ASSET MANAGEMENT GROUP
Technical report

ISSN 1174 3085

HAWKE'S BAY
REGIONAL COUNCIL

SAFEGUARDING YOUR ENVIRONMENT + KAITIAKI TUKU IHO

Upper Tukituki Flood Control Scheme

Asset Management Plan

July 2012
HBRC Plan Number 4725
HBRC Report Number AM 15-03

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SAFEGUARDING YOUR ENVIRONMENT + KAITIAKI TUKU IHO

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Engineering Section

Upper Tukituki Flood Control Scheme Asset Management Plan

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Adopted by:
Hawke's Bay Regional Council on 23rd November 2011; subject to any recommendations made by Audit New Zealand and any decisions made through the LTP development process.

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Executive Summary

ABOUT THIS PLAN

This Asset Management Plan outlines the management philosophy for flood control assets on the Ruataniwha Plains. It sets out a programme of work for the Upper Tukituki Flood Control Scheme (UTTFCS) for the next ten years to ensure that assets meet the objectives for which they were established.

There are a number of assumptions underpinning this Asset Management Plan (AMP). These represent circumstances which the Council reasonably expect to occur, including: that the economic and legislative environment in which the Scheme operates will remain the same; that Council's current activities, level of service targets and policies will continue; and that there will not be a significant flood, which requires a change to the Scheme or the way it is managed.

This AMP is supported by, and links to, a number of other documents and databases across Council. These include the Asset Registers and Valuation databases, which hold specific information on all Scheme assets; Asset and Catchment Reviews, which investigate problems and identify preferred options for addressing these; and Council policy, strategy and guideline documents, which influence how Council manages the assets. From this, annual contracts for physical works are developed and financial information is provided for inclusion in the Long Term Plan (LTP).

This AMP has been developed using the basic asset management plan model. This model is considered to provide the appropriate level of detail given the nature of the assets involved in the Scheme. The Plan is reviewed every six years and the assets are revalued every three years. The financial forecasts are reviewed annually.

This Plan is a living document and future improvements or enhancements will be considered as part of the next review or prior to that time if circumstances warrant.

THE SCHEME AND OUR CUSTOMERS

The Upper Tukituki Scheme covers the low lying historic river plains of the Upper Tukituki River and its various tributaries. It includes the urban centres of Waipawa, Waipukurau, and Ongaonga, covering approximately 24,750 hectares of predominantly pastoral farm land. There are approximately 5,000 people living within the scheme boundaries.

The objective of the Scheme is to ensure that the Ruataniwha Plains communities are very rarely affected by significant flooding, and that waterways within the scheme are highly valued community assets.

The Upper Tukituki Scheme as we know it today was constructed during the late 1980's. The design and construction was largely based on a report prepared by Gary Williams in 1985, titled *Upper Tukituki Catchment Control Scheme.* The capital cost of the Scheme was met partially from Central Government subsidy and partially from local rates. Recent improvements in the Scheme follow a review of asset performance along the Upper Tukituki River in 2008.

While the underlying goal of the Scheme has remained the same, the threats to the Scheme, its importance to the community, and the drivers behind how it is maintained have changed. The principal issues now facing asset managers are:

- The flow of gravel from the Ruahine Range and its control and sustainable management through the length of the Scheme;

- The maintenance of the design flood capacity of the river channels and adjacent stopbank systems and drainage outlets, particularly in the face of climate change;
- The maintenance of the integrity of live edge protection and the stopbanks;
- Identifying and mitigating threats to the Scheme, including potential Sawfly damage to live willow edge protection and foundation treatment of the stopbanks;
- Minimising the adverse impact of flood management methods on the environment;
- Confirming the integrity of the stopbanks and quantifying the failure risk at less than design capacity;
- Defining levels of service within the Scheme;
- Reviewing maintenance methods and techniques to accommodate changes in land management practices, including organic fruit and crop production and trends in best practice management for stormwater and flooding;
- Potential impacts of co-management arrangements with iwi on Council policy and management of schemes;

This Plan sets out the direction and work programmes to be taken by the asset managers in addressing these issues.

THE SERVICES WE PROVIDE

Council maintains a network of stopbanks, live edge protection and hydraulic structures, as well as managing the river and stream channels to ensure they work as expected during floods. The overall aim is to reduce the risk of flood and erosion damage while maintaining a high quality river environment. Five key outcomes have been identified for the Scheme:

1. **The protection of life and communities -** by providing for the control of flooding within Scheme rivers and the draining of surface water from Scheme land so that the frequency, duration and extent of flooding presents minimal risk to human life, and community viability and disruption to the community is minimised.
2. **The sustainable use of land -** by providing for the control of flooding of Plains land within the Scheme, so that the frequency, duration and extent of flooding presents minimal risk to land uses, and business disruption risk is minimised.
3. **The protection and enhancement of ecology and water quality values** - by ensuring that flood management and maintenance practices do not have significant adverse effects on the ecology of rivers, streams and wetlands and ensuring that, where practicable, enhancement aspects are included as part of asset upgrades and renewals.
4. **The sustainable management of river sediment (gravel, sand and silt) resources** - by undertaking beach raking and gravel extraction to maintain the flood carrying capacity of the river channels, and managing allocation of river gravel resources in a consistent and equitable way.
5. **The protection and enhancement of social and cultural values** - by providing for a wide range of amenity and recreation opportunities, and balancing conflicting uses and demands on river berm areas.

These outcomes are supported by Scheme Objectives and are reflected in the Levels of Service and Performance Targets identified for the Scheme.

The Scheme contributes significantly to several Community Outcomes identified in the LTP, including:

- Safe & secure communities;
- A strong, prosperous & thriving economy;
- Transport infrastructure & services that are safe, effective & integrated;
- Communities that value & promote their unique culture & heritage;
- A lifetime of good health and well being;
- Safe & accessible recreational facilities; and
- An environment that is appreciated, protected, and sustained for future generations.

LEVEL OF SERVICE

The current levels of service are based on legal requirements, community expectations and physical restrictions inherited over the evolution of the Scheme. The river assets are designed and maintained to provide protection from flood flows with up to a 1% chance of being exceeded in any one year (100 year Average Recurrence Interval (ARI) event).

Council aims to design, monitor and maintain all assets so that they operate at their intended standard and, where appropriate, improve the assets to achieve desired levels of protection. Reviews are undertaken as required on both specific assets and whole networks to investigate issues and identify appropriate solutions. These reviews drive much of the identified improvement work within the Scheme.

Council also has environmental standards associated with the Scheme that aim to reduce the impact of flood control and drainage practices on the environment, and also enhance waterway values such as ecology and social benefits, where appropriate. These are underpinned by an Environmental Strategy and a multi-value approach to waterway management, adopted by Council in 2007. This multi-value approach seeks to protect and enhance the cultural, heritage, landscape, drainage, recreation and ecological values of Council owned or administered watercourses.

LEVEL OF SERVICE REVIEW

Council intends to undertake a full review of both the levels of flood protection and the environmental outcomes sought within the Scheme during the 2012/22 LTP period. The primary driver for this review is that ongoing development of flood protected land has occurred since the Scheme was last upgraded. There may now be a case for increasing the level of flood protection provided on the main rivers. In addition, the feasibility of a water harvesting scheme, involving damming of the Makaroro River to supply irrigation water to approximately 20,000ha of farming land protected by the Scheme, is expected to be completed during the latter part of 2012. If this project is determined to be feasible, and progresses, it will result in more investment and greater productivity on the Plains. A review of the level of service provided by the Scheme will be further justified if a decision is made to proceed with this project.

The review will involve an assessment of key drivers for change, including threats to the Scheme, and a programme of public consultation. The review will seek to identify:

- Whether the level of flood protection (the 1% AEP standard) provided by the scheme river assets is still sufficient;
- The acceptability of the level of residual risk inherent in the system; and,
- The future vision for environmental management and public use of Scheme areas.

The outcome of this Level of Service Review will dictate future works and expenditure within the Scheme and may result in significant changes to how Council manages the flood control and drainage assets.

ASSETS IN THE SCHEME

The assets associated with the Scheme include: 77km of stopbank; 213 deflection banks; 205km of river, stream and drainage channel; 211km of live edge protection on the river banks; 37 structures including culverts and floodgates; 3 rock groynes; and approximately 93ha of land, including river berms and land underlying other Scheme assets.

The live edge protection and stopbanks are considered to be the most critical assets of the Scheme because they provide protection to large areas of productive land and significant parts of urban Waipawa and Waipukurau; and the consequence of their failure is high.

ASSET CONDITION AND RISK

In general, assets within the Scheme are considered to be in good to excellent condition. There are some known localised issues associated with:

- Weed growth including pest plants;
- Stopbanks with reduced performance (currently undergoing improvement);
- Gravel aggradation in upper reaches;
- Leakage on the landward side of some stopbanks due to porous foundations.

Council has capital and maintenance programmes identified to address these issues. Willow Sawfly damage is an ongoing risk to the Scheme and Council has a programme in place to monitor damage levels.

Climate change represents a risk with more uncertainty. Council has programmed a review of Scheme risks as part of the Level of Service review to be undertaken in the next ten years, and this will include further consideration and investigation into potential impacts of climate change on Scheme assets; the aim being to identify appropriate actions to minimise this risk.

Residual Risk

Residual risk for the Scheme includes both the chance of an event occurring that exceeds the capacity of the system (a Super-Design Event), and the potential for failure of an asset; both of which could result in widespread flooding and damage. There are a variety of potential causes for both super-design and failure events and these represent a risk that is impossible to eliminate completely.

Council management of residual risk focuses on good design practice, monitoring of asset status, and development of contingency and emergency plans for response management should a super-design or failure event occur.

ASSET VALUE

The replacement value of Scheme assets equates to $25.5 million dollars. Over the next ten years Council will spend approximately $730,000 per year to operate and maintain the assets at the desired levels of protection, and a further $120,000, on average, will be spent every year to improve existing assets.

ASSET MAINTENANCE

It is essential that all scheme assets are maintained using sound engineering skill and judgement. Council has a policy of retaining at least two Chartered Professional Engineers to oversee design and management of Scheme assets.

The assets within the scheme are generally maintained by Council's Operations Group with physical works undertaken by Council's Works Group. An annual contract outlines all maintenance works and the required standards.

The physical works generally include the following activities:

- **Stopbanks** – maintenance of an appropriate grass sward and cross-section shape through grazing, mowing and repair when necessary.
- **Berms and Buffers** – lopping and planting of trees to maintain a healthy dense buffer, physical repair as necessary of any hard protection (rock revetments), mowing or grazing of grassed berms to reduce fire risk and control weeds.
- **Active Channel** – maintenance of gravel bed levels through beach raking and gravel extraction where necessary.
- **Drainage Structures** – checking and clearing of obstructions as necessary.
- **Groynes** – checking and repair of groyne structures with replacement of structural units as required.

An annual maintenance programme is prepared by Council each year in conjunction with developing the Council's annual budgets. An estimate of costs is established as part of developing the maintenance programme and any issues associated with affordability are addressed as part of the Annual Plan or LTP process, to ensure that the agreed programme of works does not compromise the levels of service and that the consequence of any variance is clearly understood and documented. The annual programme of maintenance is undertaken unless circumstances dictate otherwise.

At the end of each financial year, a report is prepared outlining the work completed in each rating area, and the associated expenditure. This report is presented to Council in November for the previous financial year.

ASSET AND MANAGEMENT PLAN IMPROVEMENTS

The Scheme monitoring programme includes asset and catchment reviews, asset condition assessments, and annual audits; as well as review of this Asset Management Plan and associated registers. The programme identifies potential areas for performance improvement in both the physical assets and asset management process.

Projects aimed at improving understanding and knowledge of assets, and future requirements within the Scheme, are included within the Scheme Operational budget.
Key projects include:

- Research and further modelling of flooding;
- Data collection, including LIDAR;
- Native plant trial programme;
- Level of Service Review including Future Demand and Risk Assessments;
- GIS asset data improvements and Scheme boundary review;
- Willow sawfly, climate change and specific asset reviews;
- Code of practice and waterways guideline review and development; and,
- Development of Ecological Management and Enhancement Plans.

A number of special projects and capital improvements have been identified to maintain and upgrade Scheme physical assets, so that they achieve their desired design standards and the environmental enhancement goals.

There is $1.1 million of capital improvements planned over the next 10 years within the Scheme. This involves stopbank upgrades on the Upper Tukituki River and environmental enhancement works throughout the Scheme.

These improvement projects have been identified for inclusion in Councils 2012/22 Long Term Plan.

FINANCIAL MANAGEMENT

The financial information for the Scheme is based on the asset register, asset condition assessments and asset valuation assessments. Three key assumptions are made with regard to the Scheme financials outlined in this Plan:

1. Inflation (based on construction costs) is forecast at 3.5% in year 1 dropping to 2.5% from there on;
2. There will be no major floods requiring changes to maintenance or capital works programmes; and,
3. There will be a continuing willingness to pay for the level of serves as set out in this AMP.

These assumptions are justified by the knowledge that the likelihood of a major flood exceeding the capacity of the river system in any one year is less than 1%, and Council's disaster provisions allow for the assets to be replaced following such an event.

FUNDING

The Scheme's annual costs come from:

- Annual operations and maintenance;
- Capital works;
- Special project work;
- Loan servicing;
- Depreciation, disaster reserve and other contributions; and,
- Other miscellaneous costs.

The total costs forecast over the next ten years are:

- $7.3 million for Operation, including maintenance, monitoring and research; and,
- $1.1 million for Capital Works.

Funding necessary for the Scheme to continue to provide the required levels of service will be obtained from the following sources:

- Rental income from Scheme owned land leased for grazing or other purposes;
- Targeted rates levied specifically for the purpose of funding scheme works;
- Council general funding (17.5%);
- Borrowing where deemed appropriate and reasonable;
- Interest from the Disaster Damage Investment Fund; and,
- Miscellaneous minor income sources.

The Scheme Ratepayers are defined by the scheme boundary. Those within the boundary gain both direct and indirect benefit from the Scheme through reduced frequency of flooding of their land and reduced disruption to their lives, livelihoods and communities. The direct

beneficiaries are also separately rated to reflect the varying levels of benefit received. There are five rural classes and four urban classes within the Scheme boundary.

Those outside the Scheme and within the wider Central Hawke's Bay area also gain indirect benefits from the increased economic activity and the increased choice of service industries, employment and investment opportunities, and recreational and cultural facilities resulting from the associated increase in population sustained though the protection provided by the Scheme. As such, part of the Scheme costs are met from general funding sources; a portion of which is from rates levied on all rateable land within the Hawke's Bay region.

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Glossary

TERM	MEANING
Active Channel	This is the central section of river between the river berms. The active channel is generally identified as being the section where sediment (gravel, sand, silt) is deposited and where active movement of this material occurs.
Annual Exceedance Probability (AEP)	The probability that a given rainfall total accumulated over a given duration will be exceeded in any one year. For example a 1% AEP event (also called 100 year ARI) has a 1% probability of occurring or being exceeded in any one year.
Annual Plan	A document produced annually the Hawke's Bay Regional Council to inform stakeholders of its objectives, intended activities, performance, income and expenditure required for a period of one financial year.
Armouring	This is the larger material deposited on top of a gravel beach. This larger stone generally forms a cobbled effect with interlocking occurring between the stones.
Artificial Watercourse	This includes an irrigation canal, water supply race, canal for the supply of water for electric power generation and farm drainage canal [see definition of 'river' under the RMA].
Asset Management Plan	A plan developed for the management of one or more infrastructure assets that combines multi-disciplinary management techniques (including technical and financial) over the lifecycle of the asset in the most cost-effective manner to provide a specified level of service. A significant component of the plan is a long-term cash flow projection for the activities.
Asset Register	A record of asset information considered worthy of separate identification including inventory, historical, financial, condition, and construction, technical and financial information about each.
Average Recurrence Interval (ARI)	The average, or expected, value of the periods between exceedances of a given rainfall total accumulated over a given duration. For clarity the term AEP is used in preference to ARI within this AMP.
Beach Raking	This is the disturbing of river beach armouring to allow for gravel movement during floods and to discourage the establishment of weed and noxious plant growth.
Bed	Means: (a) In relation to any river: (i) For the purposes of esplanade reserves, esplanade strips, and subdivision, the space of land which the waters of the river cover at its annual fullest flow without overtopping its banks. (ii) In all other cases, the space of land which the waters of the river cover at its fullest flow without overtopping its banks, and (b) In relation to any lake, except a lake controlled by artificial means: (i) For the purposes of esplanade reserves, esplanade strips, and subdivision, the space of land which the waters of the lake cover at its annual highest level without exceeding its margin, and (ii) In all other cases, the space of land which the waters of the lake cover at its highest level without exceeding its margin, and (c) In relation to any lake controlled by artificial means, the space of land which the waters of the lake cover at its maximum permitted operating level, and (d) In relation to the sea, the submarine areas covered by the internal waters and the territorial sea.
Berm	That area of land located adjacent to the bed of a river (often between stopbanks) that is periodically covered by flood waters that over top the banks of the active channel.
Cumec	A flow rate or discharge measured in cubic metres per second.
Dam	Any structure across the bed of a river or lake or artificial watercourse which impounds water.
Depreciated Replacement Cost (DRC)	The replacement cost of an existing asset after deducting an allowance for wear or consumption to reflect the remaining economic life of the existing asset.

TERM	MEANING
Depreciation	The wearing out, consumption or other loss of value of an asset whether arising from use, passing of time or obsolescence through technological and market changes. It is accounted for by the allocation of the historical cost (or revalued amount) of the asset less its residual value over its useful life.
Design Channel	Includes the active river channel and the adjacent berms when confined between stopbanks.
Drainage	The activity of lowering the water table to achieve productive land use to facilitate the stability of land or structures, or to achieve some other resource use activity. This generally involves the diversion of water.
Edge Protection	Works established to provide protection to the river bank. These works generally use willow trees but may also include rock, railway iron and wire rope as required.
Edge Protection Works	Works established to provide protection to a river bank.
Ephemeral Watercourse	Ephemeral Watercourses flow only during and immediately after precipitation (rainfall). They typically have defined banks which distinguish them from surface runoff.
Freshwater	All water except coastal water and geothermal water.
Floodway	The channel for an overflow of water caused by flooding.
Generally Accepted Accounting Principles (GAAP)	Approved financial reporting standards (within the meaning of the Financial Reporting Act 1993) so far as those standards apply to a particular entity; or, where there are no approved standards, accounting policies that are appropriate to the entity and have authoritative support within the accounting profession in New Zealand.
Infrastructure Assets	Stationary systems forming a network and serving whole communities, where the system as a whole is intended to be maintained indefinitely at a particular level of service potential by the continuing replacement and refurbishment of its components. The network may include normally recognised 'ordinary' assets as components.
Instream Values	Those uses or values of rivers and streams that are derived from within the river system itself and include amenity values, cultural and spiritual values of tangata whenua, and values associated with freshwater ecology and recreational, scenic, aesthetic and educational uses.
Intermittent Watercourse	An intermittent watercourse is one that is seasonally dry or only flows for part of the year – ie during spring and winter, but not summer or autumn – and can be affected by groundwater level changes.
Level of Service (LOS)	The defined service quality for a particular activity (i.e. roading) or service area (i.e. street lighting) against which service performance may be measured. Service levels usually relate to quality, quantity, reliability, responsiveness, environmental acceptability and cost.
LiDAR	Light Detection and Ranging
Lopping	The process of felling existing trees on to the ground while maintaining an adequate connection with the stump such that vigorous regrowth is encouraged.
Maintenance	All actions necessary for retaining an asset as near as practicable to its original condition, but excluding rehabilitation or renewal.
Market Value	The estimated amount at which an asset would be exchanged on the date of valuation, between a willing buyer and a willing seller, in an arms length transaction after profit, marketing, and when the parties have each acted knowledgeably, prudently and without compulsion.
Optimised Depreciated Replacement Cost (ODRC)	The optimised replacement cost after deducting an allowance for wear or consumption to reflect the remaining economic or service life of an existing asset.
Perennial Watercourse	Perennial Watercourses flow all year round (they may still dry up - but only very occasionally - ie during a large drought).
Regional Plans	Means an operative plan approved by a regional council or the Minister of

TERM	MEANING
	Conservation under the first schedule and includes all operative changes to such a plan.
Riparian Management	The activities and practices that can be applied to the riparian margin in order to improve the natural characteristics and functioning of the whole riparian zone (which includes the waterway itself as well as the riparian margins).
Riparian Margin	A strip of land of varying width adjacent to a waterway and which contributes or may contribute to the maintenance and enhancement of the natural function, quality and character of the waterway and its margins.
River	A continually or intermittently flowing body of fresh water, and includes a stream and modified watercourse, but does not include any artificial watercourse (including an irrigation canal, water supply race, canal for the supply of water for electricity power generation, and farm drainage canal).
Sediment	Includes all rock and soil material located in a river bed, and which is derived from catchment erosion processes and includes all technical categories of such material including shingle, silts and clays, and includes other generally accepted terms such as aggregates. Note: the term 'gravel' is sometimes loosely used to refer to all sediments, particularly when gravel is the predominant portion.
Statement of Standard Accounting Practice (SSAP)	Methods of accounting approved by the Council of the New Zealand Society of Accountants for application to all financial statements.
Super-Design Event	An event that exceeds the design standard of an asset. For example, a flood event that is larger than that able to be contained within the stopbank system, resulting in overtopping or failure of the stopbank and flooding of surrounding land.
Sustainable Management *	Means managing the use, development, and protection of natural and physical resources in a way, or at a rate, which enables people and communities to provide for their social, economic and cultural wellbeing and for their health and safety while: (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.
Valuation	Estimated asset value which may depend on the purpose for which the valuation is required, i.e. replacement value for determining maintenance levels or market value for lifecycle costing.
Water *	(a) Means water in all its physical forms whether flowing or not and whether over or under the ground. (b) Includes fresh water, coastal water, and geothermal water. (c) Does not include water in any form while in any pipe, tank, or cistern.
Water Body *	Means fresh water or geothermal water in a river, lake, stream, pond, wetland, or aquifer, or any part thereof, that is not located within the coastal marine area.
Water Table	The layer of unconfined water. See also 'aquifer'.
Wetland	Includes permanently or intermittently wet areas, shallow water, and land water margins that support a natural ecosystem of plants and animals that are adapted to wet conditions. (*Constructed Wetland: means an artificial wetland.)

**as defined in the Resource Management Act 1991.*

SCHEME OVERVIEW

1 THE SCHEME AND OUR CUSTOMERS

1.1 Purpose of This Plan

This Asset Management Plan sets out the vision for maintaining and enhancing Council-owned assets in the Upper Tukituki Flood Control Scheme (UTTFCS) for the next ten years. It provides a statement of how assets associated with the Scheme will be managed to ensure they meet the objectives for which they were established.

The plan has been developed by Hawke's Bay Regional Council and will be implemented through programmes of work for which financial provision is made in Councils LTP.

The purpose of this Asset Management Plan is to:-

- Outline the ten year vision for the UTTFCS;
- Identify the assets included as part of the UTTFCS and summarise assessments of their present state;
- Define the levels of service to be provided by the UTTFCS assets;
- Define the operational, maintenance, and capital works necessary to provide the levels of service required; and,
- Provide a basis for assessment of the Council's performance in maintaining the defined levels of service.

1.2 Scheme Goals

- That floodwaters are controlled as expected during flood events so that the communities of Waipukurau and Waipawa, and the productive land of the Ruataniwha Plains, are protected from significant river flooding.
- That the rivers and drainage watercourses, which are integral to the sense of place in Hawke's Bay and are vital community assets, are enhanced where practicable so that the ecological, cultural, heritage, landscape, drainage and recreational values of the waterways are protected and improved.
- That the roles and interests of Tangata Whenua are identified and reflected in the management of the waterways.

