
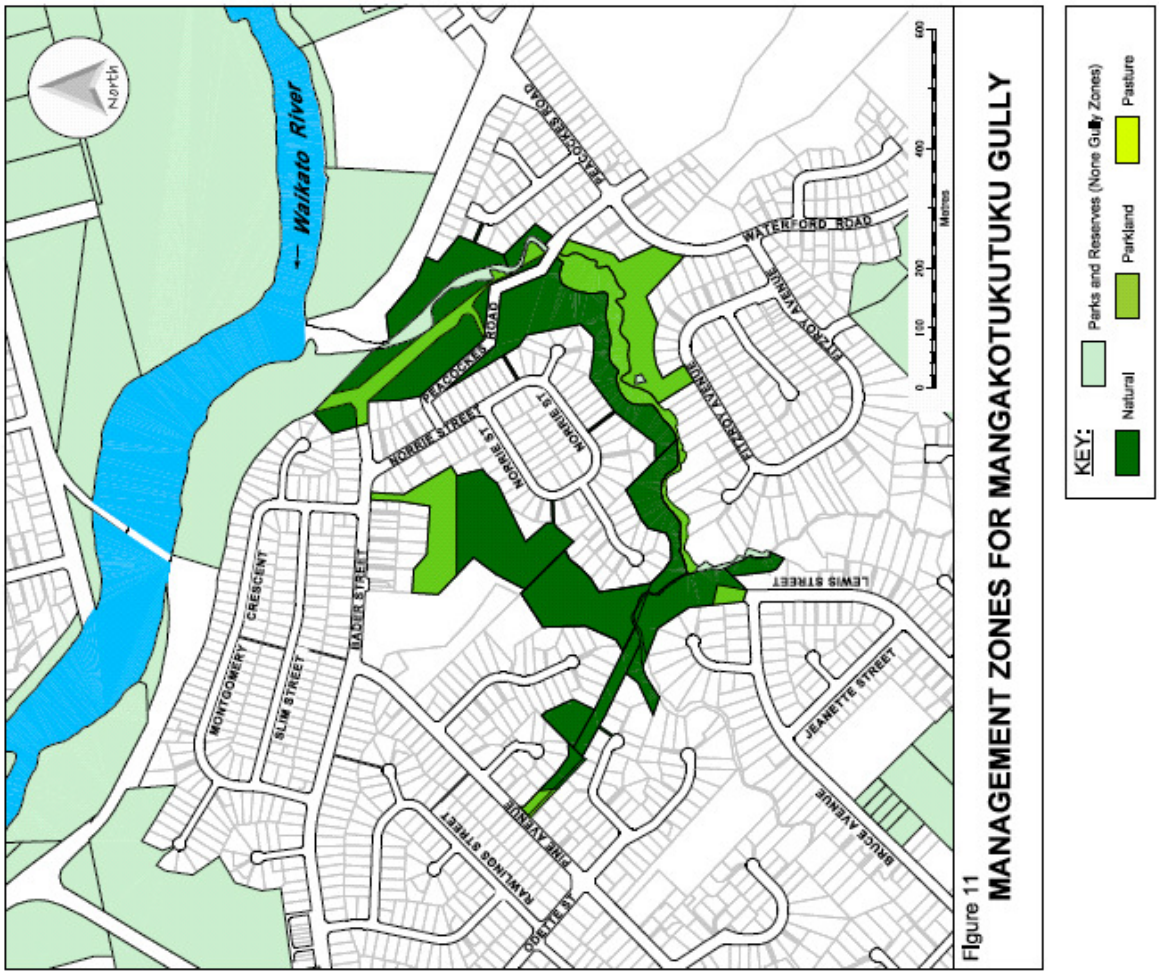


Figure 9: Gully Management Zones: Waitawhiriwhiri Gully (2)

