

Upper Waikato Zone - River and Catchment Asset Management Plan

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Executive Summary

Introduction – Purpose of the Plan

This Asset Management Plan covers river and catchment management assets administered by Environment Waikato within the Upper Waikato Management Zone of the Waikato region. Several individual catchment scheme asset plans have been in place since 1998. These plans have now been reviewed and combined into this single zone plan.

The review was also prompted by the need to include the Waikato River and Catchment Services provisions (Project Watershed) into the earlier documents, the need to include river management assets into a plan, as well as meeting the requirement for five yearly reviews of asset plans. Environment Waikato's Clean Stream Project provisions have also been included in this zone based plan.

The Upper Waikato Management Zone covers the catchment area above Mangakino extending to the Lake Taupo Control Gates. The Plan covers the earlier catchment control schemes including the Torepatutahi, Waiehu and Pueto schemes (known as the Reporoa Schemes), Paeroa Range Scheme (including Whirinaki Scheme), Whakamaru scheme and numerous individual soil conservation and river related projects.

The Plan identifies maintenance programmes, management strategies, performance standards and funding arrangements for catchment and river assets. The Plan is an agreement between Environment Waikato, property owners and local communities as to how existing scheme assets are to be maintained into the future. It is based on the consultation undertaken over a period of time including the ongoing deliberations of Upper Waikato River and Catchment Liaison Subcommittee.

Further capital work is required to achieve complete zone coverage. These works were identified under the Waikato River and Catchment Services Project (Project Watershed) and are now incorporated into the zone asset plan.

The Plan has been prepared in accordance with the Regional Asset Management Strategy adopted by Environment Waikato in 1994, the Resource Management Act (1991) and the Local Government Act (2002).

Description of assets

Catchment scheme and Clean Streams assets include fencing, land retired from grazing use, plantings of trees, and structures including bridges, erosion control structures and minor engineering works, stock crossings and reticulated water supplies.

River protection assets include bank protection, flood control and related river management works.

The catchment schemes were implemented to minimise the effect of high runoff events under storm conditions and to protect land and water resources. The Upper Waikato Zone has a high soil erosion risk due to the nature of the volcanic soils. Earlier storm events were severe enough to threaten the viability of individual farm properties and prompted a call to address soil erosion on a catchment wide scale. The schemes have been highly successful in meeting their objectives and significant benefits have resulted.

The present day value of catchment and river protection assets in the Upper Waikato Zone is \$16 million.

Levels of service

The primary objective of the asset plan is to formalise the management strategies needed to ensure the continued effectiveness of the range of assets in place and to set out a programme of additional future work.

To ensure the works are protected and maintained into the future, most assets are covered by agreements between Environment Waikato and the property owner. These include Land Improvement Agreements (LIA's) and Esplanade Strip Agreements (ESA's) and are usually registered on land title.

Key performance standards have been established throughout the construction and maintenance phases of the earlier work programmes for all catchment based and river works. These standards continue to be ensured through Environment Waikato's monitoring programmes and condition and performance reporting. Asset data management systems (Conquest Data Management) are also in place.

Lifecycle management plan

Strategies have been developed for asset maintenance, replacement and disposal, and for the creation of new assets. These include protocols for decision making at the time an asset has reached the end of its effective life.

Ongoing management strategies are essential if the benefits provided by the river and catchment works are to continue. Maintenance and management must be a partnership between the beneficiaries of the works in particular, the property owner and Environment Waikato.

The present basis for managing catchment scheme assets is set out in individual Land Improvement Agreements (LIA's). These agreements generally apply for a period of 99 years from date of signing. Since 2002, new works require an Esplanade Strip Agreement to be entered into (under Section 229 of the Resource Management Act 1991) dependent upon the extent of work these agreements will continue to provide the contractual basis for scheme management.

New soil conservation works will continue to be promoted in identified priority catchments with high soil erosion risk. The Clean Streams Project is a water quality focused programme which promotes the exclusion of stock from natural water. This project will expire in 2012 and in many cases is carried out in conjunction with the Waikato River and Catchment Services programme.

River management activity comprises routine annual maintenance of priority river and stream channels to ensure unobstructed waterways and bank and channel stability through to more substantial capital erosion control and flood protection works.

Financial requirements

Annual costs have been assessed for the range of activities associated with river and catchment management in the zone. These activities include indirect and direct activities and are explained in more detail in the plan. Costs associated with further capital river and catchment work have also been assessed. These estimates are based on those within the Waikato River and Catchment Services programme as set out in the Funding Policy document adopted by Environment Waikato in November 2002.

For Clean Streams, the objectives and funding arrangements are detailed in Environment Waikato's Clean Streams Water Body Enhancement Strategy. Clean Streams funding applies for a period of 10 years commencing 2002. Fencing and

associated planting are promoted with a grant of 35% being available from Environment Waikato's Investment Fund.

Monitoring and quality assurance

Performance standards set out in the plan are to be monitored such that assets continue to be effective. Compliance monitoring also assists to ensure conditions within Land Improvement and Esplanade Strip Agreements continue to be met.

Environment Waikato will conduct performance audits of the asset management group for internal quality assurance, and undertake customer consultation as part of the Long Term Council Community Plan.

An environmental monitoring programme is to be implemented to assess the impacts of the works undertaken and to document the environmental gains made as a result of the work.

Input from the community will continue to be sought through the activities of the Upper Waikato River and Catchment Liaison Subcommittee, ongoing consultation with key interest groups and via Environment Waikato's Annual Plan and Long Term Council Community Plan processes.

**Environment Waikato
August 2004**

1 Introduction

1.1 Asset management - objectives and principles

An Asset Management Plan (AMP) is a statement of how a group of assets are to be managed over their lifetime. The purpose of the plan is to set out the management policies and philosophies for that scheme, works programmes required, and funding requirements. The overall objective is to secure the long-term performance of those assets at a cost that is accepted and agreed with the community.

Environment Waikato administers a range of infrastructure assets, which provide direct benefits to the community. These assets include flood control, drainage, and soil conservation schemes.

The total current value of all infrastructure assets administered by council is approximately \$340 million.

In order that the schemes meet their stated objectives and remain effective in the long term, management strategies must be in place. Without these, adverse impacts may result. These include a loss of the achievements gained, an increased risk of damage from adverse events, and increased costs.

It is intended that management strategies be developed for each major scheme for which Environment Waikato has responsibility. These strategies will be detailed within Asset Management Plans (AMP's) which will conform to a Regional Asset Management Strategy (RAMS). This is set out in 'Regional Asset Management Strategy' Environment Waikato Technical Report 1994/8.

The objective of the Regional Asset Management Strategy is:

To ensure that the Region's infrastructure assets are managed in a consistent, efficient and sustainable manner; and to ensure that the benefits provided by these assets continue to be achieved for the foreseeable future.

The Regional Asset Management Strategy therefore provides the broad policies and objectives for managing Environment Waikato's infrastructure assets.

The Waikato River and Catchment Services Project (Project Watershed) Funding Policy (Doc# 752002) provides the basis for the levels of service and funding policies contained in this asset management plan.

1.2 Background/history

The Upper Waikato Management Zone covers an area 320,604 ha, of which 125,803 ha is in the Whakamaru area and 194,801 ha is in the remaining Upper Waikato Area. The zone encompasses a broad area stretching from the Kaingaroa Plateau in the east to the Pureora and Rangitoto Ranges in the west. The zone includes Lakes Aratiatia, Ohakuri, Atiamuri, Whakamaru, Maraetai and Waipapa. It also includes the steeper land comprising Paeroa Range, Horohoro Bluffs and northern Hauhungaroa Range.

Geologically the zone is volcanic in nature with 68 percent being comprised of Taupo pumice. The remainder is made up of other volcanic materials, including tephra and muds from the Rotorua Volcanic Centre.

Forty five percent of the zone is in pasture, 39 percent in production forestry, and 15 percent in native vegetation, scrub and other uses.

There are two existing catchment control schemes (CCS's) in the zone – the Paeroa Range CCS and the Reporoa CCS. A number of soil conservation projects in the Whakamaru area are collectively referred to as the Whakamaru scheme. Three previous asset plans were prepared covering these schemes. This Asset Management Plan amalgamates these plans as well as includes other individual plans within the zone that were outside these schemes.



Figure 1 Upper Waikato zone map

The Paeroa Range catchment Scheme (PRCCS) completed 1986 – 1992, is located in the vicinity of Waikite and Ngakuru in the Rotorua District. The catchment area is 68,000 ha and includes the Waiotapu, Whirinaki and Wharekaka streams that flow from the Paeroa Range to the Waikato River. The objective of the scheme is to protect land, roads, bridges and other structures from erosion, improve water quality and enhance the local environment. The scheme also provides protection to the margins of Lake Ohakuri. The forerunner to the PRCCS was the Whirinaki Catchment Control Scheme.

The Reporoa scheme (RCCS) comprises three distinct catchment based soil and water conservation schemes totalling 56,000 ha located in the Reporoa – Broadlands area of the Rotorua and Taupo Districts. These schemes were the Torepatutahi, Waiehu, and Pueto Schemes.