1.3 Assumptions

This Plan was prepared based on the following assumptions:

- That Council will continue to perform its existing functions in accordance with legislation and current Council policies;
- That economic growth within the region will remain at a level similar to that experienced over the last five years;
- That no significant changes in legislation will impact on the role and responsibilities of the Council in land drainage and river control;
- That current arrangements for gravel extraction will continue;
- That there will be no significant change to the flood control system, in turn requiring a change in the maintenance regime to retain the desired levels of service. However, a change may result from a major flood which causes significant aggradation or damage to edge protection and this may require a review of the assumptions made; and,
- That the long term service levels will be maintained for this Scheme.

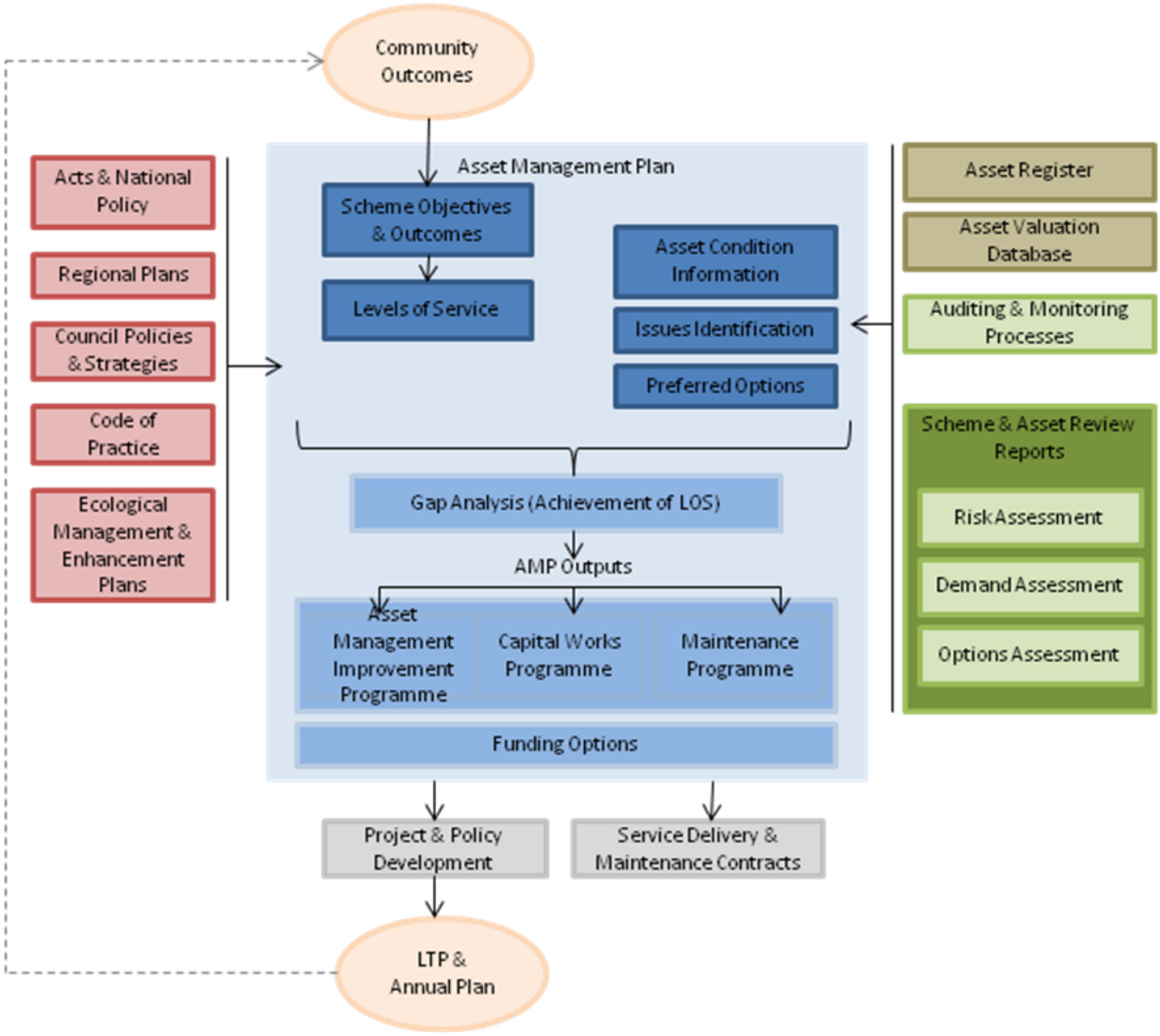
1.4 Related Asset Management Resources

There are several documents and information databases that contribute to this Asset Management Plan, including:

- **Asset Registers** – these are MSExcel workbooks which hold physical information on each specific asset within the Scheme, including information on age, construction materials, condition and renewal dates.
- **Asset Valuation Databases** – these are MSExcel workbooks which hold information on the value of each specific asset within the scheme. They are updated using valuation estimates and condition information to provide summary information for the financial section of this Plan and for use in LTP and annual planning.
- **Maintenance Contracts** – these are produced annually by Asset Management staff and detail the required maintenance and minor capital works to be undertaken by Council's Operations Group.
- **Environmental Code of Practice for River Control and Drainage Works** – this outlines the methods to be used in undertaking all works by or on behalf of Council within the rivers, streams and drains in Hawke's Bay. Compliance is a requirement under Council's Regional Resource Management Plan.
- **Environmental Strategy** - this outlines the plan and implementation of environmental projects for the scheme and is based on a 1998 Boffa Miskell report.
- **Scheme and Asset Review Reports** – these reports summarise the findings and recommendations of assessments and investigations undertaken periodically on assets to assess achievement of desired standards and investigate possible options for addressing identified issues. They can be done on a catchment wide or project basis, and in response to regular review periods or following key events such as a flood event.
- **Ecological Management and Enhancement Plans** – these plans focus on the ecological effects of Scheme activities and management of these. Plans are currently being prepared for the major rivers on the Heretaunga Plains and ecological investigations are underway for the Tukituki catchment.

These resources and how they fit within the asset management framework are shown in Figure 1.

Figure 1 Asset Management Process and Linkages to AMP Document



1.5 Review of this Asset Management Plan

This AMP is reviewed in its entirety every six years. This version replaces the 2009 draft AMP prepared by HBRC Asset Management Staff and reviewed by Audit NZ. Updates to this plan generally follow the recommendations for improvement set out by Audit NZ in their "Asset Management – Learning from Audit" report, dated November 2009.

This revised AMP has been developed in consultation with Council's Asset Management, Operations, and Environmental Management Team's, and has been externally reviewed by GHD Consultants. A record of the peer review comments received from GHD is attached at the back of this Plan.

In addition to the six-yearly overall plan review, the valuation of infrastructure assets are updated every three years with an actual recalculation of component costs using appropriate cost indices and current unit costs and prices. Capital and renewal works are updated annually.

The financial forecasts included in this Plan are reviewed each year as part of the annual planning process and where necessary, the ten year planning process. This annual review updates actual costs against budget and considers any financial implications that may result from unforeseen circumstances.

This plan has been developed using the basic asset management plan model. Due to the nature of the assets involved in this Scheme it is not proposed to progress this plan to an advanced stage. This plan is, however, a living document and future improvements or enhancements will be considered as part of the next review.

2 WHERE IS THE SCHEME?

The Upper Tukituki Scheme covers the low lying historic river plains of the Upper Tukituki River and its various tributaries. It includes the urban centres of Waipawa, Waipukurau and Ongaonga, covering a total area of approximately 24,750 hectares.

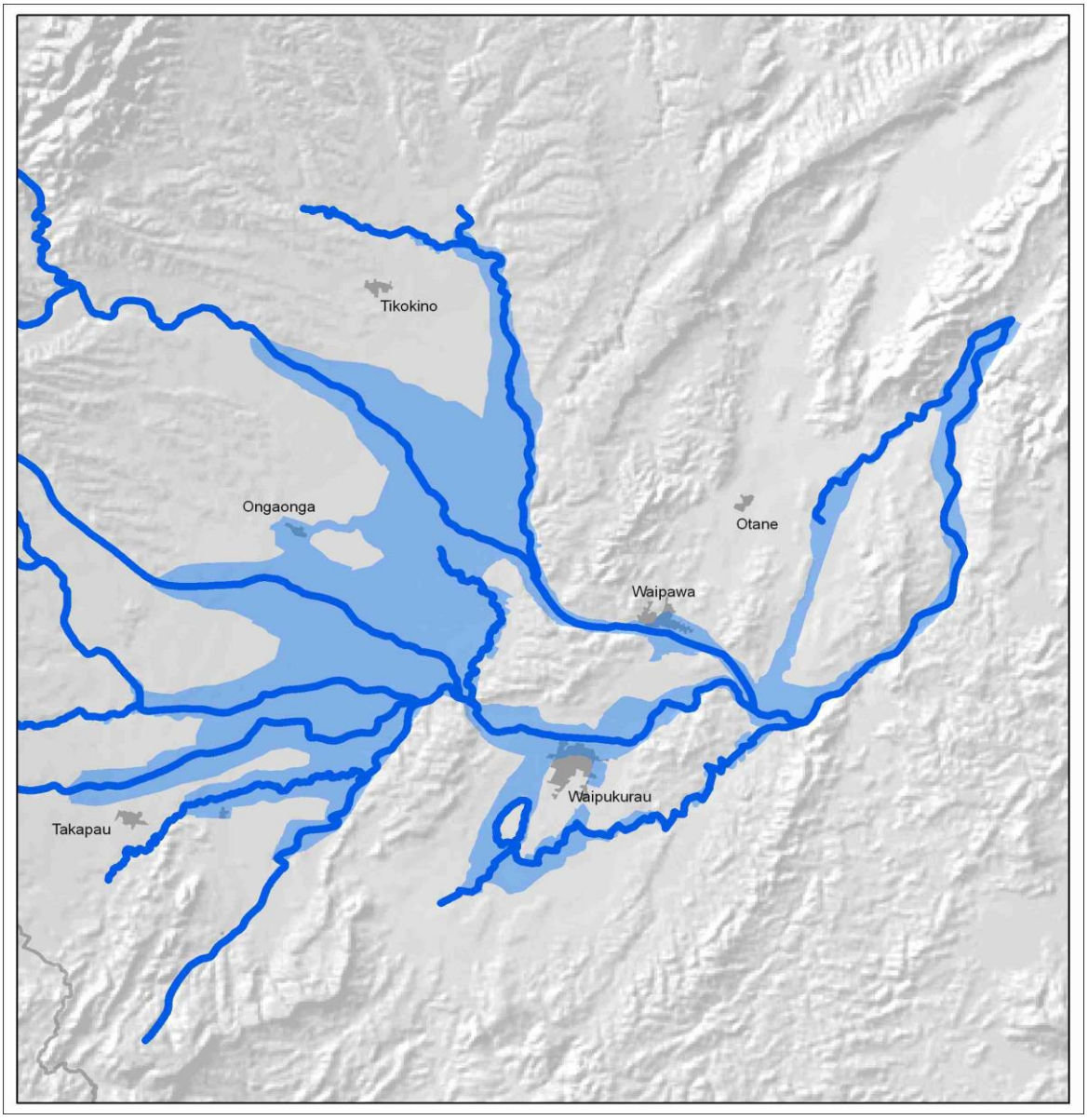


Figure 2 UTTFCS Boundary Map

2.1 Scheme Background

The Tukituki River catchment covers an area of 2,450km^2, and is geologically and topographically diverse and complex. The Ruahine Ranges form the headwaters of the catchment and the main tributaries of the Tukituki River initially flow eastwards. The Ruataniwha Plains have been built up by a process of river channel aggradation and change of river course. The rivers across these plains do not have sufficient gradient to carry downstream the high sediment input that comes out of the Ruahine Ranges.

Prior to establishing the flood control scheme for the Upper Tukituki River's, the main rivers were congested with willows. The natural state of these rivers was likely a wide clear gravel bed with vegetation, such as flax and cabbage trees, along the wetter margins, and tussock cover on the plains. After farm settlement, willows were planted for bank protection, but these willows, along with gorse and lupins, spread across the river channels, obstructing flood flows and trapping the gravel bed material.

The Upper Tukituki Scheme as we know it today was constructed during the late 1980's. The design and construction was largely based on a report prepared by Gary Williams in 1985, titled *Upper Tukituki Catchment Control Scheme.* The Scheme proposed in the Williams' 1985 report differs from the present-day Scheme with respect to the then proposed wing banks, which were to provide secondary protection should flood capacity of the stopbanks adjacent to the river be exceeded, or a breach of these stopbanks occur. The cost of construction of these proposed wing banks was discussed with the community at the time and the decision was made not to carry out the work.

The capital cost of the Scheme was met partially from Central Government subsidy and partially from local rates. Prior to the Hawke's Bay Catchment Board and Regional Water Board commencing construction of the Scheme, extensive consultation occurred with the Scheme beneficiaries with regard to the proposed design and levels of service.

Maintenance work on the Scheme since that time has concentrated on consolidating the existing works, by maintaining and improving the river edge protection and the stopbanks adjacent to the rivers. Plans for installing the proposed wing banks have not been pursued further and are not proposed as part of this Asset Management Plan.

2.2 Principle Issues

The principal issues facing asset managers are:

- The flow of gravel from the Ruahine Range and its control and sustainable management through the length of the Scheme;
- Maintenance of the design flood capacity of the river channels and adjacent stopbank systems and drainage outlets, particularly in the face of climate change;
- Maintenance of the integrity of live edge protection and the stopbanks;
- Identifying and mitigating threats to the Scheme, including potential sawfly damage to live willow edge protection and foundation treatment of the stopbanks;
- Minimising the adverse impact of flood management methods on the environment;
- Confirming the integrity of the stopbanks and quantifying risk failure at less than design capacity;
- Defining levels of service within the Scheme;
- Reviewing maintenance methods and techniques to accommodate changes in land management practices, including organic fruit and crop production and trends in best practice management for stormwater and flooding;
- Potential impacts of implementation of the NPF for Freshwater Management 2011;
- Potential impacts of co-management arrangements with iwi on Council policy and management of schemes;
- Funding drainage capacity improvements made necessary as a result of land use changes equitably given that the Local Government Act 2002 does not provide regional councils with the ability to charge development levies on new subdivisions and development.

This Plan sets out the direction and work programmes to be taken by the asset managers in addressing these issues.

2.3 Who are our Customers?

The Scheme Ratepayers are defined by the scheme boundary. Those within the boundary gain both direct and indirect benefit from the Scheme through reduced frequency of flooding of their land and reduced disruption to their lives, livelihoods and communities.

Those outside the Scheme and within the wider Central Hawke's Bay area also gain indirect benefits from the increased economic activity and the increased choice of service industries, employment and investment opportunities; and recreational and cultural facilities resulting from the associated increase in population sustained though the protection provided by the Scheme.

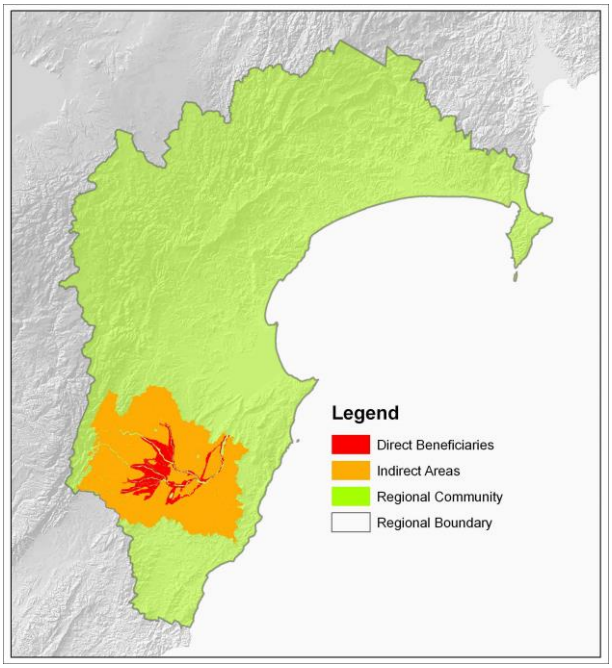
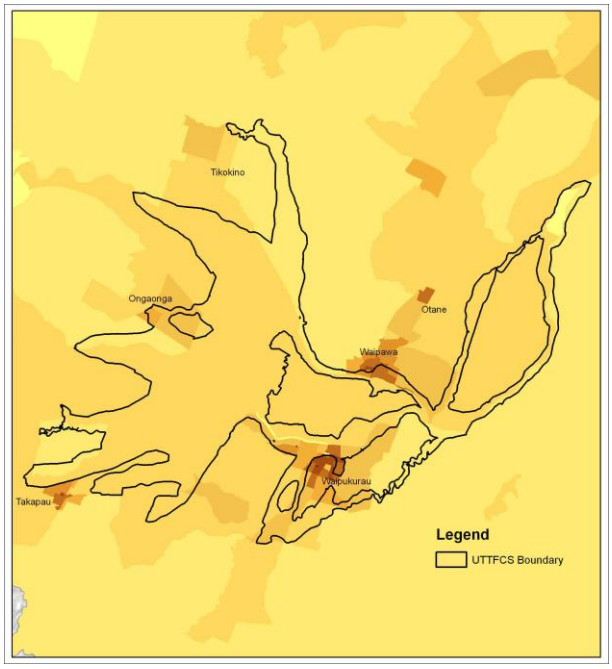


Figure 3 UTTFCS Key Rating Areas

In addition, land values throughout the region benefit from the increased population that is sustained within Hawke's Bay as a result of that economic activity. As such, 17.5% of the Scheme costs are met from general funding sources, a portion of which is from rates levied on all rateable land within the region.

There are approximately 5,000 people living within the scheme boundaries. This represents approximately 3% of the Hawke's Bay population. There are an associated 3550 rate payers (households and businesses).

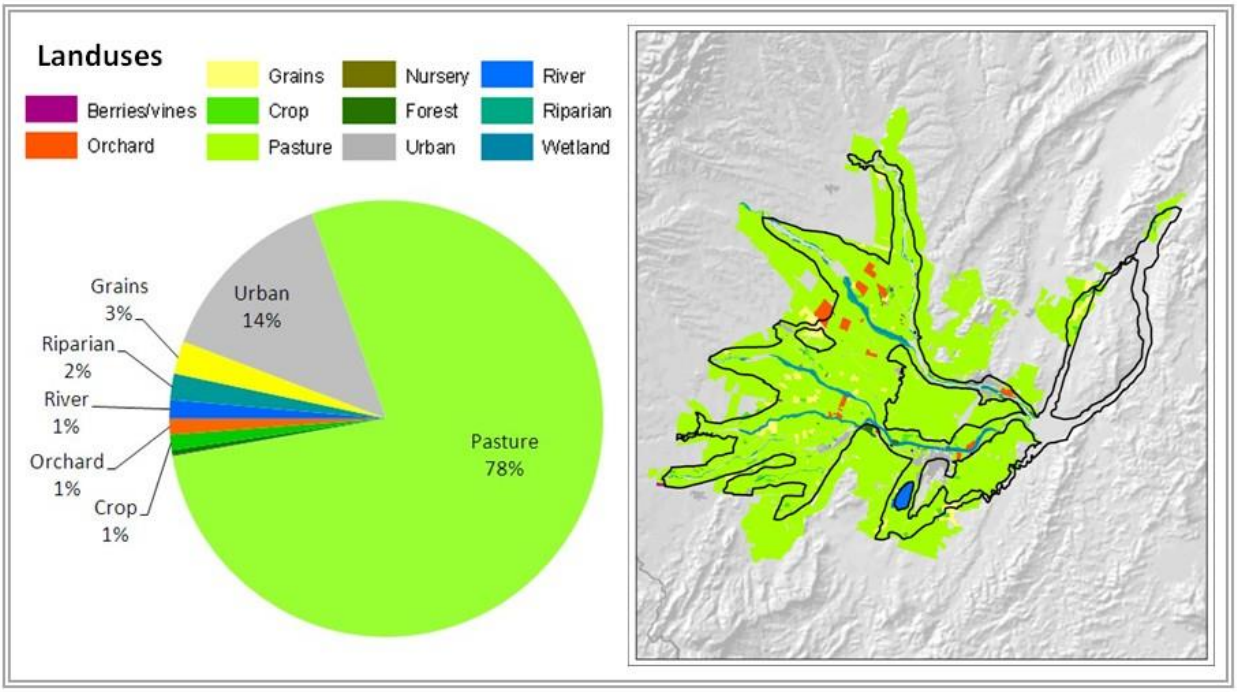


The majority of scheme ratepayers live in the urban centres of Waipukurau and Waipawa (refer Figure 4. These ratepayers include residential, commercial and industrial property owners and their occupiers. Urban land use however, accounts for only 14% of the land area within the Scheme (refer Figure 5).

Rural landowners also benefit from protection through reduced damage to farms and crops. The predominant land use within the scheme (as of 2003) is pasture at approximately 78%. Other landuses include orchards and other food crops, and riparian areas.

Figure 4 Scheme Population Density (based on 2006 Census)

Figure 5 UTTFCS Land Uses (2003)



Other key stakeholders in the Scheme include:

- **Hawke's Bay Regional Council** - responsible for administering and managing the Scheme both physically and financially.
- **Territorial Local Authorities** (Hastings and Central Hawke's Bay District Councils)
- **Iwi** and **hapu**
- **Special Interest Groups** such as Fish & Game and Forest & Bird
- **Hawke's Bay Chamber of Commerce, Primary producers, industry groups for horticulture, agriculture, and viticulture** – representing economic and commercial activity protected by the Scheme.
- **The New Zealand public** through the protection that the Scheme provides to national infrastructure networks, increased opportunities for employment, investment etc, and the protection provided by the Scheme to land and people that may result in a cost to the nation if frequent flooding were to occur.

Each of these stakeholder groups has differing needs and wants in terms of protection and other outcomes from the scheme. However, common to all, and forming the underlying drivers for the scheme, is the pursuit of achieving minimal or no impact from flooding on the daily lives and businesses of the Ruataniwha communities, allowing the land to be used in a productive way and having a clean, healthy environment to enjoy.

Table 1 lists the Scheme customers.

Table 1 UTTFCS Customer Types

Group	Customer Type
Urban customers	General Households
	Potential buyers
	Residents in high-lying areas
	Residents in low-lying areas
	Non resident ratepayers such as renters, or infrequently occupied properties
	Users of rivers, streams and lakes
	Road users
Rural customers	Farmers - Agriculture (cropping)
	Farmers – Agriculture (stock)
	Farmers - Horticulture
	Lifestyle block owners
	Properties most affected by flooding
	Organic farmers
Businesses	Commercial
	Industrial / hazardous material users/producers
	Property Developers
	Gravel extractors
Special Interest Groups	Environmental groups
	Territorial Local Authorities and other government authorities
	Tangata Whenua – Iwi and hapu
	Community representative groups
	Internal Regional Council Groups
Environment	Receiving environments – flora & fauna

(Modified from NAMS 2007).

3 THE SERVICES WE PROVIDE

The overall aim for the Scheme is to reduce the risk of flood and erosion damage, while maintaining a high quality river environment. A residual risk of flooding and therefore community disruption and loss remains, however up to the design standard the flood plain land is protected, along with the productive, personal and community assets on the land (including utility networks such as roads and bridges, drains and power and telephone cables). The danger to people, and the social disruption and stress caused by extensive flood damage, is similarly reduced.