Figures 10 & 11: Gully Management Zones: AJ Seeley Gully & Mangakotukutuku Gully



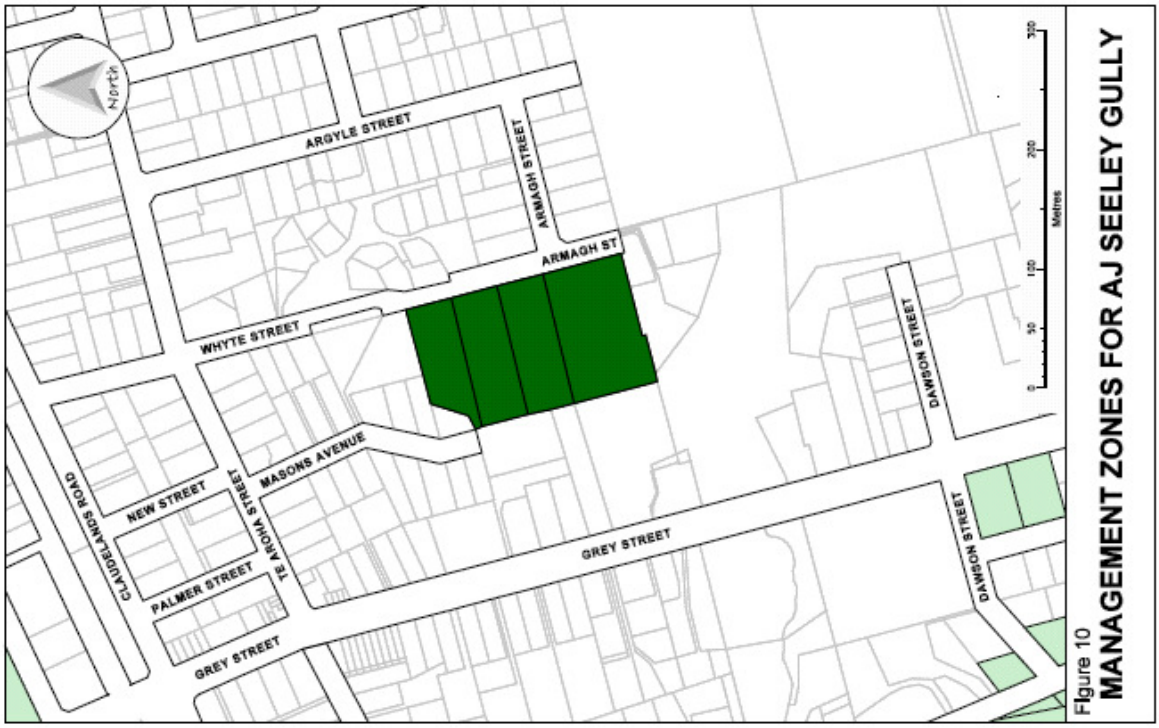
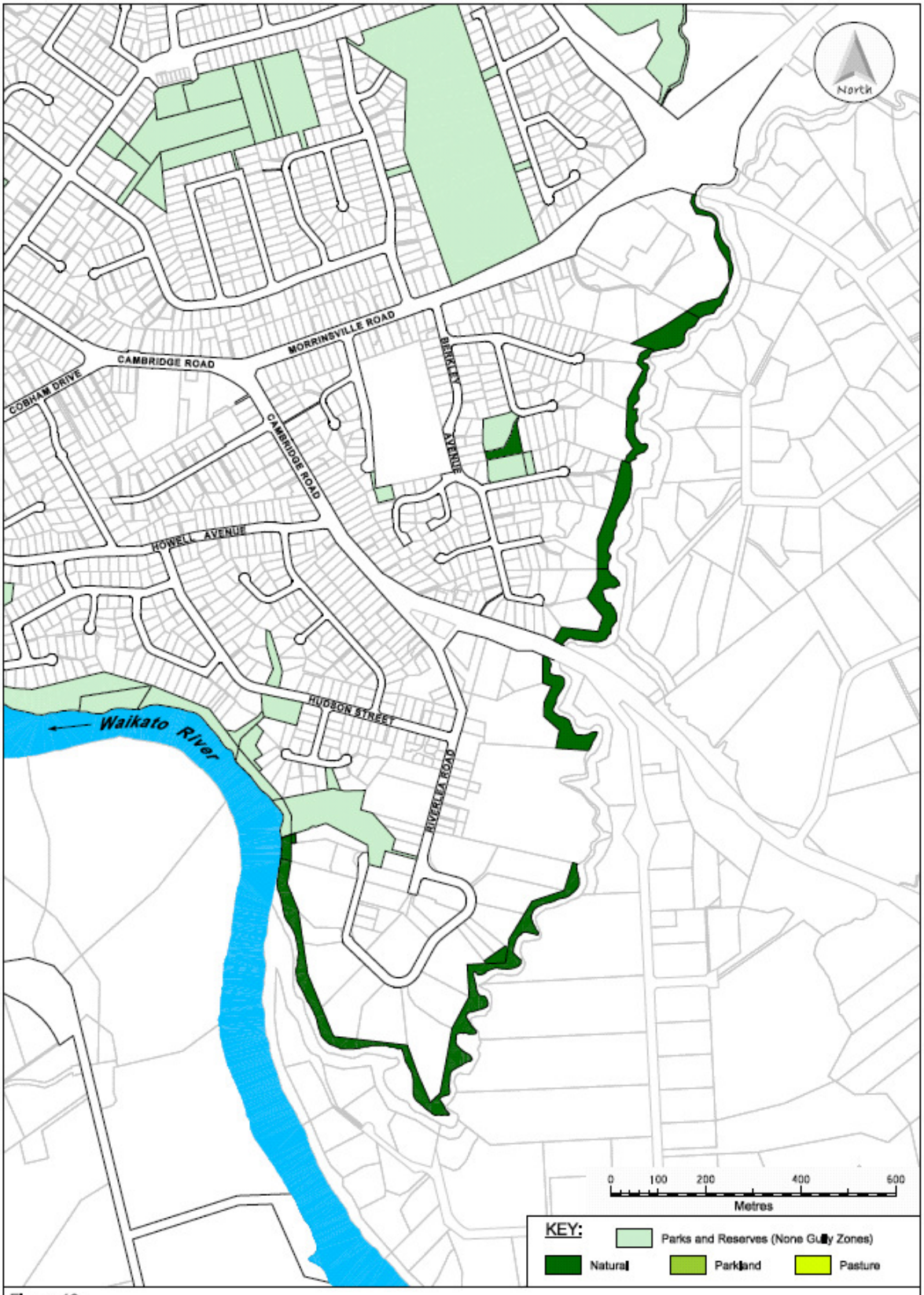