The Whakamaru works were not completed under a single scheme but by way of a number of individual projects (65 properties) completed over a number of years and now managed as an entity. Under Project Watershed provisions the works are subject to the same financial provisions as other schemes in the zone.

All of these works were implemented to minimise the effect of high runoff events under storm conditions on the erosion-prone pumice soils in the area. In the past, during the land development phase, such events threatened the viability of a number of farm properties. The schemes have been highly successful in meeting their objectives of erosion control and resource protection, and significant benefits have resulted.

In addition to the soil conservation schemes, a number of individual projects have been completed (referred to as Isolated Farm Plans) which have addressed specific soil erosion and land management issues.

The scheme assets include conservation fencing, land retired from grazing use, plantings of trees, structures including bridges, erosion control structures and crossings, and are valued at \$18m.

In addition to catchment control and soil conservation, Environment Waikato has responsibility for the management of rivers and streams. These works serve to maintain the productive capacity of land and to reduce natural hazards such as flooding. Works of this type are limited in the Upper Waikato zone although new capital works are planned in the future.

Under the Waikato River and Catchment Services Project, provision has been made for the introduction of a programme of routine river maintenance as well as more substantial capital river works where needed. These programmes are expected to involve treatment of bank erosion and channel instability, the management of vegetation, debris and related channel obstruction and limited flood protection.

The priority waterways for the Upper Waikato Zone are as follows. These streams will provide the focus of future riparian protection and river/stream management effort.

- Waiotapu
- Tahunaatara/Pokaitu
- Ruatawiri
- Kereua
- Waikora
- Torepatutahi
- Otamakokore
- Wharekaunga.
- Mangakowhiriwhiri
- Maraemanuka
- Okama
- Waipapa
- Waiteti
- Mangakino

Since 2002, Environment Waikato's Clean Streams project has been in effect. The project promotes the fencing of streams from stock with the aim of improving water quality. This project will run for 10 years and expire in 2012.

2 Levels of service

This section describes the issues, benefits, objectives and aims of River and Catchment management in the Upper Waikato Zone. Also discussed are the performance standards, methods of legislative protection, and integration with other agencies with regard to asset management works

2.1 Issues

2.1.1 Soil erosion

As a result of land clearance and development significant changes in runoff patterns from largely sub-surface to overland flow had occurred and major soil erosion problems began to emerge throughout the area. This erosion has the following forms:

2.1.1.1 Soil slip erosion

This reached severe proportions on some steeper properties where stock pressure mainly in the form of cattle grazing had removed the vegetative cover. This grazing rendered the land more susceptible to damage from storm events than in the undeveloped state.

2.1.1.2 Gully erosion

Many of the gully channels in the area are ephemeral waterways, which tend to only carry water under storm conditions. This is a feature of the pumice-land. They are usually wide and entrenched, and composed of beds of pumice in-fill materials which under high flow conditions are highly erosive. Erosion within such channels is usually initiated as shallow scours, which will often develop into a defined gully head, some of which may be up to 10m high. These gully heads may advance along the bed of the gully system during high flow events. The deepening of the channel may give rise to lateral instability which causes the channel banks to collapse thus threatening the stability of surrounding land. These problems may be further exacerbated by the collapse of road culverts not designed to cope with the increased runoff. Devastating erosion may be caused by the often sudden and significant volumes of water flowing within the channel as a result of the collapse of such structures.

2.1.2 Water quality

Declining water quality is an issue in the Upper Waikato zone (as it is over much of the Waikato region) largely due to an intensification of land use. It should also be noted that some natural features in this zone contribute to high nutrient levels (volcanic soils and geothermal influences). Toxic algal blooms are becoming increasingly common within many water bodies especially in areas such as the Whirinaki Arm of Lake Ohakuri. Declining water quality is attributable to direct stock access, nutrient run off and historic effluent discharge practices. Irrigation of water high in nutrients may also be a factor in some localities.

Environment Waikato introduced the Clean Streams project in 2002 with the objective of excluding stock from waterways through fencing programmes. This project is concurrent and ancillary to the Fonterra Accord that sets standards as to stock access to streams, promotes sustainable dairying, and overall, aims reduce the impacts of dairying on streams, ground water and wetlands.

2.1.3 River management issues

Environment Waikato has responsibility for the management of rivers and stream systems within its region such that adverse effects on communities and the environment are minimised. Such adverse effects may include flooding and the erosion associated with uncontrolled or unmanaged river systems.

The Waikato River and Catchment Services Project adopted in 2002 specifically provides for the promotion of routine river management activities and specific capital improvement projects.

Within the zone there is a need to:

- promote a comprehensive approach to river and catchment management. This includes activities such as routine river and stream maintenance, riparian and land management, flood control and capital river improvements.
- balance the needs of river management with the proactive management and improvement of the environment
- identify and promote the environmental enhancements resulting from improved river management.

2.2 Scheme objectives and description

The prime objectives of river and catchment management in the Upper Waikato Zone are:

- a) to control active soil erosion
- b) to protect land with potential for erosion
- c) to minimise inputs of nutrients and sediments into waterways
- d) to promote sound riparian management
- e) to achieve the water quality and aquatic habitat standards set out in the appropriate regional plan classification for the rivers and streams
- f) to manage the adverse effects associated with rivers and streams.

Much of the focus of earlier catchment works has been the permanent retirement of waterways within the zone. The specific objectives in relation to this work are:

- a) to reduce the magnitude of peak run off from minor to moderate storm events
- b) to increase infiltration within bed materials in these waterways
- c) to control erosion of channel beds and stream banks.

With the earlier schemes, the objectives were to promote land use change in areas of high erosion risk and to protect the productive capability of pastoral land. The schemes were also viewed as a means of securing the social and economic base of the area.

In excess of 3,000 hectares of high risk land has been retired from pastoral use and converted to a conservation management regime. The erosion control works have included:

- a) Fencing and stock exclusion from waterways and erosion prone land
- b) Planting for erosion control
- c) Structures to prevent erosion
- d) Provision of stock crossings and alternative water supplies
- e) Compensation for land lost to production¹
- f) Minor engineering works (flood detention, storm water control)

A summary of the main asset features of each scheme is set out in Table 1.

Table 1 Catchment Scheme Assets - Upper Waikato zone - January 2004*

Asset	Units
Soil Conservation Fencing	1,345 km
Conservation Planting	2,965 ha
Retired land	4,044 ha
Structures	Numerous
Water supply Systems	Numerous
Total value	\$16.1 million

*Not including some isolated farm plans (due to be surveyed 2005)

¹ Compensation for land retired from grazing applied to earlier schemes only. Has not applied since 1992.

Table 2 River management assets - January 2004

Asset
River Road Boat Ramp Erosion Protection
Lake Maraetai Foreshore Retaining Wall
Lake Ohakuri Foreshore Retaining Wall
Bank protection works – upper reach

Table 3 Clean Steams assets - January 2004

Asset	Units
Fencing	9.5 km
Planting	10.8 ha
Planting	1,225 seedlings

2.3 Description of Works

The following describes the measures applied under the capital works programmes:

2.3.1 Retirement of land

Actively or potentially eroding waterways have been retired from stock grazing under the schemes. This land is referred to as Permanently Retired from Grazing (PRFG). The purpose is to enable vegetative re-establishment for erosion control purposes and to reduce the impacts of stock upon water quality. An objective of erosion control planting is to intercept rainfall under storm conditions, and to enable groundcover plants to be established this promoting infiltration and reducing runoff.

These retired areas act as buffer and protection zones from the effects of overland flow. These areas tend to comprise the major riparian margins. All areas remain within the land title but are subject to a land improvement agreement.

Some land retired from grazing use was incorporated into existing adjacent production forest with future management taken over by the forest owners. An area of 600 ha was transferred to the then NZ Forest Service and under the control of Fletcher Challenge Forests (as at February 2004) and managed as part of Kaingaroa Forest. Due to the nature of the land involved it is critical that appropriate management measures be applied throughout the life of these forests.

Other areas were designated as PRFG areas (Permanently Retired From Grazing) and retained within farm title. These latter areas are managed as protection/production zones and subject to the conditions set out in an agreement between Environment Waikato Regional Council and the property owner.

2.3.2 Re-vegetation of retired areas

Most retired areas have been established in exotic tree species.

Many of the plantings consist of poplar and willow species. These species were favoured in the most severely eroding sites due to their ease of establishment, extensive fibrous root systems and rapid growth. The success in controlling the extreme erosion present in the catchment is largely attributable to the use of these species.

However, in 1973 poplar leaf rust arrived in New Zealand and rapidly spread through certain clones and varieties. This set back the establishment of some plantings and eventually led to greater acceptance of *Pinus radiata* and other coniferous species as suitable soil conservation species.

However, deciduous trees such as poplar and willow continued to be favoured for soil conservation due to their open habit and minimal ground shading effect. The retention of ground covering grasses and shrub species was considered vital in maintaining infiltration capacity and in sediment retention. A combination of shrub willow in the gully floor, poplar on the side slopes and conifers adjacent to the retirement fence became a common planting pattern many schemes.