3.1 Scheme Outcomes

Five key outcomes have been identified for the Upper Tukituki Flood Control Scheme:

1. **The protection of life and communities -** by providing for the control of flooding within Scheme rivers and the draining of surface water from Scheme land so that the frequency, duration and extent of flooding presents minimal risk to human life and community viability and disruption to the community is minimised.
2. **The sustainable use of land -** by providing for the control of flooding of plains land within the scheme, so that the frequency, duration and extent of flooding presents minimal risk to land uses and disruption to businesses is minimised.
3. **The protection and enhancement of ecology and water quality values** - by ensuring that flood management and maintenance practices do not have significant adverse effects on the ecology of rivers, streams and wetlands and ensuring that where practicable enhancement aspects are included as part of asset upgrades and renewals.
4. **The sustainable management of river sediment (gravel, sand and silt) resources** - by undertaking beach raking and gravel extraction to maintain the flood carrying capacity of the river channels and managing allocation of river gravel resources in a consistent and equitable way.
5. **The protection and enhancement of social and cultural values** - by providing for a wide range of amenity and recreation opportunities and balancing conflicting uses and demands on river berm and drainage reserve areas.
6. **The protection and enhancement of Tangata Whenua values and interests** in the management of waterways and ecosystems of the Scheme.

3.1.1 Scheme Objectives

The Scheme Outcomes are supported by the following Scheme Objectives:

i. There is capacity within the scheme stopbanks and floodways to contain the defined design discharge;
ii. The scheme assets are protected from erosion to minimise the risk of asset failure and to prevent changes in waterway course;
iii. Adequate outlets to the rivers are provided and maintained so that tributary systems can function at their design capacity;
iv. Any adverse effects on the river environments from the design and maintenance of the scheme assets are avoided or minimised;
v. Enhancement of the ecological value of Scheme waterways is provided for, where appropriate;
vi. Enhancements of social and cultural values of the Scheme waterways are provided for, where appropriate;
vii. Tangata Whenua values and interests are provided for.

The scheme outcomes and objectives are reflected through levels of service, which are outlined in Section 3.

3.2 Link to the LTP and Other Council Plans

Asset Management Plans are one of a suite of plans and policies developed and maintained by Council. They provide a key mechanism to implement the goals identified within the Council's LTP and strategic documents. The Asset Management Plans guide a capital works programme and financial forecasting for use in both the LTP and Annual Plans. They also form the basis of the Council Operations Group's annual maintenance contracts (refer Figure 1).

3.2.1 Long Term Plan Outcomes

Council is required to identify community outcomes for the immediate and long term future of the region. Nine community outcomes were developed in 2003/04 through a collaborative process involving the five Hawke's Bay Councils. These were reported in the 2004-14 and 2006-16 LTPs. These Community Outcomes are valid until they are reviewed in preparation for the 2012/22 LTP. They are listed in Table 2.

The scheme outcomes and associated levels of service support the LTP community outcomes. These linkages are shown in Table 2 also.

The Scheme contributes significantly to the LTP outcome of **a strong, prosperous & thriving economy** as it allows the development and ongoing utilisation of the high quality agricultural and horticultural land within the Ruataniwha Plains without interruption due to flooding, and without the costs associated with recovery from regular significant flood damage.

The scheme has allowed for permanent communities to grow and develop in areas that are desirable in terms of quality of life, work opportunities and connectivity with other communities, but which would otherwise be regularly flooded. The permanence of these communities leads to ongoing investment and development of unique cultural and social characteristics, which add to the social diversity of the region indirectly supporting the outcome of **communities that value & promote their unique culture & heritage**.

The location of supporting industry, residential, commercial and transport infrastructure within the Ruataniwha Plains, as well as the necessary level of certainty for ongoing investment in local business, also indirectly supports the community outcome of **transport infrastructure & services that are safe, effective & integrated**.

The Scheme provides for **a lifetime of good health and well being** and **safe & accessible recreational facilities** by minimising the frequency of flooding of homes and providing public access to the rivers within the Ruataniwha Plains for recreation and enjoyment.

The outcome of **an environment that is appreciated, protected & sustained for future generations** is supported by the Scheme through projects that protect and enhance the local ecological and water quality values of Scheme water bodies, and through compliance with an Environmental Code of Practice, which seeks to avoid or minimise the adverse effects caused by any physical works undertaken.

Table 2 LTP and Scheme Outcome Linkages

Scheme Outcomes / LTP Community Outcomes	1. Protection of life and community	2. Sustainable use of land	3. Protection & enhancement of ecology and water quality values	4. Sustainable management of sediment	5. Protection & enhancement of social and cultural values	6. Protection & enhancement of Tangata Whenua values
Strong Regional leadership and a sense of belonging					✓	✓
Supportive, caring and inclusive communities					✓	✓
Communities that value & promote their unique culture & heritage	✓		✓		✓	✓
Safe & accessible recreational facilities	✓		✓		✓	✓
Safe & secure communities	✓	✓	✓	✓	✓	✓
A lifetime of good health & wellbeing	✓	✓	✓	✓	✓	✓
A strong, prosperous & thriving economy	✓	✓	✓	✓	✓	✓
Transport infrastructure & services that are safe, effective & integrated	✓			✓	✓	
An environment that is appreciated, protected & sustained for future generations	✓	✓	✓		✓	✓

✓=directly, ✓=indirectly

3.3 Scheme Levels of Service

The Scheme Levels of Service are based on three key drivers:

- **Legislative requirements** which set out procedures that Council must follow;
- **Historic levels of service** which dictate the nature and design of assets inherited by the Scheme; and,
- **Community expectations** for the level of service provided and its associated cost.

The current levels of service are largely based on the legislative requirements and the historic levels of service that the Scheme stopbanks were originally built to.

3.3.1 Legislative Requirements

Four key Acts guide the regional council in provision of flood management services.

The **Soil Conservation and Rivers Control Act 1941** identifies that it shall be a function of every regional council to minimise and prevent damage within its district by floods and erosion. It places responsibilities on regional councils to:

- Control or regulate the flow of water towards, into, in and from watercourses;
- Prevent or lessen any likelihood, and any damage of, the overflow or breaking of the banks of any watercourse;
- Prevent or lessen erosion or the likelihood of erosion; and to,
- Promote soil conservation.

The **Resource Management Act 1991** identifies the function of regional councils as including the control of the use of land, water and planting within the rivers for the purpose of soil conservation, the maintenance and enhancement of biological diversity, ecosystems, water quality, water quantity and the avoidance or mitigation of natural hazards.

The **Local Government Act 2002** identifies the purpose of local government as being to enable democratic local decision-making and action by, and on behalf of, communities; and to promote the social, economic, environmental, and cultural well-being of communities, in the present and for the future.

The Act provides a framework and powers for local authorities to decide which activities they undertake and the manner in which they will undertake them. It promotes the accountability of local authorities to their communities and also promotes taking a sustainable development approach. The Act requires councils to identify community outcomes and to have a Long Term Plan and Annual Plan, as well as ensuring sound financial management utilising a balanced budget approach.

The **Civil Defence Emergency Management Act 2002** replaces the Civil Defence Act 1983. The purpose of the Act, as it relates to flood management services, is to:

- Improve and promote the sustainable management of hazards in a way that contributes to the four wellbeing's, the safety of the public, and protection of property;
- Encourage and enable communities to achieve acceptable levels of risk;
- Require local authorities to co-ordinate, through regional groups, planning, programmes, and activities related to civil defence emergency management across the areas of reduction, readiness, response, and recovery, and encourage co-operation and joint action within those regional groups.

3.3.2 Historic Levels of Service - Rivers

The current river levels of service for the Scheme have largely been developed and updated following completion of a 1985 Scheme review report:

> *Upper Tukituki Catchment Control Scheme, prepared by Gary. J. Williams, August 1985, Hawke's Bay Catchment Board and Regional Water Board.*

This report contained comprehensive proposals for upgrading of assets following concerns about the level of flood protection provided by the scheme at the time. The main aim being to achieve protection up to the 1% Annual Exceedance Probability (AEP) Design Event (refer

section 0). The 1% AEP has been considered the point at which both the cost of protection and the risk of flooding caused by overtopping have been considered acceptable to the previous Scheme community.

To date, the Scheme assets have been improved and maintained to meet these service levels. A recent review: *Upper Tukituki Stopbank Upgrading* (HBRC 2008) identified issues with part of the Tukituki River stopbank. Improvement works were initiated in 2008/09 and are expected to be completed over the next two years.

3.3.3 What is the "Design Standard" - How much protection do we have?

The existing stopbanks and channels managed by Hawke's Bay Regional Council were originally designed to carry a discharge derived from historical river flow measurements. The level used for each river represents the 1% Annual Exceedance Probability (AEP) event. This event has a 1 in 100 chance of being equalled or exceeded any one year (often referred to as a 100 year ARI event).

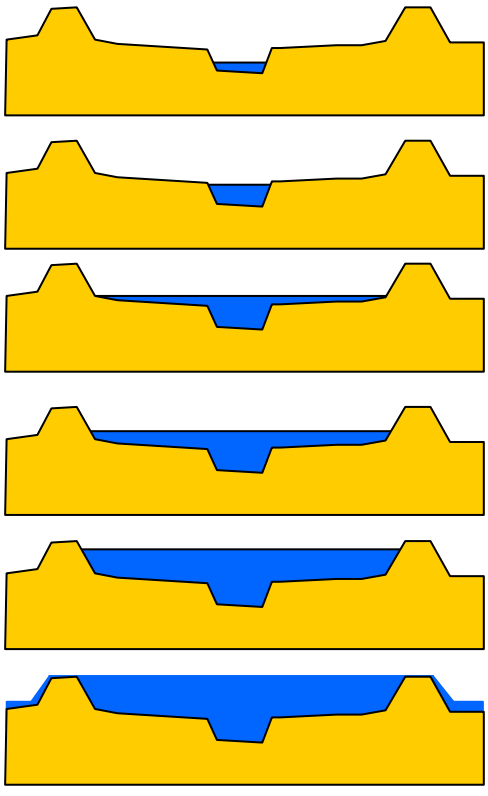
ARI (years)	AEP
1	0.632
2	0.393
5	0.181
10	0.095
20	0.049
50	0.020
100	0.010

Table 3 Comparison of ARI years and AEP percentages

The intention of the Scheme is that all stopbanks are designed, monitored and maintained to continue to meet their original design level.

When a 1% AEP event occurs, the river channels fill up and the flood waters reach near the top of the stop banks.

Figure 6 Comparison of AEP Flood Levels within Stopbank System (not to scale)



Normal flows – river within the active river channel.

Bank full – Annual flood – waters remain within the active river channel.

20% AEP (5year) – water flows onto river berms and in some areas may reach the toe of the stopbanks.

20 to 1% AEP - river water progressively reaches up the sides of the stopbanks.

1% AEP (100yr) – river water reaches near the top of the stopbanks (there is usually a freeboard within the design)

>1% AEP – river levels exceed the stopbank height and water flows over the top of the stopbanks. Failure of stopbanks could also occur.

If the event exceeds the 1% AEP level then the flood waters may flow over the top of the stopbanks, potentially causing them to fail. This is called a Super-Design Event and will potentially result in the flooding of significant areas of the Ruataniwha Plains.

The Super-Design Event is a key residual risk to the Scheme community that is impossible to eliminate completely.

Extreme flooding, including both super-design and failure events, has a low probability of occurring, but can have significant consequences both locally and regionally; including the potential for loss of life, as well as damage and loss to both public and private assets. They can have long-term impacts on communities.

Management of residual risk focuses on good design practice, monitoring of asset status and development of contingency plans for response management should an extreme event occur. Council's plans for extreme flooding management are covered in the Flood Manual and Civil Defence Emergency Management Plans.

3.3.4 Community Expectations

The Scheme and its management is promoted to the community through several methods. Council distributes a summary of each LTP and each Annual Report to every property through its newsletter publication "Our Place". This provides information on Council activities and encourages members of the public to provide feedback to Council. The full documents are also available for viewing at Council and on Council's website. Council staff members also undertake specific consultation with individual ratepayers and the general public through both surveys and meetings, as required where issues arise. Some projects associated with the Scheme are also covered by newspaper articles.

A general public survey, undertaken in 2008, highlighted that flooding hazard was considered in the top three most important threats in Hawke's Bay (earthquake and tsunami being the other two). The survey also identified it as the top issue where Council should put greater resources; however it was also shown to be of less importance than in a previous survey in 2005 and did not register as an issue of most concern (Cinta 2008).

Flooding, relative to other issues, does not attract much unsolicited comment or concern from ratepayers, however while there may not be a significant gap between community perception and the existing level of service provided by the river scheme, it is acknowledged that the scheme community has not experienced a significant river flood due to failure or overtopping since the early 1990's and that should such an event occur, public perception may change. Flooding from the smaller streams and drains occurs more frequently compared to flooding from the river system and therefore is expected to bias community focus towards this aspect.

Specific consultation to determine community expectations regarding flood protection levels will be undertaken as part of the planned Level of Service Review.

3.3.5 Current Levels of Service

Current levels of service are set out in Table 4. The table shows how Council's performance in achieving the levels of service will be measured, as well as the current and target performance for each measure.

The assessments and audits undertaken as performance measures are further outlined in Section 8.

Table 4 UTTFCS Levels of Service

Level of service statement	Level of Service Measure	Current performance	Performance Targets (2009/19) Yr 1-3 in detail Yr 4-10 outline	Required Actions to achieve performance targets
We will maintain an effective flood control network that provides protection from frequent river flooding to communities and productive land within the Upper Tukituki Scheme. *The level of protection in technical terms is to convey a flood discharge with a 1% probability of being exceeded in any one year (1%AEP).*	A full assessment of the capacity and integrity of flood control works is completed every six years by a chartered professional engineer with interim audits undertaken annually. *The level of service will be reported as:* • *Kilometres and percentage of floodway that provides the design level of service.* • *Kilometres and percentage of river edge that is at no more than low risk of failure.*	Full initial assessments will be done for each of the rivers in the flowing years: Upper Tukituki 2009/12 Waipawa 2011/12 *Audits done in past years indicate the following levels of service:* *Upper Tukituki: 34.4km, 90%* *Waipawa: 26.5km, 95%*	Yrs 1-3 Increasing to 98% Yrs 4-10 increasing to 100%	Year 1 to 3 • *Ongoing maintenance and gravel extraction to maintain the channel capacity and integrity of the flood protection assets.* • *Monitoring of flood events in accordance with the Flood Manual.* • *Annual asset audit by a chartered professional engineer, and full assessment of each of the major rivers every six to ten years.* • *Ongoing sawfly damage monitoring.* • *Upgrade stopbanks on the Tukituki River in the vicinity of its confluence with the Ongaonga Stream.* Year 4 to 10 • *Review of the current level of service provided by the Scheme to determine whether they are still appropriate or should be increased.* • *Upgrade stopbanks necessary to provide any new level of service.*
We will protect and enhance scheme riparian land and associated waterways administered by Council for public enjoyment and increased biodiversity.	The level of service will be reported as the length of Scheme riparian land enhanced.	1210 metres total in 2008	Yrs 1-3: 1.5km per yr Yrs 4-10: to be determined by *SEV programme and level of service review*	Year 1 to 3 • Stream Ecological Valuation Programme. • Develop Rivers Environmental Concept Plan • Implement annual programme from Environmental Strategy Yrs 4-10 : • Review the current level of service provided by the Scheme and determine new level of service targets.

NB: This LOS table will be updated once the 2012/2022 LTP has been adopted by Council.

4 FUTURE DEMAND

4.1 Review of Levels of Service

The current Scheme was constructed approximately 25 years ago and it is now appropriate that the current levels of service are reviewed.

4.1.1 Potential Drivers for Levels of Service Change

The need for changes to the level of service can come from both public demand for better service and from internal changes, such as policy reviews or legislative amendments, which necessitate the modification of how services are provided.

The potential drivers for change to the levels of service are summarised in Table 5.

Table 5 Potential Drivers for Level of Service Change

Driver Type	Example
Internal Reviews and Risk Assessments	Outcomes from annual asset status review – ie damaged assets Assets found to be designed below LOS standard Increased risk to property identified
Specific Feedback (Public or representative)	Complaints or comments received regarding specific projects or areas – these may be instigated by flooding events, land use changes, environmental changes or property ownership changes. Targeted survey results
Indirect Feedback	Newspaper articles Usage numbers* Litter and vandalism levels* (*as an indication of how the community values areas/assets)
Community Changes	Changing or intensification of land uses Changing community demographics Population growth
Knowledge and Technology (Internal methodology changes & better advances)	More extensive data sets More advanced modelling so better able to understand impacts New technologies allowing improved data collection, analysis or storage or improved asset design & construction
Policy and Guideline Changes	Changes to regional plans, codes of practice and internal guidelines
National and Regional Trends	National discussions and proposed changes LOS provided by other councils
Legislative Changes	Changes to acts, standards and bylaws
Affordability / Economic Opportunities	Local economic growth and stability Other projects occurring allowing shared costs opportunities Increases in land values and construction costs
Environmental Change	Climate change with increased rainfall Sea level rise
Event Occurrence	Major flood event which illustrates risk and vulnerability

4.1.2 Key Drivers for Upper Tukituki Scheme

The key drivers that could result in significant changes to general Levels of Service over the next decade are outlined in Table 6. These issues will form the basis of the Level of Service review programmed.

Table 6 Likely Drivers for UTTFCS Level of Service Change

Driver Type	UTTFCS Drivers
Internal Reviews and Risk Assessments	Willow Sawfly Risk Outcomes of full Scheme assessments and annual audits Residual Risk Management (Super-Design events)
Specific Feedback (Public or representative)	Public Consultation Outcomes from future Level of Service Review
Community Changes	Future changes and intensification of land use
Knowledge and Technology	LIDAR availability, including potential Bluewater LIDAR More advanced and extensive modelling (2D)
Policy and Guideline Changes	Amalgamation of multi-value approach into council documents and guidelines Potential impacts of co-management arrangements with iwi on Council policy and management of schemes
National and Regional Trends	Best Practice for Management of Stormwater focusing on Low Impact Options and retaining water in the landscape
Affordability / Economic Opportunities	Forecasts for local economic growth and stability Impact of increases in land values and construction costs
Environmental Change	Anticipated projections of climate change in Hawke's Bay, which suggests lower total rainfall but more frequent, more intense, rain events in future. Seasonal changes are also anticipated with lower rainfall in winter and spring and greater rainfall in summer and autumn. Greater intensity events are likely to result in an increased frequency of flooding.

Of these drivers, the ones most likely to create significant change to Council's activities and asset management outcomes are:

- Public consultation outcomes;
- Residual risk management (section 5.2);
- Multi-value approach to waterway management (refer Section 6.2);
- Stormwater Management Best Practice changes (refer Section 4.3); and,
- Climate change (refer Section 5.5).

In addition, there are a number of Council projects underway across the Ruataniwha Plains that may have an impact on the way Council manages the river systems in the UTTFCS area in future. These are briefly set out below.

4.1.2.1 Water Storage

Council is currently investigating the feasibility of large scale community water storage on the Ruataniwha Plains, to provide a more secure source of irrigation water for farmers, and to alleviate increasing pressure on groundwater and surface water resources. The feasibility study commenced in 2009 and is scheduled for completion in July 2012. The project will investigate the feasibility of building a storage dam on a tributary of the Waipawa River. If water storage is deemed feasible, resource consent applications will be lodged and detailed dam design will be initiated. The dam could be in place by 2017.

Current land use across the Ruataniwha Plains is primarily sheep and beef, and mixed arable cropping. The provision of more water for irrigation has the potential to enable more intensive agricultural and horticultural activities to an additional 20,000ha of Plains land. This potential change to the land use mix will be accompanied by changes to the social make-up

of the community and may mean substantial growth across the Scheme area as support services relocate to Central Hawke's Bay also.

Establishment of water storage on the Plains may also have associated effects for the Scheme in terms of changes to sediment load, river geomorphology, and run-off rates from farm land.

4.1.2.2 Central Hawke's Bay Wastewater Project

Treated wastewater (including stormwater) from the urban areas of Waipukurau and Waipawa has historically been released into the Tukituki River. This has been a concern for parts of the community with respect to the affect that it has on water quality in the Tukituki catchment. As such, Hawke's Bay Regional Council and Central Hawke's Bay District Council are working to design a new scheme whereby the majority of the wastewater can be disposed of to land. The proposal is currently in the design/consenting phase of development.

4.1.2.3 Emissions Trading Scheme

In October 2011, Council submitted an application to the Ministry of Agriculture and Forestry, to join the Emissions Trading Scheme with respect to the substantial areas of vegetation (live edge protection) lining the Region's main rivers (Waipawa in the UTTFCS area). Participation in the ETS comes with a degree of liability in that the vegetation must be retained or, if harvested, replanted to avoid charges being imposed. If successful with the application, this will have implications for the way Council manages the UTTFCS in future.

4.1.2.4 Regional Resource Management Plan – Tukituki Plan Change

Council is currently reviewing the allocation and water quality provisions of the RRMP in response to growing pressures on the Region's groundwater and surface water resources, and the recently adopted National Policy Statement on Freshwater. The Plan Change, applying to the Tukituki Catchment, is due to be notified in July 2012. It is anticipated that the Plan Change will set new, higher, minimum flow levels for aquatic habitat protection and more stringent rules around nutrient runoff to waterways. The new rules, policies, and objectives may have a long-term impact on land use practices on the Plains. It may also support an increased level of environmental enhancement over time.

4.2 Future Public Consultation on Level of Service

Specific consultation on the levels of service for the Scheme needs to be undertaken to enable the general public to consider whether or not the current levels of service meet their current and future anticipated needs.

Consultation will need to focus on:

- The level of flood protection (the 1% AEP event design standard) provided by the scheme river assets;
- Identifying the acceptable level of residual risk inherent in the system;
- The future vision for environmental management and public use of Scheme areas.

Prior to commencement of any public involvement, some background economic assessment and alternative design work must be completed. Assessment of risk and its communication to the scheme community are also required as part of the level of service review and are discussed in Section 5.

Outcomes from public consultation regarding the level of flood protection provided may impact on the key levels of service for the scheme. Should the scheme community seek an increase in the level of protection afforded, a scheme wide upgrade would be required.

4.2.1 Level of Service Review Plan

The following review plan has been identified:

Table 7 LOS Review Plan

Order	Task
1	Internal review of scheme levels of service including: • Cost/benefit of the scheme • Risk assessment • Future demand assessment
2	Identification of viable alternative level of service options and opportunities for adding value and any associated impact on current funding sources
3	Education regarding scheme levels of service and residual risks
4	Education and consultation regarding options for levels of service change and their likely costs
5	Identify willingness to pay and preferred levels of service
6	Update Asset Management Plan and LTP accordingly
7	Programme required capital works.

The outcomes from Steps 1 and 2 will be used for education and consultation of scheme beneficiaries (Steps 3 through 5).

4.3 Best Practice Changes

Historically, stormwater management has focused on hydraulic efficiency to promote rapid drainage. Best practice trends in stormwater management are now focusing on retaining water within catchments by slowing down and detaining stormwater. The aim being to reduce peak flows in order to minimise impacts on existing drainage systems and natural watercourses and their ecology; as well as aiding in stormwater quality management and drought resilience.

While some issues may not be considered as significant for the Upper Tukituki Scheme as they are on the Heretaunga Plains, Council intends to manage the Schemes consistently. The impacts of Scheme management on watercourses and the potential impacts of climate change are of particular significance for Central Hawke's Bay.