Figure 12: Gully Management Zones: Mangaonua Gully



17 Gully management principles

This section sets out some of the key principles for gully restoration and management. It is not intended to be a "how to" guide. Such information is provided in the Gully Restoration Guide (2001) published by HCC, and it is recommended that this publication be consulted before any gully restoration is attempted.

17.1 General

- Each section of the gully will have a design brief to guide restoration and future management consistent with the policies contained in this Plan and with the design principles set out below.
- Planting designs will take account of the need to preserve and enhance key views into, out of and within the gullies.
- Planting designs and subsequent management will take account of the need for public safety. Where necessary design and subsequent development will be carried out in consultation with adjoining residents to take account of security issues.
- Adjoining landowners will be given an opportunity to comment upon proposals for specific sections of gully prior to implementation. This will enable landowners to raise any concerns they may have regarding the locations of picnic areas, car parks and walkways. It is at this stage that impacts upon views from properties and security issues will be discussed. The level of consultation undertaken will be appropriate to the extent of the proposals planned for a given location.

17.2 Natural gully zones

- Restoration will be undertaken using native species. Planting programmes will be staged to enable the establishment of framework species (see Table 2, Stephens et. al. 1999) followed by enrichment planting.
- Care will be taken to select appropriate species to suit the precise soil conditions and a wide range of framework species will be used in the initial planting. This will include tree ferns such as Mamaku *Cyathea medullaris*, wheki *Dicksonia squarrosa* and silver fern *Cyathea dealbata* that will produce litter that will help suppress the growth of weeds such as *Tradescantia*.
- The ultimate aim will be to create a generally continuous forest cover with a high proportion of evergreen species and dominant native local seed rain that will inhibit colonisation and growth of undesirable weed species.
- Native wetland communities may be established in preference to native forest where ground conditions permit and where deemed to be sustainable (see Clarkson & Clarkson, 1997, for suitable species).
- Prior to restoration all existing native vegetation will be identified and retained within the planting design.
- Existing stands of native vegetation will be used as an initial focus for restoration. Restoration will be progressively extended from such areas.