Conifers have been successfully established throughout each scheme and are providing a high degree of soil conservation benefit. However, it is evident that while these stands have the added benefit of potential financial returns, they also have additional demands in terms of management and maintenance. The consequences of poor management are greater with these species and failure to address problems could potentially reduce the overall effectiveness of the schemes. Total shading out of the floor of the gully can occur thus preventing grass and shrub growth. This exposes the soil and increases the potential for erosion from overland water flows beneath the plantings.

2.3.3 Fencing

Fence construction is associated with the retirement of land from grazing and delineates PRFG areas and must be constructed to a high standard.

Generally existing fences are of the post and batten type and constructed according to standard specifications. In some cases, fences that existed at the time of scheme works were incorporated into the works programme (and legal agreement) and these fences can be expected to require maintenance earlier.

Clean Streams areas are fenced to prevent the type of stock present from entering the fenced area. If the type of stock carried changes then the landowner must make the appropriate changes needed.



Photo 1: Permanently retired from grazing area (PRFG) – Whirinaki scheme

2.3.4 Minor engineering works/erosion control structures

The prime purpose of gully control structures is to reduce the rate of erosion in order to enable vegetation to become established.

The success of such structures has been variable. Some have failed due to the inability to cope with extreme rainfall events or lack of maintenance. However overall, such structures are regarded as a key to the control of active gully erosion and many are performing effectively 25 years after construction. Experience suggests that on some sites they need to be considered as permanent rather than temporary, as often planting alone is insufficient to provide control. The design of future structures must reflect the intended life of the structure.

During recent years, a return to the adverse weather conditions typical of the 1970s to mid 80s has seen many old flume sites reactivated. This has led to a major maintenance program in reconstructing flumes and re-siting fence lines. The surviving flumes are therefore performing an essential task and must be maintained. Recent measurements of peak flows indicate that flow capacities may be up to four or five times greater than the original structure provided for.

The main reasons for flume failures are:

- a) Premature rotting of materials.
- b) Under design of flume capabilities, particularly supporting structures and ability to handle peak flow.
- c) The toppling of trees, adjacent or upstream of these sites, reactivating a previously stabilised area.

Due to the need to retire certain areas of land, stock and vehicular access were denied in some situations. This necessitated the construction of alternative access ways in the form of timber bridges and culverts. In some cases, alternative reticulated water supply systems were also installed.

2.3.5 River management assets

The River Management Assets in the Upper Waikato Zone are limited to three known structures (see Table 2) although it is possible that others are present. The purpose of these assets is mainly to control riverbank erosion at these sites. Timber structures need regular inspections to ensure their ongoing integrity.



Photo 2: Bank erosion – Waikato River - Reporoa

2.4 Contractual arrangements - Land Improvement Agreements (LIAs)

A Land Improvement Agreement (LIA) was entered into with each property landowner at the time of catchment works commencement and most are registered upon land title.

In the case of works on Crown land, these assets are not covered by formal agreements.

An example of a typical Torepatutahi Scheme Land Improvement Agreement is shown in Appendix I. However, it should be noted that there are differences in the wording of agreements across the schemes.

The agreement is a contract between the registered landowner and the (then) WVA, now Environment Waikato. It is effective for a period of 99 years from the date of signing unless amended by mutual agreement.

The agreements were the means by which the Government ensured security over funds advanced. In the longer term, the agreements set out the obligations of landowners and Environment Waikato, including the provision for maintenance grants for specified works. The financial commitments have been carried forward into the Waikato River and Catchment Services Funding Policy.

The critical elements of the LIAs are:

- a) Owner shall permit Environment Waikato officers' entry onto land to inspect works.
- b) In cases of default of conditions, Environment Waikato may:
 - i. require owner to repay grants or portions thereof
 - ii. require owner to remedy any default
 - iii. carry out works to remedy and recover from owner.

The prime obligations upon the owner are to:

- a) carry out routine repairs and maintenance according to the provisions of the agreement
- b) keep fences in a stock proof condition
- c) maintain conservation areas free of stock
- d) carry out silviculture in order to maintain trees in effective condition
- e) make application for approval to utilise mature trees
- f) replace trees (where utilised) at owner's cost.

The provisions for maintenance apply to the first rotation of trees only. Any subsequent crops are to be subject to new arrangements, which must be documented by way of a variation to the original LIA.

The prime obligations of Environment Waikato are to:

- a) make maintenance grants available for specified activities
- b) specify appropriate management practices
- c) monitor the compliance to LIA conditions.

The ongoing effectiveness of the schemes is dependent upon the parties continuing to meet the obligations under the LIA's. The expectation is that existing scheme works will be maintained and replaced when needed for the term of the agreement that is, 99 years.

However, it is expected that in practice there will be situations where it may be appropriate not to replace some works in an equivalent manner. It would be expected that in such cases an evaluation would be undertaken to assess the ongoing necessity for new work. This would be determined on a case by case basis and considered in the light of the scheme performance standards. Mutual agreement would be required to make any changes to the intent of the original LIA and formalised.

The presence of agreements on title also means there is a need for Environment Waikato to be aware of any changes of registered owner and other land changes. There is therefore a need to ensure mechanisms are in place for ongoing liaison and contact with new property owners, and incorporated into future monitoring and inspection programmes.

Under the Resource Management Act 1991, Esplanade Strip Agreements (ESA) are now used as a tool to protect retired areas. ESA's are also registered against property title. The conditions of the ESA are as set out in the Tenth Schedule of the RMA 1991. An ESA is required in all cases where Environment Waikato's contribution to the works programme exceeds \$10,000.

2.5 Scheme benefits

A range of benefits result from catchment and river works. Some can be expressed in financial terms; other benefits are more difficult to quantify.

Financial benefits may take the form of saved land loss from erosion, farm management benefits, and protection of infrastructure such as roading. These benefits accrue primarily to the landowners and the local and wider communities.

Catchment and river protection works provide benefits in terms of biodiversity. These benefits include providing native vegetation habitats and wildlife corridors for native animals. Enhanced riparian plantings lower water temperatures and provide shade thus improving in-stream habitat for fish and aquatic invertebrates and plants, facilitating higher water quality. A high standard of water quality is also achieved by keeping stock

out of streams and riparian strips resulting in less pollution and sedimentation due to the prevention of stock induced erosion.

Other benefits include aesthetic enhancement and resource protection. These benefits tend to be received by both the local and wider communities. These benefits are fully described in the Project Watershed Document. The benefits of Clean Streams relate primarily to the enhancement and protection of water quality.

2.6 Community liaison/consultation

Since the introduction of the Resource Management Act (1991), there has been greater community participation in resource management issues.

Property owner and other interest group involvement are essential for successful ongoing implementation of this plan. The wider public have the opportunity on an annual basis to comment on all plans administered by Environment Waikato as part of the Annual Plan and Long Term Council Community Plan process. Submissions can be incorporated into policies, asset plans and operational programmes. Community input can also be provided through the River and Catchment Liaison Sub-Committee and referred to Council.

In the Upper Waikato Zone, the local community generally has a strong interest in the works undertaken. The community is kept informed through the activities of the River and Catchment Liaison Subcommittee and regular Newsletters.

2.6.1 River and Catchment Subcommittee

Environment Waikato has established River and Catchment Subcommittees in each of the management zones with the Waikato region and these operate within Terms of Reference adopted by Council. The subcommittees report back to Council through the Operations Committee and have been established to advise Environment Waikato on river and catchment activities within each zone. They also serve as a means of conveying information back to the community.

The Upper Waikato River and Catchment Subcommittee comprises representative property owners, iwi, Taupo District Council, Rotorua District Council, Hydro Power Operator (Mighty River Power Ltd.), and Environment Waikato. Representation from forest owners/managers, Fish and Game and other parties may be appropriate from time to time. The term of representatives on the subcommittee is generally 3 years consistent with the Council election cycle.

The Torepatutahi Landcare Group deals with the ongoing management of the Torepatutahi Canyon, an area of Crown land that is subject to a management agreement between Environment Waikato and the Department of Conservation. Members comprise Environment Waikato, scheme landowners and the Department of Conservation.

Across the zone, future activities may include field days, seminars/workshops and the provision of specific advice and information. This may assist in promoting integration of the range of environmental management matters for which Environment Waikato has responsibility. This programme is to be developed further in conjunction with the Environmental Education programme within Environment Waikato.

Under section 8 of the Resource Management Act (1991) all persons exercising functions and powers under it, in relation to managing the use, development, and protection of natural and physical resources, shall take into account the principles of the Treaty of Waitangi. This is achieved by consulting with Iwi on matters in relation to this asset management plan.

2.7 Integration of functions and agencies

Environment Waikato has responsibility to manage a range of resource management matters. It is important that these be managed in an integrated way in order to maximise use of available resources, and to provide clear linkages with other organisations and agencies.

2.7.1 Environment Waikato internal integration

2.7.1.1 On Farm Services

The On Farm Services project has been developed as a way of improving the co-ordination of services Environment Waikato offers across the region. To achieve this, teams of trained and competent largely field staff will operate within five zones within the region. Each team will be comprised of representatives from a range of groups and programmes within Environment Waikato who will share and exchange information. This will assist in the dissemination of information and achieve greater consistency in approach.