This change in philosophy represents a potentially significant shift in Council's approach with regards to its waterways and, as such, may take some time to fully implement.

5 RISKS AND RISK MANAGEMENT

Risk is a measure of the consequence of an event and the probability of the event occurring. The level of risk increases as either the frequency of occurrence or the degree of consequence increases.

Risk management is the culture, process and structures that are directed towards realising potential opportunities, whilst reducing either or both of the probability or consequence of adverse effects.

The risks considered in this document focus predominantly on risks to the Scheme assets, which may prevent them from working as expected during a flood event and thereby impact on the Scheme objectives and the land which the Scheme assets protect. Health and safety risks associated with Council staff are dealt with under Councils Health and Safety system.

There is also a Scheme Risk Level, which is related to the level of flood protection provided by the stopbank system. The current design standard provides protection up to a 1% Annual Exceedance Probability event. There is a residual risk that events larger than the 1%AEP design standard will occur, resulting in flooding and possible asset failure. This residual risk is impossible to eliminate completely and Council's focus in this respect is on contingency planning.

Council is currently working through a process to formally identify risks and establish a management process for addressing them. The focus of this work includes:

- Quantifying the consequence of an overtopping or failure event in terms of asset value and potential lives lost;
- Identifying, and where possible quantifying, the circumstances which may be exacerbating risk;
- Identifying possible options for minimising these risks;
- A review of all river berms and edge protection to assign risk classification.

These points will primarily be addressed through the level of service review scheduled to begin in 2013/14. Council is also in the process of establishing a new risk management database using the 'Quantate Risk' software. The new software will be phased in over the next several years and will support future risk reviews.

The risks associated with the UTTFCS are assessed using the probability and consequence criteria outlined below.

Risks associated with the UTTFCS are outlined in the Risk Register (refer Section 5.1). A Risk Action Plan has not yet been established for the Scheme, but is identified in the Improvement Programme at the back of this Plan, and will be advanced in the 2012/13 financial year as resources allow.

Table 8 Probability Scores

Likelihood	Descriptor	Score
Frequent	Occurrence of the event regarded as highly probable. Documented and frequent incidents. Is likely to occur one or more times over a 2 year period.	5
Often	Occurrence of the event regarded as a real possibility. Documented and regular incidents. Is likely to occur once in a 10 year period.	4
Likely	Occurrence of the event regarded as having some potential to occur. Documented but infrequent incidents. Is likely to occur once in a 25 year period.	3
Possible	Whilst possible, occurrence of the event generally regarded as unlikely. Documented but few incidents. Likelihood of occurrence less than once every 100 years.	2
Rare	Occurrence of event regarded as unusual. Likelihood of occurrence less than once every 500 years.	1

Table 9 Consequence Scores

Consequence	Descriptor	Score
Catastrophic	Loss of life, greater than $5million repair cost, major disruption to community for more than 1 week. National media and political attention. Delivery of LTP outcomes across work area significantly affected for greater than six months.	5
Major	Up to $3million financial impact and less than disaster reserve for any Scheme affected. Some disruption to community but lasting less than 1 week. Delivery of LTP outcomes across work area affected for up to six months.	4
Moderate	No more than two Schemes affected and less than 50% annual rates for Scheme affected. Delivery of LTP outcomes across work area affected for up to one month.	3
Minor	One or more Schemes impacted, but less than 10% of annual budget for each Scheme affected. Event affects efficiency or effectiveness of service.	2
Insignificant	Negligible effects. Minor disruption felt by limited small group of stakeholders. Managed over short period of time.	1

Table 10 Risk Matrix

Likelihood	Consequence				
	Insignificant (1)	Minor (2)	Moderate (3)	Major (4)	Catastrophic (5)
Frequent (5)	**5**	**10**	**15**	**20**	**25**
Often (4)	**4**	**8**	**12**	**16**	**20**
Likely (3)	**3**	**6**	**9**	**12**	**15**
Possible (2)	**2**	**4**	**6**	**8**	**10**
Rare (1)	**1**	**2**	**3**	**4**	**5**

Table 11 Levels of Risk

15-25	Extreme Risk	Requires immediate remedial action
8-12	High Risk	Requires remedial planning and action via the AMP
4-6	Moderate Risk	Address via new procedures and/or modification of existing practices and training
1-3	Low Risk	No formal requirement for further action, unless escalation of risk is possible

5.1 Risk Register

Table 12 Register of Specific Risks to Assets

Risk Reference	Risk	Consequence	Probability	Risk Score # (range)		Current Risk Reduction Activities	Change to Risk	Residual Risk Score # (range)		Contingency Plan *additional reduction options
R1	**Climate Change (accuracy of current predictions/effects)** Caused By: • Changes to Global climate • Uncertainty of forecasts/predictions relating to the effects	• Increased weather impacts • Reduced protection level • Sea level rise and more frequent and severe storms • Requirement to replace assets earlier and/or more frequently • Community expectations that service levels will be maintained • Higher funding requirements • Ability/inability to pay • Higher risk of asset failure • Greater disruption to community infrastructure	Frequent (5)	**5**	**25**	• Plant wider range of plant species to improve edge resilience • Berm grass cover managed to reduce fire risk • Regularly monitor climatic conditions and assess change • Incorporate climate change forecasts into asset lifecycle/maintenance planning • Increase asset protection levels over time • Complete a climate change impact assessment for the Ruataniwha Plains rivers in accordance with MfE climate forecasts (see Improvement Plan (IP) task 12)	Adaptive capacity improved	**5**	**25**	*Increase asset protection levels *Assess climate change impacts
R2	**Asset Failure – Stopbank, Edge Protection)** Caused By: • Debris • Poor design and/or construction • Lack of maintenance • Excessive river bed movement or sediment buildup • Stock damage • Erosion • Super design event • Adverse land owner activities	• Flooding • Diversion of main flow • Legal action • Increased costs • Community disruption and public safety • Negative PR for Council	Likely (3)	**12**	**15**	• Maintain healthy live edge plantings through lopping, layering and planting • Supplement plantings with slash rows and rope and rail groynes • Monitor Sawfly damage • Monitor erosion levels • Assess erosion risk of specific river reaches • Install hard protection (groynes and revetments) at high risk sites • Prevent gravel build up through beach raking • Remove gravel build up through extraction • Berm grass cover managed to reduce fire risk • Fire bans in river areas • Two Chartered Engineers kept on staff • Best practice processes followed through design, tendering & construction phases	Probability reduced to 'possible'	**6**	**10**	CDEM procedures Super-Design Contingency Plan
R3	**Asset Failure – General (Retention dams, groynes, waterway crossings)** Caused By: • Debris/weed • Power outage • Poor design and or construction • Lack of maintenance • Super design event • Adverse land owner activities • Vandalism and theft • Excessive sedimentation	• Flooding • Legal action • Increased costs • Community disruption and public safety • Diversion of main flow • Negative PR for Council	Likely (3)	**12**	**15**	• Checking of key assets following storm warnings • Checking of assets during and following significant storms • Monitor erosion levels • Monitoring of asset condition • Removal of debris build-ups • Rapid response following complaints • Two Chartered Engineers kept on staff • Best practice processes followed through design, tendering & construction phases	Probability reduced to 'possible'	**6**	**8**	CDEM procedures Super-Design Contingency Plan
R4	**Blockage of assets** Caused By: • Debris • Poor design or lack of maintenance • Excessive river bed movement • Stock damage • Erosion	• Surface flooding • Asset failure • Stopbank breech • Legal claims • Increased costs • Negative PR for Council	Often (4)	**12**	**20**	• Checking of key assets following storm warnings • Checking of assets during and following significant storms • Monitoring of asset condition • Removal of debris build-ups • Rapid response following complaints • Two Chartered Engineers kept on staff • Best practice processes followed through design, tendering & construction phases	Probability reduced to 'likely'	**3**	**6**	Mobile pumps and generators available

Risk Reference	Risk	Consequence	Probability	Risk Score # (range)		Current Risk Reduction Activities	Change to Risk	Residual Risk Score # (range)		Contingency Plan *additional reduction options
R5	**Pest Epidemic** Caused by: • Climate Change • Proliferation of plant or animal pests • Introduction of a new pest species	• Death of live edge sections (e.g. sawfly) • Significant stopbank damage (e.g. rabbits) • Reduction in water quality • Blockages to channels • Adverse effect on levels of service • Increased costs	Often (4)	**12**	**16**	• Plant wider range of plant species to improve edge resilience • Monitor sawfly damage • Monitor stopbank condition • Undertake pest control programmes in river areas (e.g. MAF Didymo 'Check Clean Dry' programme)	Probability reduced to 'likely'. Probability may reduce further over long-term	**9**	**12**	
R6	**Storm Damage** Caused By: • Extreme weather event • Climate change	• Asset failure and/or loss • Increased aggradation or degradation and morphological change • Flooding • Loss of land • Damage to property • Damage to environment • Community and public disruption • Increased costs	Possible (2)	**4**	**10**	• Undertake regular monitoring and maintenance programmes • Develop and refine models to improve efficiencies and certainty of information (see IP9)	Assets more resilient to storm effects	**2**	**10**	Budget for asset repairs
R7	**Drought** Caused by: • Climate Change • Extreme weather event	• Increased fire risk • Live edge plant death • Poor growth rates • Erosion • Degradation of asset integrity • Loss of environmental planting • Inability to complete operational programme (i.e. mowing/beach raking) • Fire damage	Possible (2)	**4**	**8**	• Plant wider range of plant species to improve edge resilience • Berm grass cover managed to reduce fire risk	Consequences reduced to 'rare'	**2**	**4**	
R8	**Deliberate or accidental damage of assets** Caused by: • Inadequate security • Vandalism • Public use • Contractor damage • Stock • Spraying (lack of controls) • Illegal dumping of rubbish	• Damaged/ineffective assets • Fire • Erosion • Unbudgeted costs • Environmental damage	Often (4)	**8**	**8**	• Undertake regular safety inspections • Design to minimise • Monitor via telemetry • Restrict access to assets (locks, fences, gates) • Promptly respond to complaints and requests for repair	Likelihood reduced to 'likely'	**3**	**4**	
R9	**Inadequateness of institutional knowledge and experience of staff (including contractors)** Caused By: • Lack of adequate policy and procedures (i.e. procurement) • Lack of effective training and /or succession planning • Lack of competitors in the market place • Effectiveness of corporate information Management system	• Unnecessary or excessive project costs • Insufficient output or quality of work • Poor Contractor performance • Asset malfunction • Legal liability • Inefficient use of resources • Lack of compliance with CoP and RRMP	Often (4)	**6**	**12**	• Maintain contract tendering process • Monitor project reporting and costs • Support staff training and mentoring • Clearly communicate asset management processes and practices, and organisational structures • Develop waterway guidelines (see IP24) • Review and maintain existing guidelines to ensure best practice advice is kept up to date (see IP25) • Investigate the opportunities to incorporate contract details into Council Financial sysrtem (see IP8)	Probability reduced to 'possible'	**2**	**6**	

Risk Reference	Risk	Consequence	Probability	Risk Score # (range)		Current Risk Reduction Activities	Change to Risk	Residual Risk Score # (range)		Contingency Plan *additional reduction options
R10	**Staff Loss** Caused By: • Buoyant labour market • Work/Life balance • Workload • Lack of resources • Retirement	• Asset knowledge and experience lost • Under-resourcing • Inability to deliver on service levels	Likely (3)	**6**	**9**	• Maintain electronic and hardcopy file systems containing all asset condition and location data • Retain intermediate and senior level staff • Review training budget annually (see IP31) • Coordinate suitable projects and timeframes to provide opportunities for student holiday employment and 12 month internships for graduates (see IP33)	Knowledge loss and transition time is minimised	**6**	**9**	
R11	**Decrease in funding** Caused By: • Economic climate • Political climate • Operational tempo (doing more) • Inadequate forward planning	• Difficulty repaying debt • Failure to meet LTP targets • Reduced asset maintenance • Capital works delayed • Adverse impact on service levels	Possible (2)	**6**	**8**	• Monitor external funding opportunities • Prioritise projects • Liaise with other Councils	Consequence reduced to 'minor'	**4**	**6**	
R12	**Lack of Political alignment and support** Caused By: • Inability of elected members to fulfill roles • Disregard for community views • Change in council makeup through election terms • Re-organisation of local government	• Failure to meet long-term objectives • Loss or reduction in funding • Adverse effect on service levels • Negative PR	Possible (2)	**4**	**8**	• Ensure Councillors roles well defined and implemented • Regularly report to Council on LTP project progress • Retain elected members on project teams and steering groups	Likelihood reduced to 'rare'	**2**	**4**	

 # refer probability, consequence and risk tables

5.2 Residual Risk

The Scheme assets have been designed to reduce the risk of flooding to the Ruataniwha Plains lands. The river stopbanks and floodways are designed to protect the land from flooding in flood events up to a 1% Annual Exceedance Probability (AEP) event and to maintain the river within a defined course. As the flood management assets are designed to a finite level of protection there will always be the chance for a flood to occur that exceeds the capacity of the asset (a super-design event). In addition, there is always the risk of unforseen failure of part of the flood management system, such as erosion and collapse of a stopbank, or blockage of a culvert or floodgate.

Situations which could result in a super-design or failure event are outlined in Table 13.

Table 13 Potential Causes of Super Design and Failure Events

Event	Scenario/Example
Prolonged or successive rainfall events	Prolonged or successive rainfall can lead to saturation of the ground, resulting in more runoff and a weakening of soils.
Short, high intensity rainfall	These events can temporarily overwhelm drainage asset capacity.
Damaged structures	For example, stopbanks that have been weakened by unauthorised excavation could collapse during a storm. Edge protection plantings attacked by sawfly may not be able to prevent rivers from scouring out stopbanks during a flood.
Design or Construction Error	If structures are not built to the design or where materials used are not as strong as they should be then assets may fail during storms.
Unexpected events	Unpredictable events which impact on the normal function of structures, such as landslides, subsidence, blocked culverts or earthquakes can all lead to failure of assets.
Overloading	It is also possible that failure events may occur during a super-design event when structures experience pressures greater than their design limitations.

These situations represent a residual risk that is impossible to eliminate completely.

Management of residual risk focuses on good design practice, monitoring of asset status and development of contingency and civil defence emergency plans for response management should a super-design or failure event occur. Council currently undertakes annual monitoring of the scheme assets to identify and enable rectification of situations, which could significantly increase failure risks.

Review and development of contingency plans for super-design events within the main river systems is to be undertaken as part of the super design flood review, following recommendations made in the report *Super Design Flood Event* (Beca 2000).

5.3 Asset Recovery Following Flood Damage

A review of Council's Disaster Damage Risk Management was last completed in February 2007. The review dealt specifically with disaster damage risks to Council-owned infrastructure assets and concluded that Council continues to face considerable ongoing risk from natural disasters.

It was concluded that the Council may qualify for some Central Government assistance for the repair or restoration of Council infrastructure assets in the event of a disaster, however the amount of any assistance would only be significant in a major disaster. It is therefore prudent to ensure Council can meet the expectations of central government with regard to risk management by providing for small to medium disasters where Council's financial risk appears greatest and for large disasters where central government funding may not be forthcoming.

Flood damage risks to Council will be reduced and managed by a combination of measures including:

- Maintenance of infrastructure assets to their original design criteria;
- Where feasible and economic, the protection of assets from the effects of natural disasters, and ongoing improvement of their resilience to damage;
- Financial strategies to provide for the cost of repair and restoration of assets damaged in a disaster including:
    - Insurance (e.g. membership in the Local Authority Protection Programme);
    - A Disaster Damage Reserves to fund Insurance Excess, and
    - Redirection of annual maintenance budgets to repairing disaster damage.

The Disaster Damage Reserves formula is to be reviewed in the future to ensure the level of the fund is sufficient.

The financial aspects are outlined in greater detail in the Financial Sections of this Plan.

5.4 Ongoing sawfly risks

Willow Sawfly has been in Hawke's Bay since 1999. The larvae, a small, but destructive caterpillar eats only willow leaves. Infestations can kill whole trees reducing the amount of roots holding river gravels in place during floods and weakening the edge protection as a defence against berm erosion and subsequent stopbank damage.

In previous years the edge protection in other Hawke's Bay river networks has been severely damaged in places by Willow Sawfly requiring reinforcement with concrete and wire groynes and planting of native and exotic plant species that are not eaten by Willow Sawfly.

Figure 7 Willow Sawfly. Source HFRINZ 1999

Sawfly has been found in the edge protection within the UTTFCS, but so far there has not been significant damage. However, future years may see infestation problems in these areas requiring contingency works.

Council's response to management of this risk involves ongoing monitoring of edge protection to identify areas of sawfly damage. In addition, research and experience gained through management of this issue in the Heretaunga Plains Scheme will provide valuable knowledge should it become a problem on the Ruataniwha Plains.

5.5 Climate change

The anticipated projection of climate change for the Hawke's Bay region is for lower total rainfall, but more frequent, more intense rain events. Seasonal changes are also anticipated with lower rainfall in winter and spring and greater rainfall in summer and autumn (MfE 2008).

Greater intensity rainfall events are likely to result in an increased frequency of flooding and may be a key driver for increasing the design level of protection afforded by the flood control scheme.

The implications of these changes to the scheme and scheme assets include:

- Increased probability of super-design events occurring;
- Increased damage due to flooding frequency increases;
- Drought impacts on edge protection growth and survival;
- Drought impacts on environmental enhancement efforts;
- Potential changes to river ecology due to long term changes to river base flows; and,
- Potential changes to gravel, sand and silt transport – with greater transport due to more frequent, higher intensity events, but less transport between events due to lower base flows.

Possible actions for increasing resilience within the Scheme in response to climate change include:

- Purchasing additional land areas to allow for increasing stopbank size;
- Allowing for additional capacity within programmed upgrades including an appropriate level of adaptability over the lifespan of the structure;
- Allowing additional funding for more frequent repair of damage caused by storm events;
- Review of drought tolerance of edge protection species and identification of alternative species and effective restoration methods;
- Increased monitoring of bed changes and floodway capacity and associated changes in gravel management;
- Increased planting, particularly in upper catchments to slow and store water thereby reducing flood peak floods and increasing base flows.

Ministry for the Environment (MfE) predictions for the potential increase in the 100yr ARI (1% AEP) rainfall for Hawke's Bay from 1990 to 2090 are Low 5%, Middle 17% and High 44%.

Scenario development for each of the rivers to determine the impact of extreme rainfall increases is included within the improvement programme.

5.6 Corporate Risks

Due to the potential loss of key long-term staff (through retirement, turnover or death) and potential industry shortages of suitable replacements, there is a recognised risk to Council's ability to continue to employ appropriate staff to ensure that the assets are managed effectively.

Council's response to this issue includes:

- Ensuring an appropriate level of capital investment in technology to minimise dependency on the experience of specialist and senior staff; and,
- Encouragement of suitable graduates into local government careers through holiday employment and 12-month internships upon graduation.

5.7 Public Consultation on Risk

Demand is driven by perceived risk. Risk of failure of the river control and flood protection assets is real. There is a real risk of the capacity of the flood protection assets being exceeded, however it is inevitable that the public perception of the risk is influenced by their knowledge of the impact of a failure on their daily lives. This in turn is heavily influenced by the occurrence of recent significant flood events both locally and around the country. While the risk is not realised, the perception that their lives cannot be affected will remain with the large proportion of the population.

Council will consult with the beneficiaries of the Scheme with regard to the level of service and the residual risk; however it is Council's experience that the engagement of the public in

such a process is unlikely to be great while they perceive that there is little risk, unless there are significant financial implications which impact on them directly. Council would expect a significantly greater degree of engagement in the aftermath of a flood event or if the public perception of the risk was high. Education on residual risk and potential impacts is therefore a key precursor to consultation regarding flood protection levels.

This is supported by the results from the 2008 general survey, which highlighted that people recognise that flooding is a key risk in Hawke's Bay, but that it was not identified when respondents were asked to identify issues of most concern. Flooding had rated in the previous 2005 survey as an issue of concern, which may have resulted from significant drainage flooding having occurred at the time of survey.

6 SCHEME ENVIRONMENTAL STRATEGY

6.1 Adverse Impacts

The development of the Scheme and its focus on flood control has resulted in significant changes to the natural hydrology of the Ruataniwha Plains. These changes have included a reduction of flood plain areas, diversion of stream reaches, removal of stream-side vegetation and the use of structures to control flows and erosion. These permanent hydrological changes, and some of the ongoing methods used to maintain the Scheme, have resulted in adverse effects on river and stream ecology and habitats, as well as affecting the social and cultural values of the waterways.

There is increasing recognition that while the primary objective of the scheme is flood control, there are opportunities to protect and enhance the environmental, social and cultural values of the scheme waterways. Council has an Environmental Management Strategy and Environmental Code of Practice that aim to protect and enhance the waterway environments, and help reduce the potential for adverse impacts from the scheme. These are underpinned by a multi-value philosophy to waterway management.

6.2 Multi-value waterway management philosophy

On August 29 2007, the Hawke's Bay Regional Council adopted a multi-value philosophy to waterway management for all waterways administered as part of a Council Flood Control and Drainage Scheme flowing through public land.

The philosophy seeks to move Council's focus from purely **drainage** to one of multiple values, including **culture, heritage landscape, recreation** and **ecology**. Drainage for flood control will always be a priority for Council, but there are many things that can be done, particularly when redesigning or maintaining local waterways, that can help improve other values in addition to drainage.

Table 14 Multi Value Approach – Values Description

Values	
Ecology	The self-sustaining processes and inter-relationships among plants, animals and insects
Landscape	Includes the special character of sites and places, their aesthetic qualities and their meaning to the community
Recreation	Includes active and passive recreation, play and the structures that support these activities
Heritage	Includes sites and activities of historical significance (structures, remains, etc) and natural significance (remnants, landforms, etc)
Culture	The community's perception of a resource and its values, indicted by community involvement in management, celebration of past events and planning for the future
Drainage	Includes inter-relationships between groundwater and surface water, natural flow regimes and the management of storm events
Source: Waterways, Wetlands and Drainage Guide Part A. CCC 2003	

Whenever a treatment option for a waterway is considered, managers must identify how **ALL** of these values can be preserved and improved.

Formal adoption of this new philosophy has implications for how some assets are currently managed and will result in a change to management methodologies for areas that undergo enhancement. The multi-value philosophy will be progressively amalgamated into asset

management and guideline documents as they are reviewed and as enhancement projects are completed. The philosophy represents a potentially significant shift in Council's behaviour with regards to its waterways and as such may take some time to fully implement.

6.3 Environmental Management Strategy

The Environmental Management Strategy was developed by consultants Boffa Miskell Limited in February 1998 (HBRC 1998b). Copies of the complete "Environmental Management Strategy" document are available at the Hawke's Bay Regional Council office.

The objectives for the strategy are to:

- Plan for and manage waterways in a way that provides for and maintains environmental values, while meeting flood protection to required levels.
- Plan for the provision of public access and recreation within the waterway areas where these do not conflict with or compromise the primary purpose of the scheme, public safety or with identified ecological, historical or cultural values.

6.3.1 Environmental Strategy Implementation

The strategy identifies a long-term outcome for the Regions Rivers. The list below provides a series of short and long-term actions that are required to implement the strategy.