- Significant stands of native vegetation will be managed to control weed species and where appropriate late successional species will be introduced to enhance their ecological value.
- Where possible a low key, progressive approach to restoration will be adopted. This is particularly suited to areas of exotic forest, where incidence of shrub and vine weeds is low.
- Planting programmes will be staged to enable establishment of framework species before enrichment planting.
- A wide range of framework species will be used to establish native forest.
- Plants of local provenance will be used in the restoration where possible.
- Planting plans will be designed to produce vegetation patterns as consistent as possible with those found in natural ecosystems.
- Planting mixes will include a range of food sources for native birds.
- Riparian planting will include consideration of the habitat requirements of native fish.
- Use of herbicides as a means of controlling weeds will be kept to a minimum.
- Design plans will provide for planting to improve shading of streams and bank stability.

17.3 Parkland zones

- Mown grassland will be the principal treatment within parkland zones.
- Parkland zones will be enhanced by planting native specimen trees or formal plantings of native vegetation.
- Use of herbicides to control weeds will be minimised. Slopes too steep to be mown will be planted with native trees and shrubs.
- Adjacent riparian margins and steep gully slopes will be restored with native vegetation to form Natural Zones following the principles set out in section 17.2.

17.4 Pasture zones

- The principal feature of pasture zones will be grazed grassland.
- Public access will be segregated from the horse paddocks.
- Adjacent riparian margins and steep gully slopes will be restored with native vegetation to form Natural Zones following the principles set out in section 17.2.

18 Development priorities and programme

Each of the gully systems covered by this Management Plan is different and presents different challenges and opportunities. This section defines in broad terms the key characteristics and management priorities for each of the gully systems.

18.1 Kirikiriroa

The Kirikiriroa is a large gully system whose key characteristics can be summarised as follows:

- The gully is relatively broad-based within the area designated as Tauhara Park.
- Pasture is a unique feature of this system amongst the gullies covered by this Plan.

- Access to many parts of the system designated as Tauhara Park is reasonable and the system generally has the potential to offer good public access with an extensive system of walkways.
- Substantial parts of the system in the Tauhara Park area are open with good views afforded into the gully from adjacent public open space.
- Shading of the stream is generally moderate to high throughout the system.
- There is already a significant amount of new native plantings on gully slopes.
- This system presents a major opportunity to create a large unique gully parkland combining natural, parkland and pasture management zones.

Short and medium term priorities for management can be summarised as follows:

- Consolidation of existing planting efforts to ensure weeds are controlled and the correct balance of species is present.
- Progressive restoration of areas currently dominated by exotic forest, shrubs, weeds and vines. A progressive approach is particularly important along the riparian margin where the existing shading provided by exotic trees should only be reduced as native trees achieve significant cover.
- Improvement of access and provision of paths and boardwalks particularly in the Tauhara Park area. Public walkways should be separated from horse paddocks.
- Access for fish is generally good but selected culverts should be assessed for their suitability for fish access.
- Improve visual appearance of equestrian facilities.

Long-term priorities for management:

- Development of picnic and car park facilities.
- Creation of a walkway link to the Waikato River.

18.2 Waitawhiriwhiri

The Waitawhiriwhiri is a long, fragmented system, extending from Edgecumbe Park to the City boundary. The characteristics of this system can be summarised as follows:

- Low incidence of native vegetation and high incidence of undesirable plant pest species.
- High incidence of potential obstacles to fish passage, although eels are believed to migrate to and from Hamilton Lake via this stream.
- Poor water clarity with iron floc present.
- Stream shading generally low.
- Access varies between good and inaccessible.
- A number of major highways fragment the system making development of a continuous walkway difficult to achieve because of the difficulty of achieving a safe crossing.
- Canalised between the City boundary and Lincoln Street.
- Drainage and sewerage structures are visually intrusive in parts of the system.

The presence of major highways probably means that creation of a continuous walkway from the City boundary to the Waikato River is not a realistic objective. The costs of developing

such a walkway are likely to be prohibitive because of the difficulties in achieving safe highway crossings. Rather it is perhaps best to visualise the Waitawhiriwhiri as a series of loosely connected gully parklands with grassed flood berms and some tracks and paths.