It is also expected that improved customer response systems (to be introduced in July 2004) will assist in timely response to enquiries and divert calls to those most appropriate to deal with the issue.

2.7.1.2 Biosecurity issues

The objectives of plant and animal pest management are consistent with achieving sound environmental and asset management. It is therefore intended that annual control programmes be prepared in conjunction with the asset management programme where appropriate.

2.7.1.3 Co-ordination with Resource Use Group

There is a need for clear communication between Asset Management and Resource Use Group staff. Many land use activities effect or have the potential to affect assets managed under this plan. Non-compliance with resource consents with regard, for example, to effluent disposal may have a major effect on water quality in areas protected by Clean Streams or initiate erosion within soil conservation compartments if irrigators are not moved frequently.

2.7.2 Land use regulatory controls

The control of land based activities such as earthworks and vegetative removal is presently under review as part of the development of a Regional Plan being prepared in accordance with the RMA by Environment Waikato.

With increasing emphasis being placed upon the effects of land use under the RMA, there is likely to be an increasing shift toward promoting individual responsibility and self-regulation. In this way, it is likely that there will be a shift away from the regulatory controls that presently apply.

The LIA's address land disturbance activities by way of the requirement for approval to be obtained for activities that impact upon a scheme asset. However, the LIAs will not cover every eventuality, and in the future certain land use may be subject to a regional or area/issue based management plan.

2.7.3 Rotorua and Taupo District Councils

Consultation between district and regional agencies is necessary in implementing this plan. This will include liaison following storm events, discussions regarding district and regional planning functions, and general community liaison. Liaison will also occur as part of River and Catchment Liaison Subcommittee activity.

2.7.4 Department of Conservation (DOC)

DoC has responsibility for the administration of significant areas of land in the Upper Waikato catchment. This includes land set aside under the catchment schemes and under DoC control. It also includes non-scheme related riparian land, which may be contributing to scheme objectives. The management of these areas has attracted considerable local interest particularly following the establishment of the Torepatutahi Canyon Landcare Group. The group has provided the forum in which issues associated with the management of these areas may be identified, options discussed and actions taken. There may be scope for further development of this type of approach.

In a general sense, DoC is frequently consulted before activities with which they have an interest take place, and advice is often sought.

2.7.5 Fish & Game

Fish and Game manage populations of freshwater fisheries and game birds, their habitats, and public access. Environment Waikato will seek advice and where needed, authorisation from Fish and Game to undertake activities in or near fish and waterfowl habitat.

2.7.6 Forest management

An area of land established in plantation forest under the scheme is now managed as part of extensive forest interests. Due to the establishment history of these forests, and the fact that some are non-contiguous with the main forest blocks, they often have a poor conservation management history. In some cases, maintenance work is now due.

Associated with this is the fact that while the plantings were established under the earlier schemes, most are not subject to a formal agreement and conservation management is dependent upon the co-operation and support from the forest owners.

Forest management issues are likely to increase as plantings approach maturity and eventual harvesting. There is also the matter of post harvest management or implications of changed land use. The matter of whether the same levels of riparian protection need to apply as increasing land area is converted to forest use is also expected to arise.

To address these issues it is proposed that a greater level of liaison be established with forest owners/managers with the view to entering into more formal partnership arrangements where this is appropriate. Better communication between asset management staff and Resource Use Group staff regarding consent issues will address these issues.

2.8 External consultation

In addition to the parties already referred to, external consultation with other key stakeholders will be undertaken in the ongoing development and implementation of this plan. These stakeholders include local Iwi, and land user or special interest groups.

2.9 Service delivery

Service delivery is the mechanism by which scheme works are managed and maintained on an ongoing basis to ensure that the required level service is provided to scheme beneficiaries. In general, it is envisaged that Environment Waikato will move progressively towards adopting contestable and competitive processes for achieving service delivery in the most cost-effective manner.

Service delivery can be broken down into three main components:

- a) administration and management

- b) quality assurance (monitoring, inspections)
- c) maintenance works.

2.9.1 Administration and management

Currently administration and management of schemes is undertaken using Environment Waikato resources. These functions are the most difficult to competitively tender in a manner that ensures quality of service is maintained. These functions are also closely associated with Environment Waikato's responsibility to administer legislation such as the Resource Management Act. It is envisaged that this practice will continue into the foreseeable future. The Health and Safety in Employment Act 1992 has implications to many of the functions associated with asset management service delivery and places certain obligations upon the parties in ensuring that work activities are carried out in a safe manner. These requirements will impact upon plan implementation.

2.9.2 Quality assurance

Both Environment Waikato resources and Contractors are used for asset monitoring and inspection functions and this is expected to continue.

Quality assurance services are suitable for contesting on the open market provided adequate specifications and quality standards are defined.

2.9.3 Maintenance work

All maintenance work is currently carried by out private sector contractors or by property owners. It is not expected that there will be a need to alter these arrangements as these two methods are managed in a way that is competitive and leads to a cost effective delivery of services.

Again, Occupational Health and Safety legislation has implications to the contractual obligations in the undertaking of work and will need to be fully taken into account.

As previously stated, all activity for which Environment Waikato's funding provisions apply must be fully discussed and agreed prior to works commencement.

2.10 Key performance indicators

The key performance indicators applying under this Asset Management Plan are:

2.10.1 Complete stock exclusion from all retired areas

- No grazing of conservation areas covered by a Land Improvement Agreement / Esplanade Strip Agreement.
- Stock proof fencing is to be in place on all conservation areas. The standard of fencing is to be determined by the type of stock present.

2.10.2 Establishment of vegetation within PRFG Areas

Plantings shall be managed in a manner that meets soil conservation objectives. That is:

- a) adequate ground cover present
- b) erosion controlled
- c) adverse impacts avoided

2.10.3 Installation of alternative crossings/access-ways

Stock crossings and access-ways, usually in the form of culverts, low level fords and bridges are managed and maintained such that they continue perform their function effectively.

2.10.4 Erosion control structures such as gully flumes

The performance standards are:

- a) Maintenance of the structure to convey flows safely without any channel obstruction etc., for the life of the structure.
- b) Maintenance of the supporting vegetation to avoid any channel congestion, damage to the structure, or initiation of new erosion etc.

2.10.5 River and stream management

The performance standards are:

- a) Stable, healthy and well managed river systems
- b) Effects of flooding, erosion, channel congestion minimised
- c) Infrastructure assets (existing protection schemes) maintained and managed
- d) Public access and amenity values associated with rivers and streams enhanced
- e) Economic and social well being of communities protected and enhanced

2.10.6 Environment Waikato's Clean Streams

The key performance indicators for Environment Waikato's Clean Streams Project are:

- a) Complete stock exclusion from waterways bounded by Clean Streams fencing
- b) Where plantings have been incorporated, the plantings are maintained in a healthy, weed free state.

Note: This Project is distinct from that promoted under the Fonterra Accord. However, both projects seek outcomes.

2.11 Non compliance with agreements

In those instances of non-compliance with the conditions set out in registered Land Improvement or Esplanade Strip Agreements, the following process shall apply:

- i) **Incident I:** Verbal contact to be made with property owner/manager. Reasons for breach of agreement to be determined. Incident recorded on File. Formal letter to be sent if appropriate.
- ii) **Incident II:** Verbal contact to be made with owner/manager. Incident recorded on File. Letter to be sent outlining concerns over further breach. In cases of further wilful breach, warnings given as to possible legal action in the case of further breach, where appropriate.
- iii) **Incident III:** Incident recorded on File. In cases of deliberate breach of conditions, registered letter forwarded to owner. Warnings given. Legal action recommended to Council as appropriate.

3 Asset valuation and condition

3.1 Asset valuation

The replacement value of the catchment, Clean Streams and river assets in the Upper Waikato Zone are set out in the following Tables.

Table 4: Value of catchment assets - Upper Waikato zone (to March 2004)

Asset	Units	Replacement Value
Soil Conservation Fencing	1,345 km	\$10,629,000
Conservation Planting	2,965 ha	\$3,875,000
Retired land	4,044 ha	-
Structures	Numerous	\$918,000
Water supply Systems	65 systems	\$755,000
Total		\$16.1 mil

Table 5: Value Clean Streams assets- Upper Waikato zone (to March 2004)

Asset	Units	Replacement Value
Clean Streams Fencing	9,000 m	\$90,000
Clean Streams Plantings	1225 plants	\$4,900
Total		\$94,900

Table 6: Value of river management assets

Asset	Value
River Road Boat Ramp Erosion Protection	Yet to be assessed
Lake Maraetai Foreshore Retaining Wall	
Lake Ohakuri Foreshore Retaining Wall	

3.2 Condition of catchment assets

This section describes the condition of catchment assets as at October 2003.

3.2.1 Fences

The majority of scheme fencing remains in a stock proof condition, and is meeting the scheme asset plan requirements. Fencing is generally in good condition. The fencing materials are on the whole, still sound and the fences are largely stock proof. However, some problems have been associated with corrosion of post staples by the timber treatment, wire breakage, and build up of silt, migration of gully erosion features beyond scheme fences, and additional stock pressure due to a land-use change.