Table 15 Short and Long Term Environmental Actions

Long Term Actions
Prepare a comprehensive and integrated **"Rivers and Waterway Environmental Plan"** for the development, enhancement and management of the waterways within the Upper Tukituki and Heretaunga Plains Flood Control Scheme areas. To do this: • Bring together District Councils, Iwi, hapu, Department of Conservation, Fish & Game Council, Federated Farmers, Horticultural groups, Forest and Bird, recreation groups and other interested parties to review and discuss options and opportunities. • Identify and quantify ecological values in-stream, along the banks and margins, and where appropriate on adjacent land. • Identify landscape, amenity and recreational values and opportunities for waterway reaches for specific areas and sites where appropriate. Develop and maintain a public involvement and consultation strategy.
Short Term Actions
• Prioritise management actions; focus on trial areas, high visibility/high use areas, and "instant action areas" (eg clean ups) for maximum impact*; • Develop a programme for trialling alternative methods for weed management, bank design, riparian management, and the use of native trees, shrubs, and ground covers*; • Review gravel extraction processes and procedures with a view to establishing a more effective environmental audit process for applications; • Review berm maintenance and management procedures*; • Review enhancement potential of any land adjacent to rivers, prior to sale or major development expenditure by HBRC, until the above comprehensive study has been completed; • Review Council's environmental monitoring programme and results, to see if work relevant to waterways management is needed (eg effects of cattle grazing)*; • Review Council's Environmental Code of Practice signed off by Iwi, hapu, Department of Conservation and Fish and Game Council. Involve all staff in the review to increase their awareness of environmental values.

**These actions are being addressed through Ecological Management and Enhancement Plans. The first of these was completed in March 2010 for the Ngaruroro River (MWH – Adam Forbes). Plans for the other main rivers are being developed over the next five years.*

The long and short-term actions to be undertaken within the next ten years are identified within the Asset Management Improvement Programme in Section 10.

6.4 Environmental Code of Practice

As part of the existing Regional Plans, Council has permitted activity status to undertake river control and drainage works within the Hawke's Bay region. The permitted activity status is underpinned by the condition that all activities are undertaken in accordance with the "Environmental Code of Practice for River Control and Drainage Works" (the Code).

The Code was first published in 1999 and reviewed in 2003. Full reviews are scheduled every six years. The Code is currently being reviewed and an updated COP will be adopted by Council this financial year (2011/12).

The purpose of the Code is to:

- Provide clear standards of practice for river control and drainage works;
- Document the environmental enhancement and preservation practices to be followed to protect conservation interests, and identify areas for future enhancement or protection;
- Document the locations to be made available for public vehicular access, and the restrictions on public vehicular access imposed in other locations;
- Clearly identify those works that are covered by the permitted activity Rule within the Regional Plans.

The Code also provides a future common point of reference for all parties with an interest in the river and drainage berm areas, and removes any uncertainty regarding the Council policies or practices being implemented in specific locations.

In order to provide effective guidance for Council staff, and also be acceptable to the various interest groups, the development of the Code was based on a robust consultative process involving all known parties having an interest in the river and drain areas.

The consultation process undertaken and the results obtained are documented in a separate background report titled *Environmental Code of Practice for Riverworks: Consultation Process and Results, 1999* (the Consultation Report). The *Consultation Report* sets out the parties identified for consultation, the consultation process adopted for each party and the views expressed by them. For the sake of brevity, the contents of the *Consultation Report* are not repeated in the Code, but were utilised in its preparation.

Given the divergence of views, aspirations and priorities amongst all of the groups and individuals with an interest in the river and drainage areas, a process was required to:

- Clearly identify those divergent views through consultation;
- Analyse those views and document the areas of agreement and divergence;
- Prepare a Code that would dictate the way in which river and drainage works are undertaken, and the way in which river berm and drainage areas are managed by Council.

The Code contains general standards of practice that apply to Council works undertaken in any river or drain within the region, whether located inside or outside of Scheme areas.

6.5 Waterway Guidelines

Council has established a number of guidelines regarding environmentally sensible design for water management structures and practices in Hawke's Bay. These guidelines provide greater detail and direction during design and concept, construction, operation and maintenance for both Council and private developers. Guidelines established to-date include:

- *Stormwater Management Guidelines. HBRC. 2009.*
- *Erosion and Sediment Control Guidelines for Hawke's Bay. HBRC. 2009.*
- *Low Impact Design Manual. HBRC. 2009.*
- *Works in Waterways. HBRC. 2009.*
- *Industrial Stormwater Design Guidance. HBRC 2009.*
- *Small Dam Design. HBRC. 2009.*
- *Forestry Erosion and Sediment Control. HBRC, (Draft) 2010.*

6.6 Enhancement Projects

6.6.1 Public Access and Amenity

Specific club activities are provided for through Council's river land Licence to Occupy system. Currently any assets associated with these are not owned or maintained by the Scheme.

Vehicle and pedestrian access points are provided at appropriate places along the rivers.

Opportunities for improving public amenity will be identified through the planned Level of Service review and following development of the Ecological Management and Enhancement Plans.

7 LIFE CYCLE MANAGEMENT

The Life Cycle Management (LCM) section provides the broad strategies and work programmes required to achieve the goals and objectives set out earlier in this Plan.

All Scheme infrastructure assets are subject to deterioration over time. For some assets this deterioration can be prevented by ongoing maintenance. For others, replacement is required once they have served their useful life.

Provision is made for both types of assets, with an appropriate level of maintenance, and funding required on assets where maintenance is able to prevent long-term deterioration. Financial provision is also made for depreciation of assets with a finite life.

A Scheme depreciation reserve is held by Council, specifically to meet the cost of replacement of assets with a finite life. The depreciation reserve earns interest, which is used to assist with funding Scheme maintenance and improvement.

7.1 Scheme Assets

The UTTFCS river network covers the Upper Tukituki, Waipawa, Makaretu, Mangaonuku, and Tukipo Rivers and their tributaries. The Scheme provides flood protection for approximately 3,500 targeted ratepayers.

7.1.1 *Key Issues and Strategies*

The key issues relating to the management of assets in the UTTFCS, as identified in the Risk Register, are set out in Table 16.

Table 16 Key Issues and Strategies

Key Issues	Consequence	Strategies to Address Key Issues
Climate Change (accuracy of current predictions/effects) Caused By: • Changes to Global climate • Uncertainty of forecasts/predictions relating to the effects	• Increased weather impacts • Reduced protection level • Sea level rise and more frequent and severe storms • Requirement to replace assets earlier and/or more frequently • Community expectations that service levels will be maintained • Higher funding requirements • Ability/inability to pay • Higher risk of asset failure • Greater disruption to community infrastructure	• Plant wider range of plant species to improve edge resilience • Berm grass cover managed to reduce fire risk • Regularly monitor climatic conditions and assess change • Incorporate climate change forecasts into asset lifecycle/maintenance planning • Increase asset protection levels over time • Complete a climate change impact assessment for the Ruataniwha Plains rivers in accordance with MfE climate forecasts
Asset Failure – Stopbank, Edge Protection) Caused By: • Debris • Poor design and/or construction • Lack of maintenance • Excessive river bed movement or sediment buildup • Stock damage • Erosion • Super design event • Adverse land owner activities	• Flooding • Diversion of main flow • Legal action • Increased costs • Community disruption and public safety • Negative PR for Council	• Maintain healthy live edge plantings through lopping, layering and planting • Supplement plantings with slash rows and rope and rail groynes • Monitor Sawfly damage • Monitor erosion levels • Assess erosion risk of specific river reaches • Install hard protection (groynes and revetments) at high risk sites • Prevent gravel build up through beach raking • Remove gravel build up through extraction • Berm grass cover managed to reduce fire risk • Fire bans in river areas • Two Chartered Engineers kept on staff • Best practice processes followed through design, tendering & construction phases

Asset Failure – General (Retention dams, groynes, waterway crossings) Caused By: • Debris/weed • Power outage • Poor design and or construction • Lack of maintenance • Super design event • Adverse land owner activities • Vandalism and theft • Mechanical failure • Electrical failure • Excessive sedimentation	• Flooding • Legal action • Increased costs • Community disruption and public safety • Diversion of main flow • Negative PR for Council	• Checking of key assets following storm warnings • Checking of assets during and following significant storms • Monitor erosion levels • Monitoring of asset condition • Removal of debris build-ups • Rapid response following complaints • Two Chartered Engineers kept on staff • Best practice processes followed through design, tendering & construction phases
Blockage of assets Caused By: • Debris • Loss of power (pumps) • Poor design • Lack of maintenance • Excessive river bed movement • Asset malfunction (floodgate) • Stock damage • Erosion	• Surface flooding • Asset failure • Stopbank breech • Legal claims • Increased costs • Negative PR for Council	• Checking of key assets following storm warnings • Checking of assets during and following significant storms • Monitoring of asset condition • Removal of debris build-ups • Rapid response following complaints • Two Chartered Engineers kept on staff • Best practice processes followed through design, tendering & construction phases
Pest Epidemic Caused by: • Climate Change • Proliferation of plant or animal pests • Introduction of a new pest species	• Death of live edge sections (e.g. sawfly) • Significant stopbank damage (e.g. rabbits) • Reduction in water quality • Blockages to channels • Adverse effect on levels of service • Increased costs	• Plant wider range of plant species to improve edge resilience • Monitor sawfly damage • Monitor stopbank condition • Undertake pest control programmes in river areas (e.g. MAF Didymo ‘Check Clean Dry’ programme)

Storm Damage Caused By: • Extreme weather event • Climate change	• Asset failure and/or loss • Increased aggradation or degradation and morphological change • Flooding • Loss of land • Damage to property • Damage to environment • Community and public disruption • Increased costs	• Undertake regular monitoring and maintenance programmes • Develop and refine models to improve efficiencies and certainty of information
Drought Caused by: • Climate Change • Extreme weather event	• Increased fire risk • Live edge plant death • Poor growth rates • Erosion • Degradation of asset integrity • Loss of environmental planting • Inability to complete operational programme (i.e. mowing/beach raking) • Fire damage	• Plant wider range of plant species to improve edge resilience • Berm grass cover managed to reduce fire risk
Deliberate or accidental damage of assets Caused by: • Inadequate security • Vandalism • Public use • Contractor damage • Stock • Spraying (lack of controls) • Illegal dumping of rubbish	• Damaged/ineffective assets • Fire • Erosion • Unbudgeted costs • Environmental damage	• Undertake regular safety inspections • Design to minimise • Monitor via telemetry • Restrict access to assets (locks, fences, gates) • Promptly respond to complaints and requests for repair

7.2 Asset Description

Assets are grouped under three Asset Type headings as shown below.

Asset Type	Component
Erosion Control	Edge protection
	Retards and permeable groynes
	Rock groynes
Flood Control	Stopbanks and deflection banks
	Drains, channels
	Culverts, floodgates
Land	Flood protected land
	Floodable land (grazed)
	Floodable land with scheme assets

Throughout the LCM section, the assets are addressed as 'Asset Types' or individual component assets where appropriate.

7.3 Asset Summary

Table 17 provides a summary of the assets currently owned by Hawke's Bay Regional Council, including average age, condition, and expected useful life. The Optimised Replacement Cost (ORC), Optimised Depreciated Replacement Cost (ODRC), annual depreciation, and values are current as at July 2011/12.

Table 17 Asset Inventory

Asset Group	Asset Description	Base Life (Years)	Average Age (Years)	Condition (Average)	Optimised Replacemnt Cost (ORC)	Optimised Depreciated Replacemnt Cost (ODCR)	Annual Depreciatn
Floodway	Stopbanks & deflection banks	∞	50	Very Good	$11,426,609	NA	NA
Berm & Buffer	Live edge protection	∞	50	Good	$12,022,611	NA	NA
Active Channel	Active river channel	NA	NA	Excellent	NA	NA	NA
Drainage Structures	Drains	∞	50	Very Good	$175,230	NA	NA
	Culverts & Floodgates	70	50	Very Good	$1,004,426	$284,412	$14,349
Land	Land underlying assets and within floodways	NA	NA	NA	$562,948	NA	NA
Coastal Areas	Groynes	∞	20+	Excellent	$396,748	NA	NA
	Total	**NA**	**NA**	**NA**	**$25,588,572**	**$284,412**	**$14,349**

Figure 8 Optimised Replacement Cost for Each Asset Description

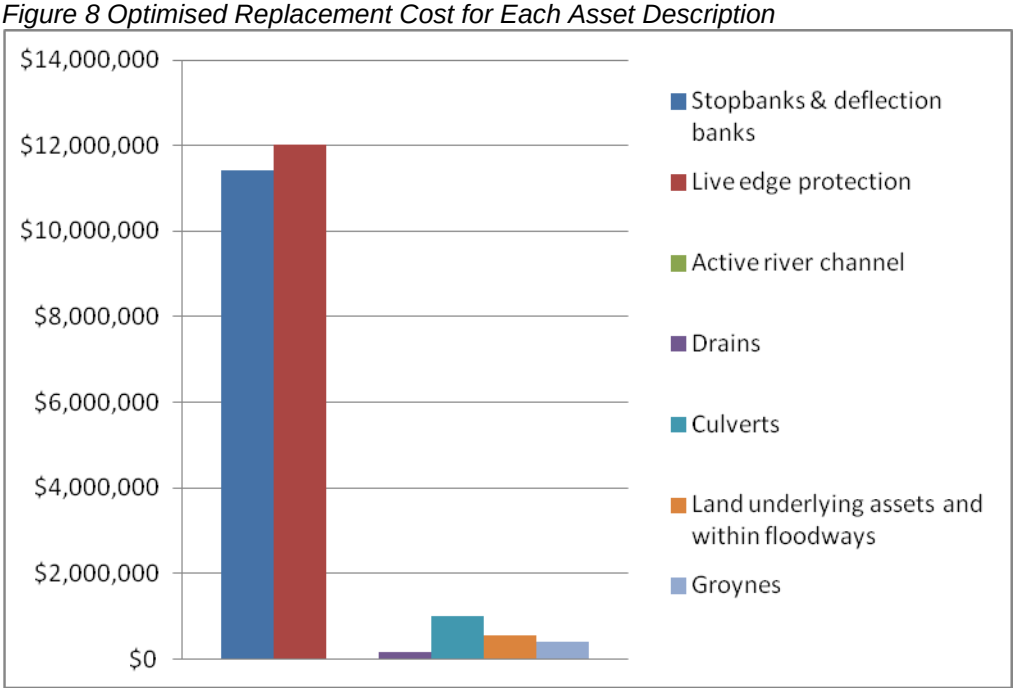
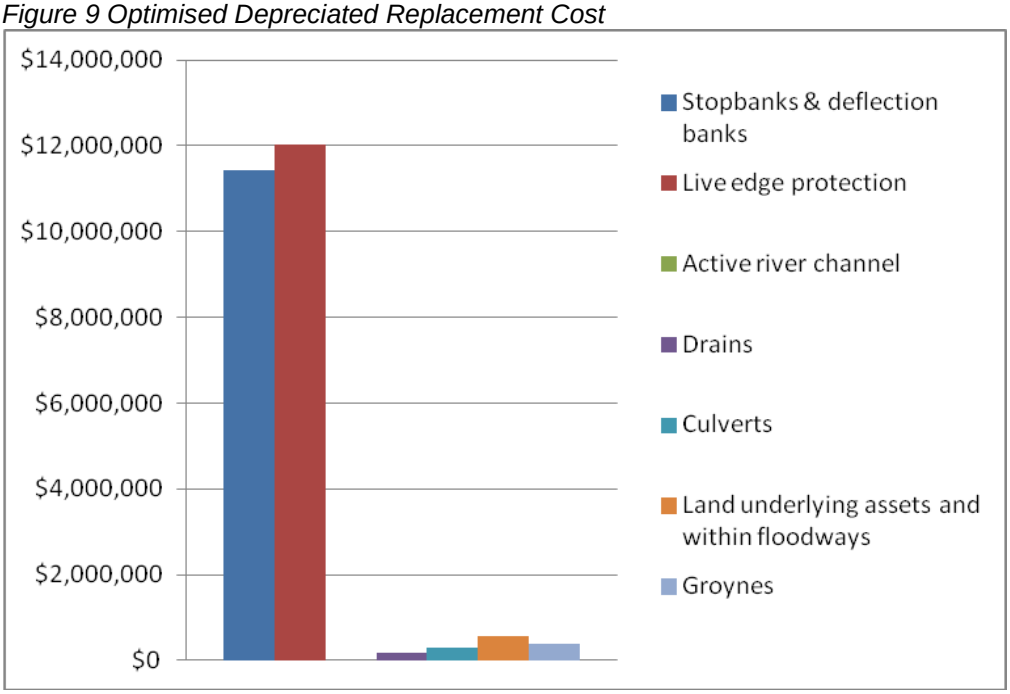


Figure 9 Optimised Depreciated Replacement Cost



7.4 Data Confidence and Reliability

The following categories are used to report confidence of data held regarding the Scheme assets, as well as financial data derived from the asset data. This table has been modified from the data and financial data confidence categories identified in the International Infrastructure Management Manual (NAMS 2006).

Table 18 Data Reliability Categories

Grade	Description	General Meaning
A	Highly Reliable	Accurate. Data based on sound records, procedure, investigations and analysis, documented properly and recognised as the best method of assessment.
B	Reliable	Minor Discrepancies. Data based on sound records, procedures, investigations and analysis, documented properly but has minor shortcomings, for example the data are old, some documentation is missing and reliance is placed on unconfirmed reports or some extrapolation.
C	Uncertain	50% estimated. Data based on sound records, procedures, investigations and analysis that is incomplete or unsupported, or extrapolated from a limited sample for which highly reliable or reliable data are available.
D	Very Uncertain	Significant data estimated. Data based on unconfirmed verbal reports and/or cursory inspection and analysis.
E	Unreliable	All data has been estimated, with no checks, inspections or verification.

Table 19 identifies the confidence in the UTTFCS asset data.

Table 19 Overall Confidence Data – Accuracy

Asset Type	Highly Reliable	Reliable	Uncertain	Very Uncertain
Land		✓		
Flood Control		✓		
Erosion Control		✓		

Table 20 Overall Data Completeness

Asset Type	60%	70%	80%	90%	100%
Land				✓	
Flood Control					✓
Erosion Control					✓

Table 21 Asset Information Reliability

Asset Type	Information Source	Grade* (A-E)	General Meaning	Reasoning
Land	Land	B	Reliable	Council has a good understanding of land holdings but needs to develop a comprehensive database for storing property information. This is under development.
Flood Control	Stopbanks and Floodway	A	Highly Reliable	Regular inspections, maintenance works and aerial photography insures that asset information is up to date and very reliable.
Erosion Control	Berms and Buffers	A	Highly Reliable	Regular inspections, maintenance works and aerial photography insures that asset information is up to date and very reliable.
	Groynes	C	Uncertain	Groynes are only inspected after significant flood events so asset information may not be updated regularly.
Drainage Control	Active River Channels	A	Highly Reliable	As above, plus regular channel surveys are undertaken to monitor performance and update asset information.
Hydraulic Structures	Drainage Structures	B	Reliable	Structures are inspected annually. Inspections are well documented but this information could soon be out of date.

**Grading based on International Infrastructure Management Manual (NAMS 2006). Refer Section 11.2 for full categories list.*

7.5 Asset Condition

The condition of the assets of the Upper Tukituki Flood Control Scheme has been assessed as part of the establishment of asset registers for this scheme. The registers divide the various components of the scheme into five major zones. These zones are:

- Stopbanks
- Berms and Buffers
- Active Channels
- Drainage Structures
- Groynes

Within these zones, a range of criteria have been used to quantify and assess present condition and value these various assets.

The criteria include:

- How the asset conforms to design specifications
- The physical condition of the asset
- The level of establishment in planted zones
- Plant quality, pest damage, and the presence of noxious plants.

Each asset is then rated on a scale of either 1 to 5 or 1 to 3 depending on the asset type. The ratings and their associated descriptions are summarised in the appendices, however they generally have the following meanings:

Table 22 Condition Descriptions Summary

For River Floodways Stopbanks, and Buffer Plantings		For Drains, Culverts, Floodgates, Headwalls	
Rating	**Condition Description**	**Rating**	**Condition Description**
1	Poor	1	Poor
2	Moderately Poor	2	Average
3	Moderate	3	Good
4	Good	-	-
5	Excellent	-	-

A comprehensive assessment of asset condition can be ascertained from the asset registers, but is summarised briefly for each river later in this section.

7.6 Risk Summary

Table 23 outlines the risk management activities with residual 'Extreme' or 'High' risk levels relating to the UTTFCS Assets. Section 5 of this AMP provides an overview of how risk is derived and managed.

Table 23 Risk Summary

Risk	**Residual Risk Score # (range)**		**Contingency Plan *additional reduction options**
Climate change (accuracy of current predictions/effects)	**5**	**25**	*Increase asset protection levels *Assess climate change impacts
Asset failure – stopbank, edge protection	**6**	**10**	CDEM procedures Super-Design Contingency Plan
Asset Failure – General (Retention dams, river groynes, waterway crossings)	**6**	**8**	CDEM procedures Super-Design Contingency Plan
Pest epidemic	**9**	**12**	
Storm damage	**2**	**10**	Budget for asset repairs

7.7 Asset and Land Ownership

All Scheme assets are owned by Council on behalf of the Scheme and regional ratepayers. Scheme assets include land upon which the substantive Scheme assets are constructed.

The policy of Council owning the assets and land upon which the assets are constructed was inherited by this Council from its predecessor organisation, the Hawke's Bay Catchment Board.

All assets require a consistent standard of ongoing maintenance and inspection. Experience with flood protection assets on private land is that over time the perceived importance of the assets for the protection of the community diminish, and challenges to Council's rights of access and management of the assets increases. Accordingly, Council continues with the policy of wherever possible having control over the land upon which assets are constructed, preferably through ownership, otherwise through easements in Council's favour. Council will continue to purchase land on which flood protection assets are constructed.

Land owned or administered by Council as part of this Scheme, is identified in Figure 10.

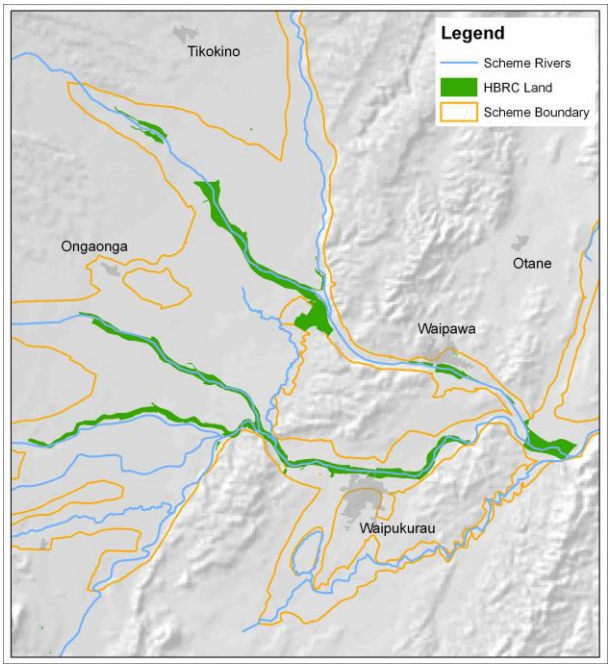


Figure 10 Upper Tukituki Flood Control Scheme – Land Assets Map

7.8 Public Amenity Assets

Council has a policy of allowing public pedestrian access onto all land owned or administered by Council. Public vehicle access is provided into specific sections of river berm land with pedestrian access available along the rivers.

Areas where public vehicle access is provided, are enjoyed by many members of the public, however, from time to time, they suffer from vandalism, illegal rubbish dumping and the consequences of other antisocial behaviour.