Short-term and medium-term management priorities:

- Consolidation of native restoration undertaken in Edgecumbe Park.
- Progressive restoration of native vegetation within those areas currently dominated by undesirable trees, shrubs, vines and weeds.
- Focus on restoration of the side gully in the Stokes Crescent area.
- Application of a parkland treatment between the City boundary and Lincoln Street.
- Treatment of visually intrusive drainage structures.
- Audit of culverts and other structures to assess suitability for fish passage.
- Assessment of the stability of the gully slopes in the vicinity of the closed landfill beneath Beetham Park.

18.3 Mangakotukutuku

The Mangakotukutu gully park is a relatively compact system that has the potential for good links to the Waikato River walkway. Its principal features can be summarised as follows:

- Main gully has a broad base.
- A significant proportion is under plantation.
- Access to the main gully is good.
- There is a swathe of mown grassland throughout much of the gully base.
- The gully supports a stand of maturing replanted native bush.
- Outside the areas dominated by plantation and mown grassland the vegetation is dominated by exotic forest and shrub/vineland. However, pockets of mature tree fern are present throughout.
- There is a number of large mature pines that may represent a threat to slope stability.
- Shading of the watercourse is moderate to poor.
- The culvert under Peacocke Road may represent an obstacle to fish movement.

Short to medium-term management priorities:

- Consolidation of existing planting efforts to ensure weeds are controlled and correct balance of species is present.
- Progressive restoration of areas currently dominated by exotic forest, shrubs, weeds and vines. A progressive approach is particularly important along the riparian margin where the existing shading provided by exotic trees should only be reduced as native trees achieve significant cover.
- Retain existing areas of mown grassland.
- Audit culverts, particularly the one under Peacockes Road, to assess suitability for fish passage.
- Audit large mature trees to assess threat to gully slope stability.
- Introduce shading to streams.

- Provide signage to mark way to and from the Waikato River and give information on the values of the gully

Long-term priorities for management:

- Development of picnic and car park facilities.
- Progressive replacement of plantations with native vegetation.
- Removal of *Tradescantia* from forest/plantation floor.

18.4 Mangaonua

The Mangaonua lies on the City boundary and is linked to Hammond Bush. Its key characteristics can be summarised as follows:

- Supports the greatest proportion of existing native vegetation but also has extensive areas of exotic forest and scrub/vineland.
- Contains the highest concentration of Key Ecological Sites.
- Difficult to access due to steep slope, tipped waste material from industrial sites, fallen timber and dense stands of vegetation.
- Potentially difficult and costly to provide access.
- SH 1 bisects the park.
- Shading of the Mangaonua Stream is poor but fish access is good.
- Offers the greatest potential benefits as a natural zone due to existing native vegetation and proximity to other areas of high ecological value, but potentially the most difficult and costly to restore.

Short to medium term management priorities:

- Create walkway ensuring that adverse effects on existing native vegetation are minimised. The feasibility of creating a Mangaonua walkway has already been assessed (City of Hamilton, 1998).
- Progressive restoration of native vegetation and removal of weeds
- Remove waste and debris and take steps to prevent further illegal tipping.

Long-term management priorities:

- Progressive replacement of plantations with native vegetation.
- Removal of Tradescantia from forest/plantation floor.

18.5 Te Awa O Katapaki Esplanade

Te Awa O Katapaki Esplanade lies near the northern boundary of Hamilton City. It is the second largest key ecological site within Hamilton City, after Lake Rotoroa, and is the only site to include both kanuka forest and wetland with regenerating native species.

Its principal features can be summarised as follows:

- Eastern arm of the gully developed through subdivision and has been built to be representative of a flood plain.
- A significant amount of native planting has been carried out in the eastern arm of the gully.
- The eastern gully includes a walkway cycleway that will be continued in the future.
- The western gully is a more natural area with well preserved native vegetation and few weed species and includes a large kanuka/mahoe stand and provides important linkages to the river corridor.