The Upper Waikato Zone has over 1020 km of fencing. 521 km of these fences has been inspected. This correlates to 487 of the 880 fence assets inspected on the ground. Of the 487 inspected fences, 97 or 20% have a portion of condition factor 4 or 5, indicating they are no longer stock-proof. However, only 49 km of the 521 km inspected or 9.5% of the total inspected fence length requires major renewal. See Table 7.

This situation is due to the fact that many of the original fences built as part of the soil conservation schemes and nearing the end of their life and are due for replacement. As more fences in the Upper Waikato Zone reach 25-30 years old additional focus is required to ensure that they are replaced. The aerial inspection reflects these figures, where ten fences were sighted and recorded as requiring attention.

Planned maintenance work for the 2003/2004 year aims to undertake some of the fencing repairs.

Table 7: Soil conservation fence condition

Condition Ranking	%	Metres
Not Present	1%	10,210
1	13%	132,730
2	51%	520,710
3	25%	255,250
4	9%	91,890
5	1%	10,210
Total	100%	1,021,000

3.2.2 Plantings

Aerial inspections undertaken indicated that 20% of problems seen in soil conservation areas involved willow and poplar congestion. On the ground inspections as per Table 8 show that the majority of plantings are in good condition, but with 10% requiring some form of follow up and maintenance. This 10% involves the removal of historic erosion control willow plantings that have not been properly maintained and have congested from stream systems and gullies under LIAs. These original plantings have served well to stabilise gullies and conserve soil. Major works are now underway on several properties to rectify willow congestion.

Table 8: Soil conservation planting condition

Condition Factor	%	Area (ha)
Not Present	2%	54.5
1	6%	163.5
2	51%	1390
3	31%	845
4	10%	272
5	0%	0
Total	100%	2725

3.2.3 Structures

Access-ways constructed under the scheme are generally in good condition. Property owners are responsible for maintenance of all structures as described in the Land Improvement Agreement and since they tend to be regarded as essential property assets, maintenance is generally carried out when necessary. Erosion control structures are not included in this condition report as there is currently little information on their condition across the zone. A detailed erosion control structure inventory is due to be completed before December 2004.

Table 9: Soil conservation structure condition

Condition Ranking	1998/1999	2002/2003
1	1%	1%
2	67%	67%
3	25%	25%
4	5%	5%
5	2%	2%
Total	100%	100%

3.2.4 Water supply systems

Water supply systems are in good condition and no known problem areas are present. As for structures, the property owners are responsible for maintenance and they are regarded as essential property assets and maintenance is usually at an acceptable level.

Table 10: Soil conservation water supply system condition

Condition Ranking	1999/00	2002/2003
1	-	-
2	75%	75%
3	20%	20%
4	5%	5%
5	%	%
Total	100%	100%

3.2.5 Condition of Clean Streams assets

Because the Clean Streams project is in its infancy at this stage, all of the assets are in good condition.

3.2.6 Condition of river management assets

The river related structures are generally in effective condition with minimal maintenance necessary as at Feb 2004.

Table 11: Condition of river management assets

Asset	Condition
River Road Boat Ramp Erosion Protection	2
Lake Maraetai Foreshore Retaining Wall	3
Lake Ohakuri Foreshore Retaining Wall	3

4 Life cycle management plan

4.1 Management strategies for the maintenance of assets

Ongoing maintenance is required to ensure the continued functioning of the river and catchment Assets. In order to identify where maintenance is required information is continuously gathered through property inspections. Scheme assets are inspected and their components (fences, plantings, structures) are graded on a scale of one to five

(five being very poor condition). (see Appendix IV Table 18) This information is inputted into the Conquest Asset Management database to enable reports to be generated highlighting priority areas where efforts need to be focussed. These reports are also used to complete condition and performance reports. When works are completed the information in the database is updated.

Generally, it will be expected that maintenance will be carried out whenever an asset does not meet the Scheme Performance Standards or where a condition within the LIA cannot be met without asset repair.

To date, responsibilities for asset management have focused upon those associated with the Land Improvement Agreements. However, under the Resource Management Act 1991, there are responsibilities upon land users to minimise the impacts of land use and it is implicit in this asset management plan that over time increasing reliance will be placed upon self regulation and self monitoring. Environment Waikato is expected to increasingly provide an overview and audit role. This approach would be developed in conjunction with the River and Catchment Liaison Subcommittee.

Scheme management may also be assisted by the introduction of a regional or area/issue specific management plan, which will provide further guidelines/standards for the conduct of certain activities.

It should be noted that there is no funding provision for the maintenance of Clean Streams projects. Under the conditions under which this project was established, the capital funding applies for a specified period only (until 2012) and maintenance is the responsibility of the landowner.

4.1.1 Soil conservation fencing

For fences constructed under scheme specifications, minimal fence maintenance has been necessary over the first few years of fence life. However, repairs can be expected to increase as the assets age over time. It is expected that provided timely repairs are carried out, fences can remain in place for an extended period. Therefore, the time of complete replacement may not often occur, unless necessitated by land use changes or other factors.

Since the prime objective is to maintain fences in a stock proof condition, ongoing vigilance is necessary and works completed as soon as possible after problems are observed. The timing of replacement of the individual components of the fence will be directly related to the timely completion of routine fence repairs throughout the life of the fence.

It should also be noted that where financial provisions for fence replacement exist within LIAs, this is conditional upon routine repairs being undertaken as needed during the life of the fence.

Fence life may be increased by the addition of a single electric wire to conventional (post and batten) fences and this practice is to be actively encouraged as an asset management strategy.

The consultation undertaken in the preparation of this plan indicates that owners wish for provision to be made for application to make adjustments to fence lines where considered appropriate.



Photo 3: Fence maintenance is required on an ongoing basis

4.1.2 Soil conservation plantings

A prime objective in the maintenance of soil conservation plantings is to ensure the ongoing health and vigour of those plantings over the term of their expected life.

There may be situations in which tree vigour may have diminished but where there is minimal detriment from taking no action. There must therefore be clear justification for undertaking any management measures.

The prime objective within areas fenced for conservation purposes is to maintain an adequate ground cover of grasses and other surface vegetation. The management practices applied to all plantings must therefore reflect the need to maximise light penetration to the ground and where appropriate, (and as a secondary issue) productive timber value.

Maintenance of plantings will tend to fall in the early stages of growth i.e. 5-8 years from planting in the case of production/protection silviculture, and in latter stages of growth (harvesting or removal).

Different species of trees will require varying forms of maintenance over a range of time periods. Generally, species with higher economic value will require more intensive silviculture. This is particularly so for *Pinus radiata* and Douglas fir which make up many of the scheme plantings. For these species it must be clear as to the maintenance requirements needed to achieve the conservation objectives as set out in the LIA, as compared to those that are production related. In developing management strategies for conservation plantings, the appropriate clauses of the LIA provide the basis for such management.

In some cases, weed species have invaded conservation areas. For plant pests for which control is required under the Biosecurity Act, this is the responsibility of the owner. However, where these plant pests are compromising the effectiveness of the conservation area by adversely affecting established vegetation or groundcover, the maintenance provisions of the LIA may apply to suitable control measures.

The following management strategies will apply:

- a) Silviculture (pruning and thinning) will be undertaken, where necessary, to prevent shading of ground vegetation and to maximise stand health.
- b) Tending operations, as necessary, to minimise risk of damage to other assets e.g. fencing, crossings etc.
- c) Maintenance/clearance operations where plantings pose a risk of channel congestion.
- d) Maintenance/removal where trees are creating an erosion risk e.g. riverbank instability.

Where these operations are carried out in accordance with the LIA and in consultation with Environment Waikato, the maintenance provisions under the scheme shall apply. It is acknowledged that for some plantings, (mainly channel planted poplar and willow) special circumstances may apply and benefits may not be present to the extent reflected in the benefit model. There is also a need to address some poplar and willow issues within a reasonable timeframe. In recognition of this, a transitional poplar and willow maintenance programme is in place with cost apportionment to reflect the conditions that apply. It must also be clear that the maintenance provisions of the LIA will not apply to future tree crops.

4.1.3 Structures - crossings/bridges

Storm events may lead to damage to wing wall protection on culverts, pipe bed stability, or instability of bridge supports. Follow up to such events is critical and will form the primary focus of maintenance programmes for these structures.

It should be noted also, that for structures referred to in the LIAs in the Torepatutahi and Waiehu catchments, the maintenance provisions apply only for ten years from the time of construction. Since this period has elapsed, maintenance requirements are now the full responsibility of the landowner.



Photo 4: Gully control flume structure – maintenance required to remove fallen trees

4.1.4 Erosion control structures

Erosion control structures are an important component of many soil conservation areas covered under an LIA. These structures include detention dams, diversion bunds, flumes, flexible pipe drop structures, retaining (flood) walls and flood (diversion) channels. Without these structures, the waterways, stream and lake banks would be more prone to erosion. The risk of reactivation of erosion may often be high if maintenance is not carried out and a structure fails.

4.2 Maintenance funding protocols

The following is a guide to maintenance works associated with soil conservation schemes covered by Land Improvement Agreements and, works promoted under the Waikato River and Catchment Services Project (Project Watershed) since 1 July 2002.