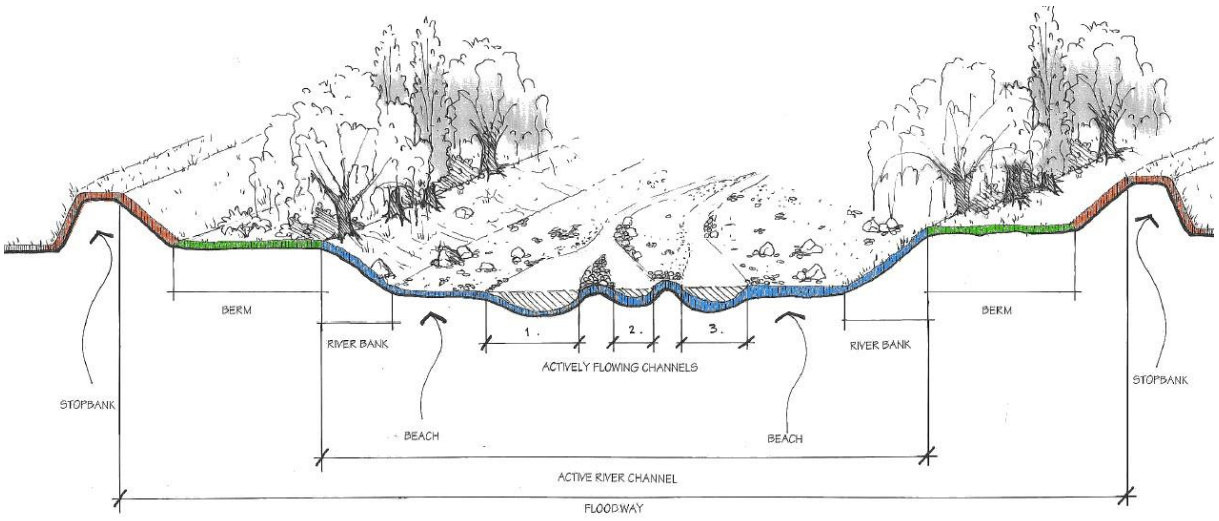
At the request of the police, Council ensures that where public vehicle access is provided, there is only one entrance to each of the areas.

Specific groups and clubs have been authorised to use the berm land for their activities. These are controlled through a system of licences for occupation of the river areas. Further details regarding public use of river berm land are set out in Council's Environmental Code of Practice for River and Drainage Works.

7.9 Assets Included in the Scheme

The confinement of flood flows, protection of the stopbanks and allowance for drainage is provided by a combination of various physical assets and management measures. These can be grouped into the Stopbanks and Floodway, the Berm/Buffer zone, the Active River Channel and Drainage Structures.

Figure 11 River Channel and Stopbank Assets Diagram



7.9.1 Stopbanks and Floodway

Flood flows are confined within the floodway by the additional ground height provided by stopbanks. The flood capacity of the floodway is dependent on the stopbank height and level of the river bed within the active river channel.

The stopbanks do not have sufficient strength to resist the erosive power of unmodified flood flows, and must be protected from high velocity flows by buffer zones of dense vegetation and physical structures such as groynes.

7.9.1.1 Design Principles and Goals

The design capacity of stopbanked reaches of the rivers is based on the 1% Annual Exceedance Probability (AEP) discharge. This event has a 1 in 100 chance of being equalled or exceeded in any one year (sometimes referred to as the 100 year return event).

The flood level produced by the design discharge is used to determine the height of the stopbanks needed to achieve the desired floodway capacity. A freeboard (safety margin), typically a minimum of 600mm, is added to the calculated stopbank height to allow for normal localised variations due to changing river conditions over time. Freeboard is increased in areas of higher risk or where greater hydraulic uncertainty exists.

The discharge of a river is difficult and expensive to measure. Often it is estimated using analysis and modelling of the river channel. Flow measurements are used in the modelling where they are available. Where they are not, the discharges are derived from rainfall data.

The existing stopbanks inherited by the Scheme were originally designed to a discharge derived from historical river flow measurements. Where flow measurements are available, these stopbanks are monitored and maintained to continue to meet their original design discharge.

Where flow data is not available, and for the development of new stopbanks or upgrades, the design is based on a flood level, which is derived from a discharge; which in turn is derived from the 1% AEP rainfall. This rainfall is measured using the network of rain gauges and interpolation of rainfall data. The use of rainfall data and modelling to derive flood discharges and levels is less expensive and easier than collection of sufficient flow or discharge data for

each waterway. A key assumption in this process is that the 1% AEP rainfall results in the 1% AEP discharge; which results in 1% AEP flood level.

The physical construction of the stopbanks follows the design guidelines within the Williams (1985) report '*Upper Tukituki Catchment Control Scheme'*.

7.9.1.2 Key Issues

- Concerns regarding construction quality and foundation conditions;
- Some unwanted plant pests.

7.9.2 Berm and Buffer Zones

The berm is the area between the active channel and the stopbank. Within the berm areas are buffer zones. The buffers are typically dense tree vegetation, made up of vigorous and strong rooting trees, such as willows, poplars or alders. The buffers are used to define the edges of the active river channel and they absorb the erosive power of flood flows, protecting the stopbanks by reducing the speed of the flood waters that flow onto the berm land and alongside the stopbanks.

A series of low level deflection banks are also used as a means of controlling the speed of floodwaters over the berms and adjacent to stopbanks within a number of areas of the rivers, included in this Scheme.

Along the active channel edge the vegetation is strengthened and re-established by lopping and layering down of existing willows, entrenchment of uprooted willow trees, cabling together and/or anchoring of trenched willows, and the use of driven rail and cabled permeable groynes or retards at intervals along the buffer zones, or across flood flow paths within the vegetation buffers. Willow vegetation is also established through the deep planting of cut poles in excavated holes or ripped lines, and by the shallower planting of lighter stakes.

7.9.2.1 Design Principles and Goals

Berm land

The width of the river berms is variable, typically between 50 and 150m wide. They are based on the natural meander forms determined from river conditions and defined by the location of stopbanks and required floodway size.

Along non-stopbanked reaches, the berms may be defined by natural changes in grade (ie hillsides); however, the extent of the berms, and therefore floodable areas, does not necessarily match property boundaries or changes in land use.

Council also owns small parcels of land outside the stopbanks that are flood protected. These parcels of land provide areas for stock run-off during times of flood.

Buffer Width

The live edge buffers within the berms are also variable in width. Within the Upper Tukituki Scheme they are typically between 15 and 80m wide, providing edge protection while leaving sufficient open space to maintain the floodway capacity.

Live Edge Density and Species

Vegetation within the buffer zone must be made up of healthy vigorous trees, with at least 25% of the buffer zone, along the river side, consisting of willow and alder trees, or equivalent strongly rooted, water tolerant trees.

Sufficient density of the buffer is achieved by slotting willows (burying willows laterally in trenches) at 6m centres along the river edge with willow poles (2 poles per hole) planted at 5m staggered spaces behind the slotted willows. The willows are lopped (2/3 of trunk cut and left to regrow) to encourage greater density and to interlink willows. Native and introduced plants are planted at 4m spacing.

Permeable groynes are constructed at intervals along the immediate river edge to reinforce newly planted areas or where the buffer zone is in a weakened condition. Groynes generally consist of a number of railway irons driven in at 5m spacing and laced with three wire ropes to form a fence like structure.

Grassed Berm
The remainder of the berms is typically in grass and pastoral weeds. These areas are either mown or grazed to minimise fire risk and control weeds.

Domestic stock is excluded from the edge protection zones and river channels.

7.9.2.2 Key Issues

- Threat of Sawfly;
- Old Mans Beard.

7.9.3 Active Channel

The active channel area is where the flood flows actively re-work the gravel bed material. Under low flow conditions the active channel consists of gravel beaches and islands, with residual flow channels. Within stopbanked areas of the rivers, the active channel is defined by the vegetation buffer zones along each edge.

The active channel area is maintained clear of vegetation by the removal of unwanted willow material, the periodic raking or blading of the gravel beaches and islands, and herbicide spraying. Beach raking helps to break up the armour layer that forms on top of the beaches and this aids the gravel transport during the flood cycles. Commercial extraction of gravel bed material is directed to river reaches where bed build-up, or aggradation, tends to occur naturally.

This extraction and beach raking helps prevent the formation of gravel islands, which lead to channel splitting and asymmetry, and which increases the erosive pressure on the vegetation buffer zones along the channel sides.

Rock groynes are also constructed to help maintain channel alignment around river confluences. In the UTTFCS there are currently three groynes: between the Tukituki and Waipawa Rivers; between the Tukipo and Tukituki Rivers; and, between the Waipawa and Mangaonuku River confluence. The groynes are constructed primarily of limestone rock, with rope and rail supports.

7.9.3.1 Design Principles and Goals

Design Width
The active channel follows the natural river meander forms that also determine the berm areas. The design width ensures the mean annual flood event is retained within the active channel. Reaches with similar river conditions have similar widths and curvatures. The design width is defined physically by the vegetation buffer zones along each bank.

The design widths of the active channel and of the vegetation buffer zones for the various rivers are given (by cross-section identifiers) in the Asset Registers and their location shown on Plan No 2171.

Bed level
The level of the bed within the active channel is determined by the build-up (aggradation) and erosion of the gravels, sands and silts, which result from natural processes of gravel transport.

Bed level is important for two reasons – to maintain the capacity of the floodway, and prevent lateral erosion of berms and stopbanks. Ideally, the active channel is to be clear of vegetation and with a low degree of variation in bed levels across the channel.

Design bed grades have been determined for each river. The aim of aggradation management is to maintain this bed grade and reduce bed variation. Significant bed changes both above or below the design grade can result in erosion of the berm and buffer zones.

There are two main activities used to manage the aggradation process: beach raking and gravel extraction.

Beach raking is a maintenance tool that helps promote gravel transport during river freshes by breaking up the areas of beach that have become armoured.

Gravel extraction is undertaken in accordance with Council's Regional Resource Management Plan, which sets out a framework to promote the sustainable management of gravel extraction from the region's rivers. There is a region-wide demand for riverbed gravel resources and the aim of the allocation programme is to direct commercial gravel extraction to the best advantage of channel aggradation management.

In addition, channel works and gravel extraction are carried out in a manner that minimises adverse impacts on the river fisheries, and ensures a natural pool and riffle low flow channel form is maintained along the rivers. In the timing of works, recognition is given to fish spawning and wildfowl breeding periods. Specific standards and methodologies required for channel works and gravel extraction are identified in the Environmental Code of Practice.

7.9.3.2 Key Issues

- Aggradation in hard to reach extraction areas;
- Some plant pests.

7.9.4 Drainage Structures

Drainage outlets into the river are provided by two specific mechanisms: through overlapping stopbank areas and through piped structures through the stopbanks. With overlapping stopbanks, the drainage channels pass between the stopbanks and downstream through the vegetation buffer zones to give adequate drainage grades. These outlets are generally at river confluences or on larger drainage courses.

Piped structures under the stopbanks are generally concrete pipes with headwalls and floodgates and provide passage of water from private drains on the landward side of the stopbank system through to outlet channels within the stopbank areas. These structures are important for both protection of the stopbanks and for maintaining the drainage capacity of the associated private drains; helping to reduce the risk of flooding of land outside of the stopbank areas. Both the piped structures and the outlet channels are maintained as

Scheme assets. The outlet channels are graded downstream to take maximum advantage of the river grade.

7.9.4.1 Design Principles and Goals

Drainage outlets are to provide for continuous outflow, up to their design capacity, with a well formed drain being maintained. The design capacity of the drainage outlets vary depending on the capacity of their associated channel and management of potential flooding impacts.

7.9.4.2 Key Issues

No issues have been identified to-date with respect to the way in which Council manages and monitors its drainage structures.

7.9.5 Maintenance Access

Access roadways are maintained alongside the rivers, mainly along the top of stopbanks, but vehicle entry in many places is restricted by locked gates.

7.9.5.1 Design Principles and Goals

Access to the rivers, other than public access, is via locked gates in most instances. Metal roads are formed along the berm to aid gravel extraction and river maintenance operations. Where appropriate these are designed to prevent the acceleration of berm flow by avoiding long straight stretches. Other than formed metal access, all rivers have a 4WD track to allow inspection and maintenance equipment to any part of the river.

7.9.5.2 Key Issues

No issues have been identified to-date with respect to the way in which Council manages and monitors its drainage structures.

The assets of the Upper Tukituki Flood Control Scheme are listed in Table 24 and shown in Figure 12 and Figure 13. Values have been sourced from Council's UTTFCS Asset Register.

Table 24 Scheme Physical Assets (as of 2011/12)

Main Rivers	Stopbank (km)	Berm (km)	Channel (km)	Drains, Floodgates, Culverts(#)	Groynes (#)
Makaretu	4	33	16	0	0
Mangaonuku	3	31	15	2	0
Tukipo	9	29	17	9	0
Upper Tukituki	41	67	36	19	2
Waipawa	20	53	28	7	1
Totals	**77**	**212**	**112**	**37**	**3**

Source: UTTFCS Asset Register. Electronic copy located in: N:\OPERATIONS\Gorsty\Asset databases\2011-12 Revaluation\UT Asset revaluation 2011-2012.xls

Figure 12 and Table 25 identify the rivers and stream sections managed as part of the Upper Tukituki Flood Control Scheme.

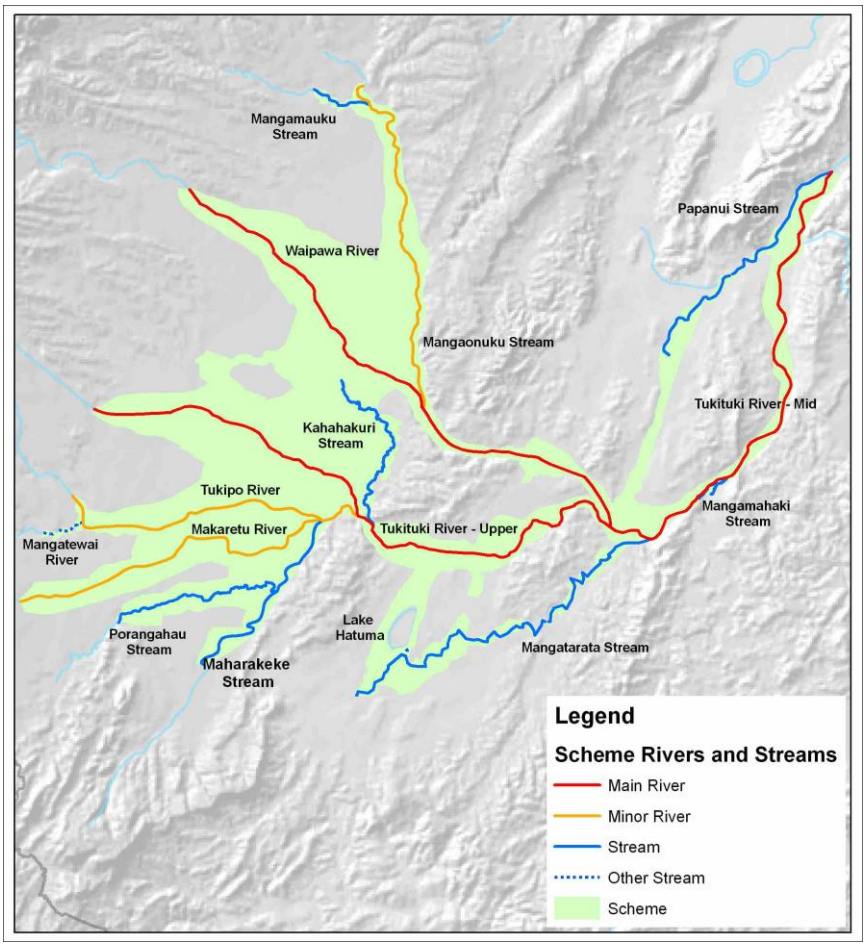
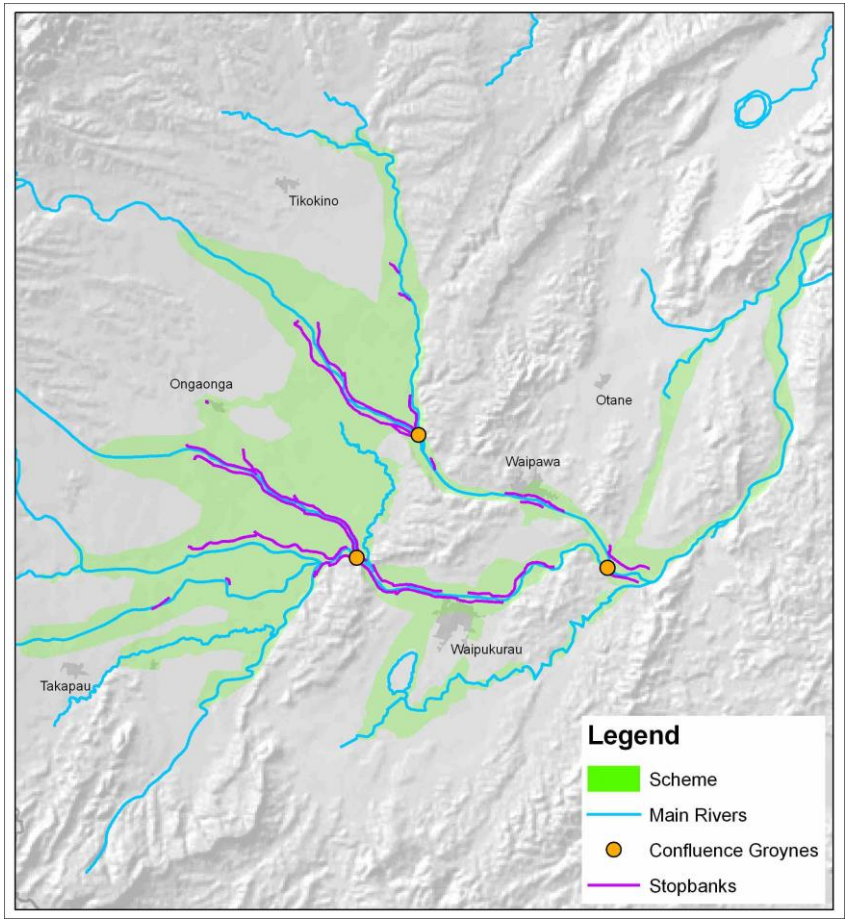


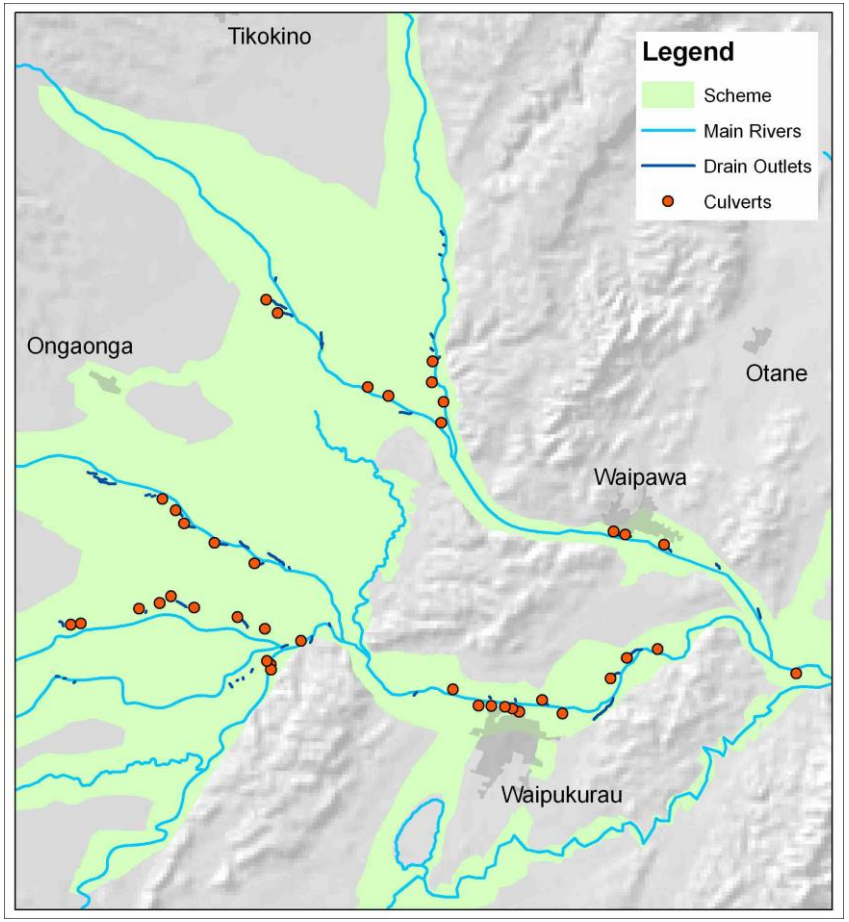
Figure 12 UTTFCS Rivers and Streams

Table 25 UTTFCS Rivers and Streams

Rivers	Smaller Streams
Main Rivers	Papanui Stream
Tukituki River	Mangamahaki Stream
Waipawa River	Mangatarata Stream
Minor Rivers	Kahahakuri Stream
Makaretu River	Maharakeke Stream
Mangaonuku River	Porangahau Stream
Tukipo River	

Figure 13 Upper Tukituki Flood Control Scheme Assets





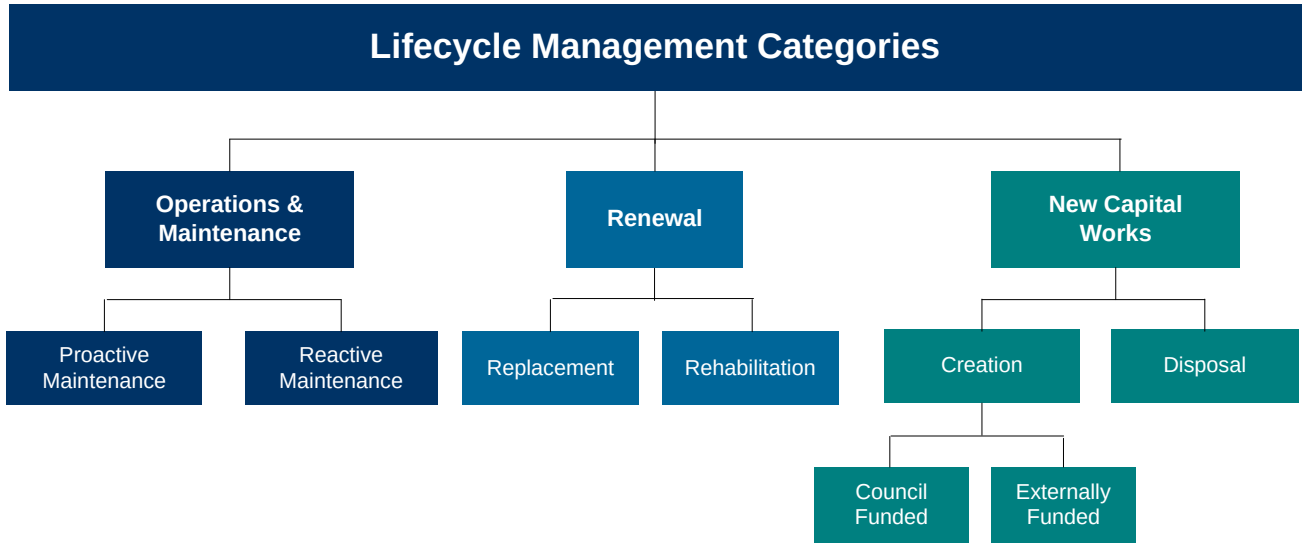
8 MAINTENANCE AND CAPITAL WORKS PROGRAMMES

Expenditure on infrastructure assets can be categorised into three key areas:

- Operations and Maintenance;
- Renewals; and
- New Capital Works.