Short to medium term management priorities:

- Continue the walkway in the eastern gully to link surrounding streets.
- Continue to utilise low growing plants in front of houses in the eastern gully to minimise loss of sun and views.
- Plant higher growing species at the boundary of adjacent properties to frame views.
- Encourage bird life to the area through planting of acceptable plant species.
- Continue to acquire gully land through subdivision to link the western and eastern arms of the Te Awa o Katapaki system.
- Encourage private landowners to participate in the protection and restoration of gully areas within their properties.

Long-term management priorities:

- Continue the walkway/cycleway to link Te Awa O Katapaki with the riverside walkways.
- Progressively restore the gully system and wetland areas by planting native vegetation conducive to the area.
- Use ecologically sourced plant material, specifically trees such as kanuka, mahoe and ground cover ferns, in restoration planting.

18.6 The AJ Seeley Gully

The AJ Seeley Gully is situated in Hamilton East close to Grey and Te Aroha Streets. Access can be gained from Armagh and Whyte Streets.

The management priorities below should be read in conjunction with the objectives and policies contained in this management plan.

History

In July 2004 Dr Alwyn Seeley gifted the AJ Seeley Gully Reserve to Hamilton City. Doctor Seeley purchased the land in 1960 for around 2000 pounds and set about an ambitious project of planting trees in the gully. The property, which is approximately 2ha in size, was originally grazed by cattle There was not a single tree in the gully when Dr Seeley started but with over 45 years of hard work the gully is now filled with thriving kanuka, manuka, totara, matai, poroporo, lancewood, rimu, kahikatea, lemonwood, kauri, nikau and many more species. Use of the gully is currently low key mostly by schools and environmental groups.

Dr. Alwyn Seeley

Key Objective for The AJ Seeley Gully

> To retain the feeling of a natural bush reserve through protection of the work carried out by Dr Alwyn Seeley, continuation of this work through planting of native species and removal of weeds while also providing opportunities for recreation and education to the community.

Management Priorities

Vegetation Management

- Conservation and enhancement of vegetation should be the main philosophy behind the management of vegetation in AJ Seeley Gully.
- Develop a weed control programme particularly for those species identified as Regional Plant Pest Species and others that are a significant threat to native biodiversity of the gully. Methods of control will include a mix of herbicides (in conjunction with Council's Herbicide Policy), physical removal and restoration of the native forest cover.
- Remove vegetation will be where is a threat to public safety. Almost all trees likely to fall into this category in the gully will be exotic trees such as poplars. The Reserves Act 1977 places an obligation on the Council to preserve vegetation but it may, and will, remove trees that are dangerous, or dead/diseased and likely to become dangerous. The decision to remove trees that may threaten public safety or properties will only be taken following inspection by an appropriately qualified arborist.

Community Involvement

- Promote the educational values and opportunities provided by AJ Seeley Gully to local schools and educational institutions.
- Encourage involvement of the community in the restoration and management of the gully.
- Use AJ Seeley Gully as an example to encouragement and support private gully owners.

Public Access

- Improve public access to the gully through formalisation and upgrading of the present walkway through the gully.
- Enhance and promote recreational use of gully for passive recreation in a way that maintains the special ambience and aesthetic qualities of the gully experience.

Interpretation

- Provide information notices within the gully giving details of walkway routes, access and information on features and issues of interest.
- Develop signage and promotional literature to inform the public of the values of AJ Seeley Gully, how they can make best use of them and contribute to its restoration and management.

Links to other reserves

- Preserve, create and enhance linkages between AJ Seeley Gully and other parts of Hamilton's Green Network especially, specifically Jubilee Bush.

Key Implementation Areas

- Develop a detailed planting plan to provide certainty about the future restoration of the gully.
- Remove selected exotic vegetation, specifically the poplar stand before further restoration work is initiated.
- Develop a walkway system through the gully with access from Whyte and Armagh Streets. The walkway should be of low key design and be an example of what private gully owners may be able to do in their own gullies (Figure 13).
- Investigate future acquisition of adjoining land with access off Grey Street to extend the gully and provide pedestrian access.
- Conduct a botanic study, in partnership with others e.g. Waikato University, of the gully to identify significant species and provide a benchmark for future restoration and assessment.
- Develop interpretation signage to identify significant features of the gully and walkway routes.
- Develop interpretation signage to identify significant features of the gully and in association with the walkway provide information on walkway routes.