Note: Works completed under the Clean Streams Project are not eligible for maintenance grant assistance.

4.2.1 Land Improvement Agreements (LIA's)

Generally maintenance works will be undertaken in accordance with the provisions of the Land Improvement Agreements or as set out in this Asset Management Plan.

It should be noted that:

- a) The adoption of the Waikato River and Catchment Services Project may have modified provisions in some cases. Where a change has occurred, this has usually led to an increase in grant share.
- b) Environment Waikato may exercise discretion over maintenance provisions on a case by case basis.

4.2.2 Eligible works

The following activities will generally be eligible for maintenance grants. This applies to historic scheme works and works implemented under the Waikato River and Catchment Services Project since July 2002.

4.2.2.1 Management of plantings/vegetation

Includes:

- a) Clearance of obstructions and debris, removal of branches from fencing etc.
- b) Silviculture including pruning and thinning where needed to maintain water and soil protection benefit. Maintenance grant will not apply to silviculture that provides primarily production (timber) benefits.
- c) Replanting (see below)

4.2.2.2 Fencing

- a) fence repair, upgrade, replacement

Where replanting occurs in an area where revenue has been generated from the previous plantings (in excess of costs), maintenance grants will generally not be available in accordance with the LIA. Grants will generally be available for replanting where revenue has not been generated. See further explanation below.

4.2.2.3 Structures

For water supplies, crossings, bridges etc. maintenance grants will generally not be available. However, in certain cases financial support may be warranted where for instance, storm damage threatens the integrity of the soil conservation area.

4.2.2.4 Revenue from harvesting

Revenues gained from harvesting soil conservation areas must be used to replant the area as required by the LIA. This includes situations where different species are replanted.

Where the scale of the work is such that revenues will not cover replanting of riparian areas, these may be considered separately and re-established under maintenance grants.

4.2.2.5 Transitional work

This is provided for under Waikato River and Catchment Services Funding for earlier catchment scheme works in the Upper Waikato Zone.

Transitional work is urgent work required to maintain or restore the integrity of the catchment scheme. In some cases, the work is a result of a backlog of maintenance that accumulated prior to the present funding provisions. Generally, it will consist of urgent channel clearance works associated with historic willow and poplar plantings. It may also serve to provide an additional incentive to harvest poplar plantings when market conditions are favourable.

Transitional works may also include urgent fence repair/replacement or upgrade to structures but will have lower priority than above.

Financial provisions for transitional works expire in 2007/2008.

4.2.2.6 Financial provisions

Maintenance grants will apply as set out in the Waikato River and Catchment Services Funding Document. (See Page 91 of that document). A summary of the grants applying to the Upper Waikato Zone is set out in Appendix IV of this plan)

For the Paeroa Range Scheme, a Deed of Agreement is in place between Environment Waikato and the Rotorua District Council (RDC) for a term of 35 years from 1988. Under this agreement the RDC will contribute one half of the landowner share for routine maintenance on earlier PRCCS scheme works only, completed between 1986 and 1992. This therefore excludes Whirinaki Scheme works which were carried out prior to 1986. Based on the above, RDC and landowner share will each be 32.5% of total costs (one half of 65% each). This compares to the 37.5% of costs contained in the original Deed.

Since the RDC and landowner shares are both less than that shown in the original Deed a formal change to the Deed has not been undertaken.

Where 'non scheme' works are contributing to the intent of the scheme, maintenance grants may be applied provided an agreement is entered into with the property owner as appropriate.



Photo 5: Willow congestion – prior to transitional removal works



Photo 6: Stream channel following transitional works to address willow congestion

4.3 River management strategy

The Waikato River and Catchment Services Project has provision for routine management of rivers and streams within the Upper Waikato zone (and entire Waikato River catchment).

Routine river management includes vegetative management and removal of channel obstructions.

There is also provision to maintain the limited bank protection assets in place on the main Waikato River channel and to carry out limited capital river improvement work. Much of this work has yet to be identified in detail.

A total of \$569,000 has been provided for new capital work. While some work has been identified, detailed programmes have yet to be prepared. Such work is expected to include that at River Road and other sites in the reach above Mihi where bank erosion is active at a number of localities.

The work proposed may in part, be influenced by the final outcome of Mighty River Power Resource Consent process which is under Appeal as at March 2004.

Further investigation of the river management requirements within the Upper Waikato zone can be expected.

Grant rates for River Management Works under the Waikato River and Catchment Services Project are set out in Table 23 (Appendix V).

4.4 Asset replacement strategy/disposal plan

Over time assets will deteriorate to the point where they will need to be replaced. In the case of fencing, timely repairs tend to result in progressive renewal.

Generally, it is expected that assets will be replaced to a similar standard and specification to the original, taking into account any technological advancement or other development. In some cases, it may be appropriate to modify specifications or requirements or, not to replace certain assets. To assist with this, it is proposed that a decision making process for asset replacement be applied:

- a) Are works located on a major waterway?
- b) Proximity of works to major waterway?
- c) Erosion potential of waterway/risk from flood events?
- d) Consequences of non-replacement?
- e) Have land use changes occurred which result in differing requirements?
- f) Alternatives to providing similar level of protection?
- g) Adequacy of maintenance arrangements?
- h) Adequate funding arrangements?

The following specific replacement policies for the major work types apply:

4.4.1 Fencing

Where fences are due for replacement due to useful life being complete, the current approved funding policy will apply. Where fences are dismantled due to tree harvesting (i.e. before useful life expended) these are to be replaced at owner cost (as provided for in the LIA).



Photo 7: New soil conservation fencing

4.4.2 Planting

In all cases involving replacement of plantings careful evaluation of the options must occur. This relates to consideration of the need to replant the choice of tree species, planting patterns and the siting of trees. Where vegetation is required to meet the scheme performance standards species will be selected with:

- a) maximum conservation value
- b) minimal maintenance requirements
- c) maximum rotation lengths and
- d) merchantable value where trees can be harvested with minimal adverse impact or compromise to objectives.

Steps shall be taken to:

- a) avoid the planting of trees too close to waterways/fences or other assets or where there may be future harvesting limitations
- b) avoid use of species which may congest waterways or give rise to long term management liabilities
- c) minimise planting density while being aware of plant pest implications
- d) use native plant species that are ecosourced wherever possible.

Replanting

The following will apply in relation to the responsibility for replanting (as set out in most LIAs):

- Approval from Environment Waikato will be required to harvest all trees within a conservation area and these shall be replaced at the cost to the owner.
- Funding may be available for replanting after harvest with native, soil conservation or amenity tree species.

4.4.3 Erosion control structures

In all cases, erosion control structures within LIA areas should be maintained to avoid the erosion site reactivating. However, where the site has stabilised, it may not be necessary to reconstruct the structure.

4.5 Creation/acquisition/augmentation plan

New catchment control assets are to put in place under the provisions of the Waikato River and Catchment Services Project and Clean Streams.

Where soil erosion control, soil conservation or river and flood management apply, the funding vehicle will be the Waikato River and Catchment Services Project. This Project provides for approximately \$3.5 million of new soil conservation and river management capital work over 12 years to 2014.

Clean Streams has provision for further \$2.4 million of riparian protection work. The Clean Streams project has as its primary focus the prevention of stock access to waterways to improve water quality. The project is funded in a separate manner to above being from Environment Waikato's Investment Fund. This project has a finite term and expires in 2011.

For both projects, annual expenditure targets commence at a lower level but progressively increase over the initial three years. In 2003/2004, the proposed combined Project Watershed and Clean Streams programmes represents approximately 20 km of fencing. This rises to a budgetary provision of 60 km per annum in 2005/2005 as set out in the following Table.

Table 12 Stream fence lengths budgeted to be fenced

Year	Project Watershed (km)	Clean Streams (km)	Total (km)
2003/2004	4	17	21
2004/2005	8	34	42
2005/2006	9	51	60
2006/2007	10	51	61
2007/2008	15	41	56
2008/2009	15	35	50
2009/2010	15	35	50
Total	76km	264km	340km

Therefore, 340km of stream fencing is budgeted to be completed under these two programmes up until 2011. This is obviously dependent upon willing landowners to complete the work.

This level of work compares with the total remaining stream/river fencing in the zone, which has been estimated at 2374km. At the rate of 60km per annum it would take 40 years to reach this target.

5 Financial requirements

5.1 Funding policies

General funding policies are fully outlined in the Waikato River and Catchment Services Funding Document, which is funded by specific rates applied under this

project and the Waikato general rate. Clean Streams projects are funded by Environment Waikato's Investment Fund. These policies are not detailed in this plan. See the Bibliography for details of these documents.

5.2 Activity analysis

Activities associated with asset management have been classified as being Indirect or Direct. Indirect activities relate to overall scheme management and performance monitoring. Direct activities relate to the works programme needed to maintain scheme assets.

5.2.1 Indirect activities

Indirect activities are those associated with management of the scheme overall which cannot be assigned directly to an asset or individual group of assets. The total indirect costs for the 2004/2005 year for the Upper Waikato Zone is \$46,399. For a breakdown of the primary component of these costs being labour, refer to Appendix II.