Figure 14 illustrates how these categories fit together under the umbrella of lifecycle management.

Figure 14 River and Drainage Lifecycle Management Categories



These categories are described in more detail below.

8.1 Maintenance

Operations and Maintenance expenditure is that required for the day-to-day operation of the network, whilst maintaining the current levels of service. Routine maintenance forms a vital part of ensuring the integrity of the scheme and minimising the risk of asset failure.

Maintenance of the Scheme assets is programmed and managed by Council's Operations Group and physically undertaken by Council's Works Group and their contractors.

The key maintenance outcomes and methods for each asset group are:

- **Stopbanks** – maintenance of an appropriate grass sward and cross-section shape through grazing, mowing and repair, when necessary.
- **Berms and Buffers** – Lopping and planting of trees to maintain a healthy dense buffer, physical repair, as necessary, of any hard protection (rock revetments), mowing or grazing of grassed berms to reduce fire risk and control weeds.
- **Active Channel** – maintenance of gravel bed levels through beach raking and gravel extraction where necessary.
- **Drainage Structures** – checking and clearing of obstructions as necessary.
- **Groynes** – checking and repair of groyne structures with replacement of structural units as required.

An annual programme of maintenance works is prepared and considered by Council as part of their Annual Plan deliberations. Preparing the annual maintenance programme requires consideration of:

- The works necessary to ensure the desired level of service is achieved;
- The degree of flexibility required to enable an appropriate response to seasonal variations for necessary works;
- Environmental effects; and,
- Improvements to works found to provide less than the desired level of service.

An estimate of costs also needs to be established. Any issues associated with affordability are addressed with the Council to ensure that the agreed programme of works does not compromise the levels of service, or that the consequence of any variance is clearly understood and documented.

The annual programme of maintenance is undertaken unless circumstances dictate otherwise. Any changes from the programme are clearly identified with reasons given as to why the change was deemed necessary.

An annual report of maintenance work completed, and the associated expenditure, is prepared at the end of each financial year. The specific maintenance methodologies, standards and annual works programme forms the basis of the Asset Maintenance Contract documents used by the Operations Group.

Table 26 sets out the maintenance regime for each asset type.

Table 26 Maintenance Plan

Asset Group	**Maintenance Regime**	
	Activity	**Frequency**
Stopbanks	Mowing	2-4 times/year
	Spraying	as required
	Misc. repairs	As required
	Inspections	Rotating monthly
Berms and Buffers	Spraying	Annually
	Lopping	As required
	Mowing	2-4 times/year
	Grazing	On-going
	Misc. repairs	As required
Active Channel	Beach raking	Annually
	Spraying	Annually where required
	Survey	3-yearly (gravel extraction reaches) 6-yearly (non-gravel extraction reaches)
	Gravel extraction	As required, where directed
Drainage Structures	Inspections	Annually (minimum)
	Misc. repairs	As required
	Replacement	As scheduled (approx. every 70 years)
Groynes	Inspections	After significant flood events

8.1.1 Renewal Works

Renewal expenditure includes rehabilitation and replacement of assets. The objective is to restore an asset to its original level of service as measured by, for example, capacity or another required condition. Renewals expenditure forecasts cover the cost of asset renewal through its whole lifecycle to disposal of the asset.

Renewal works will be funded from the Scheme depreciation reserve. Where the new asset is providing a higher level of service than the asset it is replacing, the part of the cost relating to the increase of service will be met with capital funding from the Scheme.

Drainage structures under stopbanks, including culverts and flood gates, are the only assets depreciated in the Scheme. The remainder of the assets are maintained such that they will continue to provide their design level of service in perpetuity.

There are no structures due for renewal within the next ten years.

8.1.2 Capital Improvement Works

New capital works involves the creation of new assets, or works, which upgrade or improve an existing asset beyond its current capacity or performance in response to changes in usage or customer expectations. The capital improvement works are focused on upgrading Scheme assets so that they achieve their desired design standards and enhancement goals.

Significant capital works programmed to year 2022 (and subject to community and Council approval) are:

Table 27 Significant Scheme Capital Works Projects

River	Project	Improvement value (2011)
All rivers	Environmental enhancement and native planting, including strengthening of edge protection zone	$1,154,558
	TOTAL	$1,154,558

Other capital works projects may be identified as part of the review of the Levels of Service review to be completed within this period.

8.2 Monitoring of Assets

The dynamic and changeable nature of river and coastal environments, and the high variability of responses to protection measures and other management interventions, makes monitoring of river management schemes especially important.

The pattern and intensity of flood events depends on climatic variations, and there can be long quiescent periods with few flood events, followed by stormy periods when a number of floods occur in quick succession. Management must be flexible, and responsive to the natural cycles of floods, and to the associated changes in river conditions. Buffer zone vegetation may establish well during quiescent periods, but vegetation spreading within the active channel will also take place more rapidly. Channel reworking activity will be greater during stormy periods, with more pronounced variations in channel bed levels and accumulations of gravel bed material as well as more severe channel edge attack, and hence buffer zone erosion.

Well documented records over long periods of time are therefore important in assessing the effectiveness of river management. At the same time, the complexity and variability of river systems makes clear and meaningful documentation especially difficult.

To support the Scheme's management, the following activities are carried out:

- Flood Reports;
- Collection of hydrological data;
- Collection of aerial photography and LIDAR;
- Annual inspections and audits of scheme assets;
- Annual summary reports;
- Six-yearly cross-section surveys; and,
- Periodic scheme reviews

The management approach for the Scheme is one focused on maintenance of the agreed level of flood protection and river values in perpetuity. Assets must therefore be continuously monitored, repaired and maintained to achieve the Levels of Service. The significance of information collected will be assessed as it is obtained, and management practices adjusted in accordance with assessment findings.

8.2.1 Flood Reports

For flood events with peak flows in excess of the estimated 20% AEP flow (5 year return period) –a report on the magnitude and impacts of the flood event will be produced. This is to include comment on all significant damage to scheme works, indicating the extent of substantial areas of erosion and the repair works undertaken.

For events with peak flows in excess of the estimated 10% AEP flow (10 year return period) a more comprehensive report is required. As far as practical, maximum flood levels are to be determined from debris lines and flood levels pegged during the event, and surveyed for level. A hydrological assessment from rainfall and flood level records is to be carried out and attached to the flood event report. Damage to scheme works is to be identified on plans, showing the location and extent of all significant damage, with a schedule of damages, repair works and costs.

Flood reports are stored both electronically and in hard copy within the Council's record system.

8.2.2 Hydrological Data

The collection of hydrological data is carried out by the Environmental Information department of Council. The network of rain and water level gauges is managed through the Hydrology Asset Management System (HAMS). A management plan is to be developed by the Environmental Information department for the assets within HAMS.

Hydrological data is stored in Council's information database and accessed through the Hilltop software purpose built for ease of access and interpretation.

8.2.3 Aerial Photography and LIDAR

Vertical aerial photography, using standard colour prints, and given an approximate scale of 1:5500 are taken every year along the Tukituki River from Tamamu Bridge to SH50, and the Waipawa River from its confluence to Caldwell Road. For the scheme reaches of the Tukipo, Makaretu and Mangaonuku rivers and of the Tukituki River downstream of Waipukurau, aerial photography is taken every third year.

LIDAR (Light Detection and Ranging) data is collected by airplane through airborne laser scanning. The data is used to produce contours up to 100mm in accuracy, which enables more accurate flood modelling and mapping.

Aerial photos and LIDAR are stored digitally and are accessible though Councils GIS system.

8.2.4 Annual Inspection and Audits

These annual audits are carried out to:

- Observe progress of the major river works from year to year
- Ensure that the design philosophy is sound and is effective
- Gauge the effectiveness of particular design methods and techniques
- Observe failed areas and learn from these what works and what doesn't
- Determine if the current maintenance is adequate to achieve the aims of the scheme and design assumptions
- Determine the effect on channel capacity and design grade

The audit is intended to cover the whole range of flood control works related to the major scheme rivers. This includes observation of the condition of:

- Scheme stopbanks;
- Structures affecting the integrity of the stopbanks;
- Berm and buffer zones; and,
- Active channels.

Locations to be inspected are decided on the basis of the amount of work carried out each year, particular problem areas, problem areas noted at the previous audit and areas less frequently visited during the year.

Random inspections are carried out throughout the year usually to observe specific problem areas and to generally gauge the adequacy of the regular maintenance items such as mowing, spraying and beach raking. Targeted inspections are carried out after any significant flood events.

Targeted inspections of specific project works is timed in early summer following the financial year to allow sufficient time for the completion of the annual programme and for new works to get established.

Inspection and audit summaries are presented as Council papers and are stored both electronically and in hard copy within the Council's record system.

8.2.5 Annual Summary Reports

Records on works and management activities carried out during each financial year will be collated into an engineering report, which provides comment on the intensity of flooding and damages, the effectiveness of works and measures undertaken and general comment on the adequacy of current management practices and available resources.

Annual Summary Reports are presented as Council papers and are stored both electronically and in hard copy within the Council's record system.

8.2.6 Cross-Section Surveys

Repeat surveys of the defined cross-sections are carried out in accordance with the agreed programme of river surveys. For the two main rivers, the Tukituki and Waipawa, complete repeat surveys are to be no more than six (6) years apart, and for the three minor rivers no more than twelve (12) years apart. Reaches where aggradation trends are high, and where

gravel extraction is being concentrated, must be re-surveyed more frequently, at intervals of no more than three (3) years.

Cross-section Surveys results are stored in the cross section database and are used in Councils gravel allocation process.

8.2.7 Periodic Scheme Reviews

Periodic scheme reviews may include all or some of the following aspects:

- Modelling – computer and physical;
- Annual report reviews;
- Flood report reviews;
- Issues identification and risk assessment;
- Demand assessment including identification of demand drivers;
- Options assessment and identification of preferred solutions;
- Costing and work programming.

The most recent reports for the Upper Tukituki Rivers are:

> *Upper Tukituki Catchment Control Scheme, prepared by Gary. J. Williams, August 1985, Hawke's Bay Catchment Board and Regional Water Board.*
>
> *Upper Tukituki Stopbank Upgrading (paper to Council) prepared by Gary Clode, September 2008, Hawke's Bay Regional Council.*

Scheme Review Summary Reports are stored both electronically and in hard copy within the Council's record system.

8.3 Excess Capacity and Obsolescence

Capacity of the Scheme is monitored through river cross section surveys undertaken every six years. The results of these surveys are input into computer based flood models and flood capacity of the Scheme assets is checked. Where increased capacity is required, gravel extraction or beach raking is focused on the reach to increase the channel flood capacity. Reaches with excess capacity are monitored to ensure that there is no undercutting of live edge protection, and gravel extraction may be reduced, or beach raking may be focused on an upstream section to encourage transport of gravel to the reach of the river where excess capacity has been identified. Only in extreme cases is it likely that capital works will be undertaken to increase the capacity of the channel.

There are no assets that are now obsolete to the Scheme.

8.4 Critical Assets

Critical assets are those where the consequence of failure is high. As such the critical assets are the live willow edge protection and stopbanks. These assets make up the majority of the asset value of the Scheme. Flood protection assets providing protection to large areas of the Plains with a high developed value, such as the urban areas of Waipukurau and Waipawa; clearly have a higher consequence of failure than other river reaches.

An assessment of the consequence of asset failure is published in *Ruataniwha Plains Flood Hazard Study June 1998* (HBRC 1998). This report identified the potential floodable areas caused by overspill (super-design events) or breaching of the flood protection works.

8.5 Asset Description and Condition

The following tables provide an overview of the UTTFCS assets and conditions. For ease of reference, the tables are split by river.

8.5.1 Tukituki River

Table 28 Asset Condition Summary Tables

Asset Type	**Stopbanks**
Description	Stopbanks are located between Waipukurau township and Burnside Road.
Design Standard	1% AEP design standard
Most Recent Review / Upgrade	2008 Flood report identified specific sections to be upgraded. Subsequent upgrading was carried out in 2010 and 2011.
Management	Grass coverage managed through mowing and grazing in specific areas.
Issues	Minor areas of plant pests.
Condition	Good

Asset Type	**Berms and Buffer Protection**
Description	Berm widths vary between 20 and 250m and consist of a zone of live willow edge protection, buffer zone plantings of poplars and shrub willows, and grassed areas.
Design Standard	Design width of live edge protection varies between 35 and 55m
Most Recent Review / Upgrade	1985 Williams Scheme Report
Management	Plant pest spraying, willow lopping, grazing in specific areas.
Issues	Plant pests – particularly Old Mans Beard.
Condition	Good

Asset Type	**Active Channel**
Description	Active River Channel between live edge plantings.
Design Standard	Design width varies between 90 and 215m
Most Recent Review / Upgrade	1985 Williams Scheme Report
Management	Beach raking, regrowth spraying and gravel extraction.
Issues	None
Condition	Excellent

Asset Type	**Drainage Structures**
Description	Piped structures under the stopbanks - generally concrete pipes with headwalls and floodgates.
Design Standard	Varies accordingly to associated drain capacity.
Most Recent Review / Upgrade	1985 Williams Scheme Report
Management	Inspected annually or after any significant flood event.
Issues	None
Condition	Very Good

Asset Type	**Groynes**
Description	2 Confluence Groynes located where the Waipawa and Tukipo Rivers meet the Upper Tukituki River.
Design Standard	Waipawa groyne constructed using 750m^3 limestone rock. Tukipo groyne constructed using 375m^3 limestone rock.
Most Recent Review / Upgrade	1985 Williams Scheme Report
Management	Inspected annually or after any significant flood event
Issues	None
Condition	Excellent

8.5.2 Waipawa River

Asset Type	**Stopbanks**
Description	Stopbanks are located between Waipawa township and Plantation Road.
Design Standard	1% AEP design standard
Most Recent Review / Upgrade	Upgrading works completed in 1995
Management	Grass coverage managed through mowing and grazing in specific areas.
Issues	Minor areas of plant pests
Condition	Very good

Asset Type	**Berms and Buffer Protection**
Description	Berm widths vary between 25 and 300m and consist of a zone of live willow edge protection, buffer zone plantings of poplars and shrub willows, and grassed areas.
Design Standard	Design width of live edge protection varies between 45 and 80m
Most Recent Review / Upgrade	1985 Williams Scheme Report
Management	Plant pest spraying, willow lopping, grazing in specific areas
Issues	Plant pests – particularly Old Mans Beard
Condition	Good

Asset Type	**Active Channel**
Description	Active River Channel between live edge plantings.
Design Standard	Design width varies between 135 and 160m
Most Recent Review / Upgrade	1985 Williams Scheme Report
Management	Beach raking, regrowth spraying and gravel extraction.
Issues	Gravel aggradation in upper reaches
Condition	Good

Asset Type	**Drainage Structures**
Description	Piped structures under the stopbanks - generally concrete pipes with headwalls and floodgates.
Design Standard	Varies accordingly to associated drain capacity.
Most Recent Review / Upgrade	1985 Williams Scheme Report
Management	Inspected annually or after any significant flood event.
Issues	None
Condition	Very Good

Asset Type	**Groynes**
Description	1 Confluence Groyne located where the Waipawa and Mangaonuku Rivers meet.
Design Standard	Groyne constructed using 600m^3 limestone rock.
Most Recent Review / Upgrade	1985 Williams Scheme Report
Management	Inspected annually or after any significant flood event.
Issues	None
Condition	Excellent

8.5.3 Tukipo River

Asset Type	**Stopbanks**
Description	Stopbanks are located on the true left bank above Ashcott Road.
Design Standard	1% AEP design standard
Most Recent Review / Upgrade	1985 Williams Scheme Report
Management	Grass coverage managed through mowing.

Issues	None
Condition	Excellent

Asset Type	**Berms and Buffer Protection**
Description	Berm widths vary between 20 and 100m and are fully vegetated with live willow edge protection and buffer zone plantings of shrub willows.
Design Standard	Design width of live edge protection varies between 30 and 55m
Most Recent Review / Upgrade	1985 Williams Scheme Report
Management	Plant pest spraying, willow lopping.
Issues	Plant pests – particularly Old Mans Beard. Stock grazing.
Condition	Good

Asset Type	**Active Channel**
Description	Active River Channel between live edge plantings.
Design Standard	Design width varies between 55 and 75m
Most Recent Review / Upgrade	1985 Williams Scheme Report
Management	Beach raking, regrowth spraying and gravel extraction.
Issues	None
Condition	Excellent

Asset Type	**Drainage Structures**
Description	Piped structures under the stopbanks - generally concrete pipes with headwalls and floodgates.
Design Standard	Varies accordingly to associated drain capacity.
Most Recent Review / Upgrade	1985 Williams Scheme Report
Management	Inspected annually or after any significant flood event.
Issues	None
Condition	Good

8.5.4 Mangaonuku River

Asset Type	**Stopbanks**
Description	Only the lower section below Tikokino Road is stopbanked
Design Standard	1% AEP design standard
Most Recent Review / Upgrade	1985 Williams Scheme Report
Management	Grass coverage managed through mowing
Issues	None
Condition	Very Good

Asset Type	**Berms and Buffer Protection**
Description	Berm widths vary between 20 and 80m and are fully vegetated with live willow edge protection and buffer zone plantings of shrub willows.
Design Standard	Design width of live edge protection varies between 20 and 35m
Most Recent Review / Upgrade	1985 Williams Scheme Report
Management	Plant pest spraying, willow lopping
Issues	Plant pests – particularly Old Mans Beard. Stock grazing.
Condition	Good

Asset Type	**Active Channel**
Description	Active River Channel between live edge plantings.
Design Standard	Design width varies between 60 and 80m
Most Recent Review / Upgrade	1985 Williams Scheme Report

Management	Beach raking, regrowth spraying.
Issues	None
Condition	Good

Asset Type	**Drainage Structures**
Description	Piped structures under the stopbanks - generally concrete pipes with headwalls and floodgates.
Design Standard	Varies accordingly to associated drain capacity.
Most Recent Review / Upgrade	1985 Williams Scheme Report
Management	Inspected annually or after any significant flood event.
Issues	None
Condition	Very good

8.5.5 Makaretu River

Asset Type	**Stopbanks**
Description	Only minor sections of stopbanking.
Design Standard	1% AEP design standard
Most Recent Review / Upgrade	1985 Williams Scheme Report
Management	Grass coverage managed through mowing.
Issues	None
Condition	Very good

Asset Type	**Berms and Buffer Protection**
Description	Berm widths vary between 20 and 80m and are fully vegetated with live willow edge protection and buffer zone plantings of shrub willows.
Design Standard	Design width of live edge protection varies between 15 and 40m
Most Recent Review / Upgrade	1985 Williams Scheme Report
Management	Plant pest spraying, willow lopping
Issues	Plant pests – particularly Old Mans Beard. Stock grazing.
Condition	Moderate

Asset Type	**Active Channel**
Description	Active River Channel between live edge plantings.
Design Standard	Design width varies between 40 and 55m
Most Recent Review / Upgrade	1985 Williams Scheme Report
Management	Beach raking, regrowth spraying and gravel extraction.
Issues	Gravel aggradation in upper reaches
Condition	Good

8.5.6 Minor streams

Asset Type	**Active Channels**
Description	Active River Channels between live edge plantings.
Design Standard	No specific design widths. Channels are maintained to prevent permanent vegetation growth.
Most Recent Review / Upgrade	n/a
Management	Regrowth spraying. Tree removal.
Issues	None
Condition	Good

8.6 Scheme Operational and Maintenance Expenditure

Historical and projected operational and maintenance expenditure relating to the UTTFCS, is attached to this Asset Management Plan as Section 11.4. Currently, financial data is summarised across all rivers. Through implementation of the improvement plan, Council will review the way these financial tables are set out so that more detailed operational and maintenance expenditure (e.g. costs per asset type) can be made readily available in future. This is an area of on-going improvement.

8.7 Renewal Plan

The objective is to steadily renew assets considering the following:

- The age profile;
- The condition profile;
- The level of ongoing maintenance; and,
- Financial and customer risks.

Renewals are reviewed regularly, with any deferred work re-prioritised alongside new renewal projects and a revised programme established where required. The financial tables, attached as Section 11.4, set out the historical and projected renewal expenditure for the Scheme.

8.8 Capital Works Plan

Capital Works are generally initiated through triggers such as:

- Growth;
- Levels of service;
- Regulatory change; or,
- Operational efficiency.

Historical and projected capital works expenditure for the Scheme is set out in the financial tables attached as Section 11.4.

8.9 Disposal Plan

There are no intentions to dispose of any of the Scheme assets at this time as river scheme assets are not normally disposed of and design standards are not normally lowered.

9 FINANCIAL MANAGEMENT

9.1 Assumptions

The following assumptions have been made in developing the long term financial forecasts for the Scheme:

- There will be no major floods or other unforeseen risks or issues that require mitigation, or repair. Flood damage resulting from a major flood may impact on the level of service provided by the Scheme, resulting in a need to review and reprioritise maintenance and capital works programmes. The Scheme may provide a reduced level of service for a time following a major flood if significant damage has occurred. This may require a review of this asset management plan.

- Inflation has been included in the financial forecasts using rates of 3.5% in year 1 (based on construction costs), dropping to 2.5% from there on. The financial estimates are not significantly sensitive to small movements in inflation; therefore this is considered a reasonable approach. However, if reliable inflation trends indicate a more suitable rate, the financial models are able to be amended as appropriate.

- There continues to be a willingness to pay for the level of service as set out in this asset management plan. Factors that could affect this are associated with the general economic performance of the region. It is therefore assumed that the current level of economic optimism and performance will remain.

9.2 Confidence Levels

The financials are based on the asset register, asset condition assessments and asset valuation assessments. Council has a high level of confidence in both the register and condition assessments and has followed the processes outlined below for asset depreciation and valuation. These assessments are undertaken by skilled staff with extensive experience in management of the river and drainage networks, and are overseen by a chartered professional engineer and peer reviewed, as appropriate. The assumptions above are considered to be reasonable; in particular the likelihood of a major flood that exceeds the capacity of the river system in any one year is less than 1% and Council's disaster provisions allow for the assets to be replaced following such an event.

Table 29 Financial Forecast Information Reliability

Information Source	Grade*	General Meaning	Reasoning
Asset Register	B	Reliable.	Based on sound records which are updated regularly by knowledgeable staff. Asset details including age and condition are generally well documented, but some assets have incomplete historical data.
Asset Condition Assessments	A	Highly Reliable.	Data based on sound records. Condition assessments undertaken regularly by appropriately skilled and experienced staff and overseen by a Chartered Professional Engineer.
Asset Valuation Assessments	A	Highly Reliable.	Data based on sound records. Assessment methodologies are considered to be best practice, are undertaken by experienced staff and peer reviewed by an appropriately qualified independent consultant.

**Grading based on International Infrastructure Management Manual (NAMS 2006). Refer to Appendices for full categories list.*

9.3 Financial Reporting Standards and Policy

Council is required to comply with section 111 of the Local Government Act 2002, which requires all financial information in asset management plans to be prepared in accordance with generally accepted accounting practice. From 1 July 2006, Council adopted International Financial Reporting Standards; therefore, all financial information in the asset management plans has been prepared in accordance with generally accepted accounting practice in New Zealand for a public benefit entity adopting New Zealand equivalents to International Financial Reporting Standards.

The relevant New Zealand equivalents to International Financial Reporting Standards for asset management plans are as follows:

a) NZ IAS 16: Property, Plant and Equipment.
This standard covers recognition, measurement at recognition, revaluation, and depreciation and de-recognition of tangible assets including infrastructure assets.

b) NZ IAS 36: Impairment of Assets
This standard covers when an asset is impaired, how to measure that impairment and the accounting treatment used to recognise that impairment in financial statements.