Hamilton City Council
Te kaunihera o Kirikiriroa

FIGURE 13
AJ SEELEY GULLY RESERVE
PROPOSED WALKWAY

DATE July 2007
SCALE 1:1250 @ A3
PATH G:\Proj\ComServ\Parks_Gardens\AJ Seeley Walkway\CAD\AJ Seeley Gully Reserve.dgn

19 Further information

Hamilton City Council published guidelines for establishing and managing native vegetation in gullies in March 2001. It is called the "Gully Restoration Guide: a guide to assist in the ecological restoration of Hamilton's gully system" and may be obtained from Hamilton City Council.

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Personal communications:

Dr Brendan Hicks — University of Waikato.

Dr Bruce Clarkson — Centre for Biodiversity and Ecology Research, University of Waikato, Hamilton.

Appendix 1

Reserves included in the Gully Reserves Management Plan

Name	Approximate Area (hectares)
Te Awa O Katapaki Esplanade	5.6
Kirikiriroa Gully	
Tauhara Park (part only) plus Lot 6 off River Rd	24.3
Mangaiti Reserve	13.7
Onukutara Park	5.4
Hillary Park (Part only)	1.0
Waitawhiriwhiri Gully	
Aberfoyle Park	1.2
Beetham Park (Part only)	5.7
Waitawhiriwhiri Esplanade	3.5
Rhode Street Park (Part only)	0.2
Olwyn Green	0.3
Edgecumbe Park	5.1
Lincoln Street Reserve	1.4
Kahikatea Park (Part only)	1.3
The AJ Seeley Gully	2.0
Mangakotukutuku Gully	
Sandford Park (part only)	21.3
Mangaonua Gully	
Mangaonua Esplanade	10.8
Humaire Park	1.1
Total	**103.9**

Notes

All reserve land incorporated in this Management Plan lies adjacent to the gully systems and in most instances has a direct link with the relevant stream. The one exception to this is Humare Park (Mangaonua Gully) that, although a branch of the Mangaonua Stream, is physically separated from the Mangaonua Gully by residential properties.

Land excluded from this Management Plan is that part of Beetham Park on the southern side of the Waitawhiriwhiri Stream as this land forms part of Rugby Park which is included in the (draft) West Town Belt Management Plan. In addition, reserves that contain sports fields (such as Tauhara and Kahikatea Parks) are recognised as different park management zones. These zones recognise that different areas within a park system require different management techniques and policies. They also accommodate different levels of use and development.

Appendix 2

Extract from the Reserves Act 1977 detailing the purposes of recreational reserves

17 Recreation Reserves

(1) It is hereby declared that the appropriate provisions of this Act shall have effect, in relation to reserves classified as recreation reserves, for the purpose of 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 and beauty of the countryside, with emphasis on the retention of open spaces and on outdoor recreational activities, including recreational tracks in the countryside.

(2) It is hereby further declared that, having regard to the general purposes specified in subsection (1) of this section, every recreation reserve shall be so administered under the appropriate provisions of this Act that-

(a) The public shall have freedom of entry and access to the reserve, subject to the specific powers conferred on the administering body by sections 53 and 54 of this Act, to any bylaws under this Act applying to the reserve, and to such conditions and restrictions as the administering body considers to be necessary for the protection and general well-being of the reserve and for the protection and control of the public using it:

(b) Where scenic, historic, archaeological, biological, geological, or other scientific features or indigenous flora or fauna or wildlife are present on the reserve, those features or that flora or fauna or wildlife shall be managed and protected to the extent compatible with the principal or primary purpose of the reserve:

Provided that nothing in this subsection shall authorise the doing of anything with respect to fauna that would contravene any provision of the Wildlife Act 1953 or any regulations or Proclamation or notification under that Act, or the doing of anything with respect to archaeological features in any reserve that would contravene any provision of the [[Historic Places Act 1993]]:

(c) Those qualities of the reserve which contribute to the pleasantness, harmony, and cohesion of the natural environment and to the better use and enjoyment of the reserve shall be conserved:

(d) To the extent compatible with the principal or primary purpose of the reserve, its value as a soil, water, and forest conservation area shall be maintained.