Catchment Oversight

This includes:

- a) Asset plan management and Zone management
- b) Database and information management
- c) Inspection Contract Management
- d) River and Catchment Subcommittee
- e) Compliance monitoring
- f) Clean Streams management

Compliance monitoring involves both ground and aerial monitoring to ensure compliance with scheme performance standards. It is proposed that a minimum of two aerial inspections of the scheme area be made each year and that those properties observed to be non-complying in terms of scheme performance standards or for any other reason will be visited. Estimates assume 20% of properties will be inspected in any one year. Much of these inspections are carried out through the Inspection Contract.

Indirect activities are funded according to the Waikato River and Catchment Services Funding Project and set out in the Funding Policy document. In situations where additional inspections are necessary as a result of ongoing non-compliance costs are recovered directly from the landowners involved.

5.3 Direct activities - maintenance

Costs will be associated with specific maintenance and repair work including:

- a) fencing maintenance
- b) silviculture/planting maintenance.
- c) Maintenance of erosion control structures

Funding will be according to the beneficiary assessment set out in Waikato River and Catchment Services Funding Policy document. This funding policy identifies the landholder as the primary beneficiary but with input from other major beneficiaries.

5.3.1 Transitional maintenance

A programme of transitional work to be implemented until 2007/2008 as distinct from routine maintenance is proposed. As outlined earlier, these are urgent works that threaten the effectiveness of catchment works.

Works to the value of \$270,000 are estimated and to be carried out to 2007/2008. In some cases revenue is expected from the sale of poplar timber. See Table 13 for the Transitional Grant rates that apply.

5.4 Direct activities - new capital works

Sites have been identified where additional works are desirable in order to provide comprehensive catchment coverage. In many cases, these works are located on properties where agreement could not be reached at the time of scheme construction. In other cases, new erosion sites have developed since scheme completion. Remedial works are proposed for these sites, subject to landowner approval.

The respective owner on whose property the works are undertaken is identified as the primary beneficiary, and with a level of external input to reflect wider benefits. Future new capital work will be subject to the relevant policies of Environment Waikato, the Resource Management Act (1991) and other relevant legislation.

Total estimated cost of new catchment capital work is \$2,987,046 and it is assumed these works will be completed over a period of twelve years. Average annual expenditure is \$249,000. All works are subject to landowner agreement.

Fencing estimates are based on conventional fencing costs. However, it is expected that fences of lesser specification may be erected, provided that this is in accordance with the performance standards described in this document.

5.5 Disaster Contingency

Environment Waikato is developing a corporate policy in regard to financial provision for disaster events. This is expected to be adopted by Council in mid 2004. Provision is to be made within annual programmes for those flood/storm events that may require damage repair and other response. The detail of this policy will be incorporated into this plan when confirmed.

6 Asset management practices

6.1 Database management

Information and the ability to easily access it are key requirements to effective management of infrastructure assets.

Information systems have been developed with the aim of creating a database of historical performance, and information sufficient to enable more accurate forecasts of future costs and resourcing requirements.

Environment Waikato's asset management database (Conquest) records all assets including the following information:

- a) Description of asset
- b) Location of asset
- c) Owner of asset
- d) Dimensions of asset including size of area and plantings and fence length & type
- e) Condition of asset as a whole and of components

In conjunction with Conquest, digital mapping is now available. This enables computer-generated maps of soil conservation compartment boundaries and reference numbers to be viewed as an overlay on aerial photography. Because the digital aerial photography is relatively recent, compartment boundaries are up to date and accurate.

Staff are able to select compartments on screen to find basic information including area, planting data and fence type. Property boundaries can also be overlaid onto aerial photography.

These management tools enable the following:

- a) An inventory of all assets in the zone, their location, condition and ownership.
- b) The timing between inspections of different asset classes will be programmed into Conquest and Conquest will advise when inspections are due.

These tools will assist with overall asset management including forward planning and budgeting.

To March 2004, documented inspections have been carried out on approximately half of the assets. As more assets are inspected a more accurate picture of the zone's assets will be available.

The ongoing inspections have highlighted the fact that some assets have not yet been inputted to Conquest. Baseline information will be collected for these assets. In addition to new compartments, a planned baseline inspection of all erosion control structures is planned for during 2004 and 2005. These assets are not currently recorded in Conquest.

All river management and flood protection assets will be progressively recorded into Conquest. This is to be completed in the 2004/2005 year.

7 Monitoring and quality assurance

7.1 Compliance and condition monitoring

It is intended that compliance with scheme performance standards will be achieved by:

- a) increasing reliance upon self-monitoring. This to be achieved through the education programmes/care groups and similar
- b) remote sensing means, namely aerial surveys
- c) a property inspection programme.

The property inspection programme will achieve the following:

- a) monitoring of compliance with LIA conditions.
- b) maintenance of contact between Environment Waikato and the landowner.
- c) maintenance of asset profile to assist with future planning.

This inspection programme will therefore fulfil a compliance, enforcement, information and data base management role.

A set frequency of property inspections is proposed. Additional inspections must be allowed for in cases of non-compliance or where special factors apply (storm damage etc.).

Generally, each property will be inspected at least on a three yearly cycle. Wherever possible, inspections will be made to new property owners upon the sale of a property where an agreement is in place. Letters will also be sent to new owners where this information is known to Environment Waikato.

A Condition and Performance Report is presented to the Upper Waikato River and Catchment Sub-Committee on an annual basis. This report details the condition of all zone assets and the performance of the schemes as a whole.

7.2 Performance audits

It is proposed that performance audits be undertaken on a regular basis to provide an indication of the performance of specific assets or aspects of asset management plan implementation. This may include checks upon the operational, financial, and procedural components.

7.3 Customer surveys

Management of assets should include regular feedback from stakeholders and interest groups as to the level of satisfaction with the performance of the assets and Environment Waikato.

Surveys of interested parties would be proposed on a regular cycle and possibly combined with the production of scheme publicity materials.

Customer feedback will also be sought through the Upper Waikato River and Catchment Sub-Committee.

7.4 Environmental monitoring

A significant issue to emerge during earlier consultation was the need to ensure that the outcomes associated with river and catchment works programmes are monitored and fully documented. This was seen as necessary in justifying the past expenditure, verifying the Funding Model, and providing a basis for future decision making.

Provision has been made for an annual and ongoing environmental monitoring programme in the Upper Waikato Zone.

7.4.1 Monitoring objectives

The aim of the environmental monitoring programme is to provide a representative (and where possible quantitative) indication of changes (primarily long-term) in soil erosion, sedimentation and quality of surface water (rivers and streams) resulting from works programmes.

Regional scale monitoring although useful for background information is not suitable for assessing changes at a sub-catchment scale. Therefore, monitoring is to be targeted to where work is scheduled, and limited to selected priority sub-catchments. Monitoring when work is completed and again either annually or at the end of the study provides baseline data and comparative data.

Monitoring of land (land and riparian stability), water quality and aquatic habitat is required to link changes on the land and riparian zone to changes in the water.

Monitoring will make use of existing programmes undertaken by Environment Waikato where possible and establish additional monitoring in targeted areas. On-going regional monitoring information will also be used to increase knowledge of water quality, soil erosion and health, and sedimentation of water within each management zone of the Waikato Catchment.

7.4.2 Water quality issues

Regional scale water quality data indicates that the water quality for the Upper Waikato zone is generally unsatisfactory for nutrients (total N and P). Water temperature (important for fish habitat) and turbidity are satisfactory or better for about 70% of the samples. Water quality for recreational contact (swimming) is generally unsatisfactory for about 54% of the samples.

Generally, poor quality water is found downstream of areas where the land use effect can be "swamped" by high ammonia from geothermal sources.

For phosphorus (P), a land use effect is not so evident because of the naturally high levels of dissolved phosphorus in this zone. Total phosphorus is made up of dissolved phosphorus and particulate phosphorus (equation 1).

$$\text{Total P} = \text{P}_{(\text{dissolved})} + \text{P}_{(\text{particulate})}$$

Dissolved P is mainly from the pumice and ignimbrite feed spring water. Particulate P is mainly from soil erosion and fertiliser additions to the soil. The high unsatisfactory total P samples can be attributed largely to the dissolved P component in water as a result of pumice and ignimbrite feed springs. However, there are varying amounts of particulate P present at sites within the upper Waikato zone suggesting some land use effect (soil erosion) is present.

The particulate P (mainly soil erosion) and nitrogen leaching from land use should be minimised to ensure nutrient loads to receiving water bodies are restricted above what is naturally occurring.

7.4.3 Environmental monitoring schedule

Following consideration by the Upper Waikato River and Catchment Liaison Subcommittee, a monitoring schedule was developed. This will focus on the Tahunaatara sub-catchment. The key issues and rationale for monitoring in the selected sub-catchment are presented in Table 14.

Table 13 Subcatchment issues and monitoring

Subcatchment	Issues	Monitoring
Tahunaatara	<ul style="list-style-type: none"> ➤ <i>Minimal soil conservation</i> ➤ <i>Minimal riparian protection</i> ➤ Potential for increased nutrients and faecal matter in the surface water ➤ Hillslope and riparian erosion potential 	Photo points Water temperature Stream ecological health

It was decided to focus monitoring on water quality as opposed to hillslope and riparian stability assessments. Environmental monitoring will focus on demonstrating visual changes in riparian character using photo reference point survey and in-stream aquatic habitat using stream temperature and stream ecological health monitoring. These methods are outlined in Table 15.

Table 14 Soil conservation assessment methods, issues addressed, effects and on-site benefits measured and anticipated off-site benefits

Assessment method	Issues addressed	Effect measured	On-site benefits	Off-site benefits
Land stability monitoring				
Photo points	Hillslope, gully and riparian erosion, stock access.	Aesthetics, short term soil and riparian stability.	Aesthetics, better soil, land and riparian stability.	Less sediment in water, better water quality, more riparian stability, less flooding, better riparian habitat.
Aquatic habitat monitoring				
River ecological monitoring sites (REMS)	Stream biological and habitat condition	Change in stream habitat condition for invertebrates	Better in-stream conditions for invertebrate habitat	Better in-stream conditions for invertebrate habitat
Water temperature	Stream habitat condition	Change in stream habitat condition for macro fauna	Better in-stream conditions for native fish habitat	Better in-stream conditions for native fish habitat

Estimated annual costs are provided in Table 16. The estimates provided include fieldwork, materials, labour, data analysis and reporting. Total expenditure for environmental monitoring for 10 years is estimated at \$70, 000.

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Appendix I

Catchment works and value - Upper Waikato zone*

		Paeroa Range	Reporoa	Whakamaru	Isolated Plans	TOTALS
Soil Conservation Fencing	km	635	376	188	146	1,345 km
	Value	\$5,685,000	\$2,600,000	\$1,584,000	\$760,000	\$10,629,000
Soil Conservation Planting	ha	1,267	958	500	240	2,965 ha
	Value	\$2,196,000	\$850,000	\$560,000	\$269,000	\$3,875,000
Retired Land	ha	1,802	1,146	1,000	96	4,044 ha
Structures	Units	54	Various	7	-	-
	Value	\$697,000	\$117,000	\$70,000	\$34,000	\$918,000
Water Supply Systems	Units	65	Numerous	-	-	-
	Value	\$655,000	\$120,000	-	-	\$755,000
TOTAL VALUE		\$9,233,000	\$3,687,000	\$2,214,000	\$1,063,000	\$16,197,000

* Not including some isolated farm plans (due to be surveyed 2005)

Appendix II

Indirect activities² - annual cost estimates

Catchment Oversight	Environment Waikato	Contractor
Asset Plan Management		
Zone Management	80 hrs	
Database/information management	80 hrs	
Contractor Management	80 hrs	
River and Catchment Subcommittee	50 hrs	10 hrs
Compliance Monitoring	30 hrs	240 hrs
Vehicle running	1,200 km	
TOTAL HOURS	320 hrs	250 hrs
Information and Advice / Landowner Liaison		
Landowner liaison	170 hrs	80 hrs
Information and Advice	80 hrs	11,000km
TOTAL HOURS	250 hrs	80 hrs
River Management		
Property owner liaison	80 hrs	-
Vehicle Running	1,000 km	-
TOTAL	80 hrs	-
TOTAL PROJECT WATERSHED	650 hrs	
Clean Streams		
Community / Landowner Liaison	250 hrs	-
Vehicle Running	1,500 km	-
TOTAL CLEAN STREAMS	250 hrs	
GRAND TOTAL	900 hrs	330 hrs

Direct activities³ estimates

Asset Category	Assumption
Fencing Maintenance	1.5% of total capital fence value required for annual fence maintenance
Silviculture	2% of total planting capital value required for annual planting maintenance
Disaster Contingency	See Environment Waikato Disaster Recovery Policy
Structures	1% of total value every 5 years. Note: this tends to be a variable item based on the nature of the structure.

² Indirect activities are those associated with management and those that do not usually relate to a specific project

³ Direct activities are those associated with costs associated with specific assets

Appendix III

Upper Waikato zone – Waikato River and catchment services

Upper Waikato		04/05	05/06	06/07	07/08	08/09	09/10	10/11	11/12	12/13	13/14
Maintenance	Catchment Oversight	25,434	25,999	27,058	27,741	28,653	29,294	30,129	31,007	31,502	32,003
	Information/Advice	20,965	21,147	22,059	22,663	23,431	23,955	24,658	25,390	25,789	26,194
	Catchment Maintenance	399,309	406,425	396,381	405,816	437,367	463,875	475,850	488,260	499,366	511,046
	Catchment New Work	129,373	134,645	154,156	233,232	239,511	245,379	251,878	258,463	264,580	270,975
	Clean Streams	129,355	187,199	188,136	160,934	143,061	146,372	92,192	92,667	94,669	96,787
	River Maintenance	92,445	95,927	101,614	103,884	106,721	109,261	112,832	114,219	114,367	114,273
Capital	River capital	40,000	42,025	42,000	43,080	44,160	45,240	46,400	47,560	48,720	49,960
		836,881	913,367	931,404	997,350	1,022,904	1,063,376	1,033,939	1,057,566	1,078,993	1,101,238

Note: Total New Catchment work \$2,703,200
 Total New River capital \$515,000
TOTAL NEW WORK \$3,218,200

Appendix IV

Upper Waikato zone - funding apportionment

	Beneficiary Percent					Contributor Percent		
	Regional	Catchment	Zone	Landowner	Hydro	Hydro	Urban Industrial Rooding	Pastoral
Upper Waikato								
Soil Conservation Scheme (Direct)	9.5	7	9	65	2.5	2	3	2
Soil Conservation Scheme (Indirect)	60	5	23		5	2	3	2
Soil Conservation Scheme (Transitional)	44.5	7	19	20	2.5	2	3	2
Soil Conservation Farm Plan (Direct)	9.5	7	9	65	2.5	2	3	2
Soil Conservation Farm Plan (Indirect)	60	5	23		5	2	3	2
River Management – Main	5	9	36			30	6	14
River Management – Tributaries	5	16	64				3	12
River Improvements – Main	2	6	16	26		30	6	14
River Improvements – Tributaries	5	14	38	28			3	12
Catchment Oversight	26	28	28			6	3	9

Appendix IV contd.

Grant rates

The following table summarises the grant rates that apply within the Funding Policies in place for the Upper Waikato Zone.

	Landowner %	Project Watershed Rating/Grant %	RDC %
Catchment Works			
Routine Maintenance – Non PRCCS	65	35	-
Routine Maintenance – PRCCS	32.5	35	32.5 ⁴
Transitional Maintenance	20	80	-
New Capital	65	35	-
Clean Streams			
Clean Streams Capital	65	35 ⁵	-
Clean Streams Maintenance	100	-	-
River Management			
River Improvement - Capital⁶	25	75	-
General River Management⁷	0 - 65	35 -100	-

⁴ Under Deed of Agreement Rotorua District Council and Environment Waikato. To expire 2023.

⁵ Provided from Environment Waikato Investment Fund. To expire 2012.

⁶ Dependent upon individual project. Landowner share may be provided by way of a local rate

⁷ Dependent upon level of local benefit received. See Table 23 Appendix V

Appendix V

River Management grant rates and provisions

Extent	Where applicable	Rate of Assistance (Grant)	Local Share
Single Property	Predominantly on site benefit In most cases, assumption is that willow works are followed up with Clean Streams or Soil Conservation fencing & planting	Up to 35%	65% +
Multiple properties	Some on site benefit Wider community benefits apply in form of downstream protection, water quality, biodiversity, erosion control, and invasive plant removal. May be appropriate to seek financial contributions from other agencies, e.g. District Councils, where benefit provided to bridges, culverts, and roads. This would reduce the level of assistance. 1. Routine river works (e.g. multiple property willow removal) 2. Significant improvement work (river improvement as defined in Project Watershed Funding document)	50% 76%	50% 24%
Isolated works	Obstruction removal of in channel obstruction where erosion or flooding is likely to occur. On site benefit Minimal or no landowner benefit. Isolated, 'one off' works or Urgent/Emergency works. Work that is necessary and would not get completed without EW intervention. No identifiable local beneficiaries or funders,	50% Up to 100%	50% Nil

Note: The above applies in general under the Waikato River and Catchment Services Project but may be modified by specific provisions within some Management Zones such as the Transitional arrangements that apply in the Upper Waikato Zone.

Appendix VI

Condition grading system

Grade	Condition	Description
1	Near New Condition	As new condition Asset likely to perform adequately with no maintenance for 5 years. No work required.
2	Normal Maintenance	Sound physical condition; performing to design standard Routine Maintenance required Minimal short term failure risk.
3	Backlog Maintenance Required	Functionally sound, but showing some wear with minor failures. Minor components need replacement or maintenance. Deterioration is reflected in performance and higher attendance for maintenance. Failure unlikely within 2 years, but major works within 5 years. Work required but assets still serviceable.
4	Requires Major Renewal	Functioning but requires a high level of maintenance to remain operational. Marked deterioration in performance within 2 years likely. Substantial work required in short term.
5	Asset Unserviceable	Failed or failure imminent. Asset effective life exceeded. High risk of breakdown and serious impact on performance. Major work or replacement required urgently.