Appendix 3

Indigenous vegetation types of Hamilton's gullies

The following is an extract from a report by Landcare Research prepared Beverley R. Clarkson and Bruce D. Clarkson in July 1997 (revised April 2000) for the Ministry of the Environment.

E GULLIES

(i) Narrow gully floors

Landform: Colluvium, rhyolitic sand, silt and gravel + organic, poorly drained, flat

Vegetation type: Kahikatea-pukatea-swamp maire forest

The poorly drained gully floors and their associated backswamps were dominated by kahikatea, pukatea, swamp maire, cabbage tree and pokaka. Understorey and ground cover species included mapou, fuchsia, lancewood, pate, *Coprosma rotundifolia*, *Cyathea cunninghamii*, *Astelia grandis*, kiekie, and supplejack. This type is represented in a small (1 ha) remnant immediately east of Hammond Park, alongside the Waikato River, which is described in detail in de Lange (1996).

Characteristic Species	Life Form
Astelia grandis	monocot herb
cabbage tree	tree
Coprosma rotundifolia	shrub
Cyathea cunninghamii	tree fern
fragrant fern	fern
hangehange	shrub
Isolepis reticularis	sedge
kahikatea	tree
karamu	shrub
kiekie	scrambler
lancewood	tree
mahoe	tree
mapou	shrub
Metrosideros fulgens	liane
pate	shrub
pigeonwood	tree
Pneumatopteris pennigera	fern
pokaka	tree
pukatea	tree
raurekau	shrub
rewarewa	tree
Schoenus maschalinus	sedge
silver fern	tree fern
supplejack	liane
wheki	tree fern

(ii) Terrace scarps and gully sides

Landform: Hinuera Formation, rhyolitic sand and gravel, well drained, steep

Vegetation type: Totara-matai-kowhai forest

The scarps and steep gully side slopes were covered with forest dominated by totara, matai, and kowhai. Kanuka and kamahi were also present, and mahoe occurred in more poorly drained sites. The understorey included shrubs of mapou, mingimingi, and *Rhabdothamnus solandri*, and the ground was covered in a variety of ferns such as *Blechnum chambersii*, *Doodia media*, and *Polystichum richardii*. Slopes too steep for forest had herbaceous or shrubby vegetation including *Machaerina sinclairii*, whatariki, rangiora, koromiko, and heketara.

Characteristic Species	Life Form
Blechnum chambersii	fern
Cyathea cunninghamii	tree fern
Doodia media subsp. *australe*	fern
Earina mucronata	orchid
heketara	shrub
hounds tongue	fern
kamahi	tree
kanuka	tree
koromiko	shrub
kowhai	tree
Machaerina sinclairii	monocot herb
mahoe	tree
mamaku	tree fern
mapou	shrub
matai	tree
mingimingi	shrub
northern rata	tree
pate	shrub
Polystichum richardii	fern
rangiora	shrub
rewarewa	tree
Rhabdothamnus solandri	shrub
rimu	tree
totara	tree
silver fern	tree fern
whatariki	monocot herb

Appendix 4

Council Resolution

Hamilton City Council
Te kaunihera o Kirikiriroa

memo

Private Bag 3010, Hamilton, New Zealand. Phone 07 838 6699 www.hcc.govt.nz

Democratic Support Services

To: General Manager Community Services

From: Fleur Yates

Subject: Draft Reviewed Gully Reserves Management Plan

Date: 6 December 2007 File: 33/117 536/GUL/2

31.10.07

Your report relating to the above refers.

At its meeting held on 5 December 2007, Council resolved as follows:

That:

a) the report and attached Submissions Analysis Report as circulated be received,

b) the Reviewed Sections of the Gully Reserves Management Plan be adopted as the operative sections of the Gully Reserves Management Plan 2007 and that submitters be advised of the adopted plan and thanked for their submissions, and

c) it be noted the adopted Gully Reserves Management 2007 will supersede the previous Gully Reserves Management Plan 2001.

Please note the foregoing and action accordingly.

Fleur Yates
Committee Secretary

Copy to: Parks & Gardens Manager