9.4 Council Accounting Policy

Council's accounting policy in respect of infrastructure assets, as set out in its Statement of Accounting Policies, is as follows:

> *"Infrastructure assets are shown at fair value, based on periodic, but at least triennial, valuations by suitably experienced Council employees, on the basis of depreciated replacement cost. Independent, professionally qualified valuers review all such valuations."*

Infrastructure asset recognition and initial measurement of cost

The costs of an infrastructure asset are recognised only if it is probable that future economic benefits associated with the item will flow to the Council; and the cost of the item can be measured reliably.

Costs can include:

- Purchase price, including import duties and non-refundable purchase taxes after deducting trade discounts and rebates; and
- Costs directly attributable to bringing the asset to the location and condition necessary for it to be capable of operating in the manner intended by management. Directly attributable costs include:
    - Employee benefits;
    - Costs of site preparation, initial delivery, handling installation and assembly costs; and
    - Costs of testing whether the item is operating correctly.

Distinction between new assets and renewal or replacement assets

Infrastructure assets are classified as either:

- New assets, (which are funded by a mixture of scheme, general funds and, if necessary, borrowings);
- Renewal or replacement assets, (which are funded by the Infrastructure Asset Depreciation Reserve (IADR) and, if necessary, borrowings). Note that as depreciation for infrastructure assets has only been funded since 1st July 1999, it

may be necessary to borrow where there are insufficient funds in the IADR to cover the entire cost of the renewal or replacement.

To be classified as a new asset, an asset must increase either the existing service levels or capacity levels currently provided under an Asset Management Plan.

Renewal or replacement assets replace existing assets and maintain existing levels of service or capacity levels provided under the Asset Management Plan.

Sometimes an asset is replaced before the end of its expected useful life by an asset that increases the existing service level or capacity level previously provided. In the case where the asset is partly a new asset and partly a renewal, funding is provided in proportion from Scheme/general funds and the IADR. The proportion of funding from the IADR should be the estimated cost of the renewal to previous service or capacity levels. The remainder should be funded from Scheme and general funds.

9.5 Depreciation

Depreciation is the systematic allocation of the cost or re-valued amount of an asset over its useful life.

Where an asset is assessed as having an infinite useful life, no depreciation is charged. Examples of infrastructure assets that have an infinite useful life include:

- Land;
- Stopbanks;
- Berm edge protection;
- Sea or river groynes; and,
- Drainage works (channels).

These assets are not considered to deteriorate over time and will, therefore, provide a constant level of service unless subjected to a significant flood event.

Where an asset is considered to have a finite useful life, and therefore will deteriorate over time, depreciation is calculated using the straight-line method to allocate the costs or re-valued amounts to their residual values over the estimated useful lives of the assets.

Assets residual lives are reviewed, and adjusted where appropriate, at each balance sheet date. Assets that have a finite useful life are shown below along with the periods used to calculate depreciation:

Table 30 Expected Life Span of Depreciated Assets

Asset type	Component	Years
Drainage Structure	Floodgates	50
	Culverts	70

9.6 Valuation

Council values infrastructure assets at least every three years on the basis of depreciated replacement cost. Valuations are carried out by suitably experienced Council staff, whose work is reviewed by an independent consultant holding a recognised and relevant professional qualification and who has recent experience in the location and category of the assets being valued.

Depreciated replacement cost is a method of valuation that is based on an estimate of the current replacement costs of property (including land), plant and equipment; less allowances for physical deterioration, and optimisation of obsolescence and relevant surplus capacity.

Increases in carrying amounts arising from valuations are credited to revaluation reserves in equity. Decreases that offset previous increases of the same asset category are charged against revaluation reserves in equity. All other decreases are charged to the income statement.

Subsequent additions
Subsequent infrastructure asset additions are recorded at cost until the next valuation.

Impairment
Infrastructure assets are assessed for indications for impairment each balance sheet date. Whenever events or changes in circumstances indicate that an asset or group of assets may be impaired, impairment testing is carried out.

An impairment loss is recognised in the income statement for the amount by which the asset's carrying amount exceeds its recoverable amount. The recoverable amount is the higher of an asset's fair value less costs to sell and value in use.

For the purposes of assessing impairment, assets are grouped at the lowest levels for which there are separately identifiable cash flows.

Whenever impairment occurs between valuations, the value of the asset class is reduced to its recoverable amount.

The valuation policy with respect to the component assets of the UTTFCS is shown in the following table.

Table 31 Valuation Basis for Scheme Assets

Asset Type	Component	Valuation Basis
Land	Flood protected land	Market Value
	Floodable land (grazed)	Capitalised rental
	Floodable land with Scheme assets	No value
Flood Control	Stopbank	Replacement Cost
Drainage Structure	Floodgates	Depreciated Replacement Cost
	Culverts	Depreciated Replacement Cost
Erosion control	Retards and Permeable Groynes	Replacement Cost
	Rock groynes	Replacement Cost
	Edge Protection	Replacement Cost

9.7 Basis for Valuation
Valuation of the assets is based on the following:

Land
Land owned by the Scheme has been divided into two significant categories. These are:

1. Flood protected land outside Scheme stopbanks (11ha).
2. Floodable land available for grazing, including sections of stopbanks (82ha).

A Registered Valuer has provided average land values for these two categories. For the purposes of this plan the following rates have been applied:

1. Flood protected land: $15,000/ha (This is the average land value of adjoining properties and recognises the income received from these areas).

2. Floodable land available for grazing: $4000/ha. (This value recognises the income received from grazing @ $50/ha).

Stopbanks

The value of stopbanks is calculated from the volume of compacted material within the structure per metre length. The value calculated is based on the most recent contract rates obtained in tenders by Hawke's Bay Regional Council for similar projects; factored by appropriate cost indices where the latest rates obtained were greater than 12 months previous to the date of valuation. The river systems generally have a supply of available material to construct stopbanks and it is considered reasonable to assume that the same techniques employed in the past will be used for any foreseeable future works.

The value calculated includes allowance for:

- Establishment and disestablishment of the Contractor;
- Winning fill material including stripping;
- Transporting of material for an average distance, reasonable for the section of river being considered;
- Controlling moisture content and compaction of material;
- Grassing and fertilising;
- All associated works such as fencing and dust control;
- Investigation, design, and construction supervision; and,
- Resource consents and material extraction charges.

No allowance for depreciation is made for stopbanks as the maintenance regime is intended to maintain the asset at the defined long term service level, with no foundation or internal settlement.

Edge Protection Planting

The assets of the edge protection and planted zones include tree and shrub willows, permeable groynes, and tree anchoring mechanisms. The value of edge protection is calculated from the planted area and the age and density of the planting.

The cost of establishing the planted area, including the cost of major maintenance such as lopping, is factored into the valuation. Thus, the value of plantings includes allowance for:

- Pole purchase and transport;
- Preparation of the area, including animal pest control;
- Pole planting;
- Winning of trees for slotting and trenching;
- Excavation of slots or trenches;
- Fixing down of slotted or trenched trees;
- Protective fencing;
- Lopping and layering; and,
- Specific plant pest control.

Where planting is under significant pressure from the river, an additional allowance for rope and rail retard work may be made, whether or not such works exist. This will be relevant where such works are likely to be necessary to reinstate existing works.

No allowance for depreciation is made for edge protection planting as the maintenance regime of lopping and animal and plant pest control ensures that the asset is maintained at the defined long term service level.

Other Berm planting
The value of berm planting is calculated using the same criteria as edge protection planting and similarly, no allowance for depreciation is made.

Drains
Drains are used to convey drainage water from the drainage structures under the Scheme's stopbanks through the edge protection zone, out to the river channel. There are a number of drains that are the responsibility of the scheme and each has been identified and included in the Scheme asset register. The method of valuation used for drains is replacement construction cost. The drains are valued according to their specific dimensions and current construction costs.

Drainage Structures
There are 37 drainage structures under the Scheme stopbanks. These generally consist of concrete pipes, concrete headwalls and floodgates. These structures were installed as part of the initial scheme works of the early 1950's, although five of the structures were replaced or modified as part of the interim scheme works carried out in the early 1980's. The recommended tax life of these assets is 50 years, although their expected life is nearer 70 years.

The value of culverts and floodgates is calculated by estimating the cost of their replacement. The estimated replacement cost is depreciated over the recommended useful life of each component, according to the age of the item and its estimated effective life. This determines the present depreciated replacement cost.

Rock Protection Work
Rock groynes have been constructed at the confluences of the major rivers of this scheme. The groynes are used to establish a permanent location for the confluences of the rivers where significant expansion zones allowed large volumes of gravel to accumulate. The controlling and confining of these areas enables gravel material to be transported more evenly during flood times and to discourage the deposition of large volumes of material. These rock groynes are located at the confluence of the Waipawa and Tukituki rivers, the Tukituki and Tukipo rivers and the Waipawa and Mangaonuku rivers.

The value of rock protection work is calculated from the volume of rock placed, as defined by the original design. The value calculated is based on the most recent contract rates obtained, and where no recent contract rates are available, estimated following enquiries into at least two possible sources of supply.

The value calculated includes allowance for:

- Establishment and disestablishment of a contractor;
- Supply and transport of rock;
- Preparation of site including associated river work;
- Placing of rock;
- All associated work, such as fencing and dust control; and,
- Investigation, design, and supervision.

No allowance is made for depreciation of these assets, but an annual maintenance budget of $5,000/year/groyne is provided to maintain the assets to the approved design standard.

Active River Channel
The river channel shall have no value.

9.8 Asset Value

The Upper Tukituki Flood Control Scheme assets are revalued every three years. The values quoted in this AMP were established through the last review, undertaken in August 2011. In accordance with Council policy, the next revaluation is scheduled for 2014.

Asset values are determined using a range of criteria and are recorded in the Asset Database. Asset values are summarised in Table 32 below.

Table 32 Upper Tukituki Flood Control Scheme Asset Values

Zone	Asset description	Replacement Value	Depreciated Value
Floodway	Stopbanks	$11,365,020	$11,365,020
	Deflection banks	$61,589	$61,589
Berm & Buffer	Live edge & buffer protection	$12,022,611	$12,022,611
Active Channel	Active River Channel	$0	$0
	Small Stream Channel	$0	$0
Drainage	Drains	$175,230	$175,230
Structures	Culverts, Flood Gates & Structures	$1,004,426	$284,412
	Confluence Groynes	$396,748	$396,748
Land	Land underlying assets and within Floodways	$562,948	$562,948
	Total	**$25,588,572**	**$24,868,559**

9.9 Optimised Decision Making

9.9.1 Capital Works

A range of options are considered for all major capital works projects, with options presented in a report for consideration by Council. In recent years, all capital works projects have been associated with the improvement of existing infrastructure assets such that they provide the level of service agreed for the Scheme, or enhance its integrity. For this reason, no specific consultation with the community has been entered into.

9.9.2 Maintenance Works

Innovation in the approach to maintenance of the Scheme is encouraged through the annual contract with Council's Operations Group. In recent years, Council has invested in plant items that have improved the effectiveness and efficiency of Scheme maintenance work. An example of this is Council's decision to sell its bulldozer, which was used primarily for beach raking, and purchase a large pivot steer tractor. As a result, operating costs have reduced significantly and productivity has been improved.

9.9.3 Enhancement

Council has adopted a multi-value philosophy to management of Scheme waterways. This approach requires managers to consider cultural, heritage, landscape, recreational and ecological values in addition to flood control and drainage. The philosophy will be implemented through development of an Environmental Management and Enhancement Plan for the Upper Tukituki River, through enhancement works undertaken as part of any future capital projects, and through special enhancement projects.

9.9.4 Scheme Costs

The annual costs for the Upper Tukituki Scheme are made up of three significant components; annual maintenance, special project work, and other costs.

A summary of the budgeted operational and capital expenditure for the Scheme over the next ten years is provided in section 11.4 of the plan.

9.9.5 Annual Operations and Maintenance

The cost of delivering the annual operations maintenance programme as described in this Asset Management Plan is currently $635,341 (2011/12); including contract and supervision costs. The annual operations costs also include a Disaster Reserve contribution, rate collection costs, cross section monitoring, pest control, drainage structure depreciation and Scheme administration.

The current management regime includes, but is not restricted to:

- Beach raking;
- Mowing;
- Spraying willow regrowth in the channels;
- Lopping of existing willow edge protection;
- Controlling noxious plant infestations;
- Inspecting and maintaining all drainage outlets, pipes and floodgates;
- Maintaining three of eight minor stream channels;
- Planting and managing production timber in areas of suitable berm land.

Details of the above works are included in an Asset Maintenance Contract negotiated annually with the Council's Operations Group. The contract provides operations and maintenance services.

9.9.6 Capital works

Capital works are scheduled in Council's ten year plan to enhance the level of service provided by the Scheme. During the 2012-2022 LTP period, Council will spend around $650,000 on improvements to the Upper Tukituki stopbank.

9.9.7 Special projects

Three special projects are planned for the next ten years. These projects are summarised below:

- Review of levels of service provided by the Scheme – The current level of service provided by the stopbanks on the Ruataniwha Plains is to convey a flood with a 1% chance of exceedance in any one year safely to the sea. This level of service was established during the 1980's. Since that time land use has intensified, and the number of residential, commercial and industrial properties has increased. There is now expected to be a sound economic argument to increase the level of service provided by the Scheme. The work will include an assessment of the cost benefit of a range of possible options for increasing the level of protection provided by the Scheme assets.

- Environmental enhancement – Council has adopted a multi value approach to its flood control and drainage scheme works. This approach will be incorporated into Council's Environmental Code for Flood Control and Drainage Works when it is

reviewed in the 2011/12 financial year. In addition, a prioritised work programme for ongoing enhancement work will be developed and implemented.

9.9.8 Debt Servicing

Debt servicing is undertaken is accordance with the conditions imposed on any money borrowed by the Scheme. The cost of debt servicing is provided for in the Scheme budgets.

Current debt is repaid over 25 years. An annual interest payment is also provided for. Future borrowing may be spread over longer periods with loan servicing costs being the same each year borrowing is outstanding (ie capital repayments will increase as interest costs reduce, but the same total payment will be made each year of the loan.

10 ASSET MANAGEMENT PLAN IMPROVEMENT PROGRAMME

This document and the associated processes and records that feed into it are regularly reviewed; over time enabling Council to make more informed decisions, develop more effective plans and strategies, review outcomes, and improve the way risk is managed. Where review processes identify opportunities for improvement, these are translated into the Scheme's improvement programme (Table 33) and provision is made through Council's annual planning process to fund projects.

This section describes the specific improvements proposed over the next three to five years. For clarity, improvement opportunities are categorised into the following areas:

- **Asset Management and Information Systems** (e.g. Asset register, plans and records systems, financial systems, condition monitoring etc.);
- **Asset Data and Knowledge Processes** (e.g. spatial data, physical attributes, risk data, valuations, condition data, asset hierarchy etc.);
- **Demand Analysis and Strategic Planning Processes** (e.g. demand analysis, failure prediction, risk assessment, Levels of Service review, LTP etc.);
- **Operations and Maintenance Processes** (e.g. O&M policy/strategy, emergency planning, contract monitoring and control, operational expenditure review etc.);
- **Asset Capital Processes** (e.g. asset rationalisation, asset handover, contract monitoring, construction/design standards etc.); and,
- **Organisational Processes** (e.g. training, asset management team, contracting policies, roles etc.).

Table 33 Improvement Programme Summary – UTTFCS

Process	Key Area	Current Practice	Tasks/Target Practice	AMP section	Resources	Timing	Project Lead(s)
Asset Management / Information Systems	Asset Register	• MSExcel workbooks are used to hold physical information on all assets within the Scheme (e.g. age, construction materials, condition, and renewal rates). • Workbooks are maintained by the Operations Rivers Manager.	1. Develop and document a process for the accurate capture of assets from new capital works projects. 2. Link to valuation database. 3. Link to condition monitoring records system.	Monitoring Our Assets	HBRC	2011-2013	Operations Rivers Manager & Asset Engineer
	Plans and Records Systems	• ArcMap is the core GIS system. It is managed by Council's Information Management Team and editing rights are limited to minimise any data issues in the system. Council's Asset Register is not currently linked to the GIS system. • Council maintains a River Lease Database for monitoring river lease land across the Plains.	4. Investigate software options that will enable Council to integrate data from the asset register and valuations database into Council's GIS system. 5. Strengthen links between Council's River Lease Database and the GIS system.	Monitoring our Assets, Risks and Risk Management	HBRC HBRC	2011/2012 2011/2012	Team Leader, Technical Support & Operations Rivers Manager Asset Engineer
Asset Data and Knowledge	Asset valuations	• Valuations are undertaken internally. Data is extracted from an excel asset register and valued accordingly. • Valuations are peer reviewed externally. • Valuations are undertaken three yearly (next review scheduled for July 2011).	6. Develop and implement a database to record unit rates.	Financial Management	HBRC	2011/2012	Manager, Rivers Operations
	Spatial data	• Currently, gravel management relies on cross-section survey information for the main rivers. Cross-sections are completed every six years. The work is contracted out on an annual basis.	7. Investigate the costs/benefits of using LiDAR to manage gravel in the main rivers as opposed to relying on cross-section surveys.	Monitoring our Assets	HBRC	2011/2012	Senior Design Engineer
	Asset maintenance history records	• Annual maintenance contracts identify and keep track of scheduled work. • All old contract documents are retained in Council's record system in hard copy and electronic form.	8. Investigate opportunities to incorporate contract details into Council's new financial system (linked to 'R9' – Risk Register).	Financial Management	HBRC	2011/2012	Administration Officer, Operations
Demand Analysis and Strategic Planning	Failure prediction	• 1D and 2D river models have been developed in many areas across the region to assess river bed conditions and breach scenarios, and to assist with stopbank design. 2D modelling is fragmented in some areas. • A 16m long physical model was built in 2006 to analyse options for addressing the Sawfly outbreak. It was disestablished once modelling was complete; however it would have value over the longer term if available.	9. Develop and refine models to improve efficiencies and certainty of information (linked to 'R6' – Risk Register). 10. Seek Council approval to build a purpose-built shed to house the model and reinstate it for future investigative work around risk/failure analysis.	Risks and Risk Management, Monitoring our Assets	HBRC	On-going 2011/2012	Manager, Engineering

Process	Key Area	Current Practice	Tasks/Target Practice	AMP section	Resources	Timing	Project Lead(s)
	Risk assessment	• Council has recently purchased new risk assessment software (Quantate Risk) to evaluate and manage risks across the organisation. • Council does not yet have a full understanding of the potential impact that climate change may have on the Plains. • Council does not currently have a formal review process for its Flood Manual, which is linked to Council's CDEM procedures. • Council does not currently have a Risk Action Plan.	11. Familiarise relevant staff with the new software and undertake a comprehensive risk identification and assessment exercise for the UTTFCS. 12. Complete a climate change impact assessment for the Upper Tukituki Flood Control Scheme area in accordance with MfE climate forecasts (linked to 'R1' – Risk Register). 13. Establish formal review procedures and initiate Flood Manual review. 14. Develop a Risk Action Plan.	Risks and Risk Management	HBRC / External HBRC HBRC HBRC	2011 2013/2014 2011-2013 2012/2013	Group Manager, Asset Management Senior Design Engineer Asset Engineer
	Level of Service Review (LOS)	• Development of LOS is undertaken as part of AMP processes. • A LOS review is scheduled for the 2012/22 LTP period.	15. Review levels of service and engage community with respect to options and costs. 16. Incorporate new levels of service into the next LTP. Initiate detailed design of new assets required to meet revised levels of service.	LOS, Capital Works Programme, Financial Management	HBRC and External	2013/14 2015/16 LTP review	Asset Engineer
	Ten Year Plan (TYP)	• Current LTP period is from 2012 to 2022. • The next LTP review is scheduled for 2015. • The LOS review will be underway prior to the LTP review in 2015, providing an opportunity for information and programming associated with the LOS review to be aligned with the proceeding LTP period.	17. Ensure linkages between the AMP and TYP are clear and that funds required for improvements are budgeted for.	Financial Management, LOS, Total AMP	HBRC	2011/12	Group Manager, Asset Management Group
Operations and Maintenance	Policies/strategies	• Council is working through a process of developing Ecological Management and Enhancement Plans (EMEPs) for the main rivers. The Ngaruroro EMEP was completed in December 2010 and the Tutaekuri EMEP is currently under development. Once this is complete, Council plans to develop an EMEP for the Tukituki River. • A scoping report, "Review of Riverbed Gravel Management", was completed by Tonkin & Taylor in July 2010. The report provided a first step in reviewing and improving Council's understanding of riverbed gravel movement; the impact of gravel extraction on flood protection works and coastal processes; and, Council's management regime for assessing the gravel resource.	18. Develop an EMEP for the Tukituki River. 19. Implement recommendations of the review of gravel management, undertaken by Tonkin & Taylor Ltd. 20. Implement recommendations set out in the Corporate and Strategic Committee Paper, dated 9 November 2011 as they relate to Council's Infrastructure Insurance.	Scheme Environmental Strategy	HBRC HBRC / External HBRC / External	2013-2014 2011-2016 2011-2013	Environmental Engineer & Senior Engineering Officer, Design Manager, Engineering Group Manager, Asset Management Group
	O&M manuals	• The Environmental Code of Practice was first published in 1999 and reviewed in 2003. Regular reviews are scheduled every six years.	21. Review and update the Environmental Code of Practice.	Scheme Environmental Strategy	HBRC	2011/2012	Environmental Engineer
	Emergency planning	• The proposal for developing a Super Design Contingency Plan was drafted in 2008. It recommended four actions: more accurately identifying likely points of failure; identifying the implications of such a failure; consulting with the public; and, incorporating the management of risks into the current flood management and CDEM procedures. These actions have been initiated in-part through the Rivers LOS review.	22. Develop a Super Design Contingency Plan in accordance with the actions set out in the 2008 proposal.	Risk and Risk Management	HBRC	2012-2013	Asset Engineer
Asset Capital	Land rationalisation	• There is currently no formal Council procedure for keeping track of all Council owned and administered land as it is acquired and disposed of.	23. Develop a database and associated GIS layer identifying all Council owned and administered land; enabling Council to sort data by purpose, type and area etc.	Life Cycle Management	HBRC and The Property Group	2011/2012	Manager, Engineering

Process	Key Area	Current Practice	Tasks/Target Practice	AMP section	Resources	Timing	Project Lead(s)
			24. Develop a strategy for rationalising land holdings along the main rivers.				
	Construction/design standards	• Council is developing a series of Waterway Guidelines to assist developers and TAs with the design and construction of water management structures and practices, by providing best practice advice.	25. Develop Waterway Guidelines for 'proprietary stormwater management devices', 'fish passage', and 'stream enhancement' (linked to 'R9' – Risk Register). 26. Review and maintain existing Guidelines to ensure best practice advice is kept up-to-date (linked to 'R9' – Risk Register).	Scheme Environmental Strategy	External / HBRC	2011-2013	Manager, Engineering
Organisational / commercial	AM review / improvement	• The AMP is developed by Council's Engineering Team and externally peer-reviewed. • Full reviews are carried out (as a minimum) every six years. • This Plan replaces the draft AMP completed in 2008. It takes into account recommendations made by Audit New Zealand in its March 2009 Audit report. • The Improvement Programme is a key component of the AMP.	27. Implement the Improvement Programme. 28. Review the format and content of the AMP in 2012. 29. Align the AMP with Council's annual plan and ten year plan. 30. Review the way operational/maintenance and renewal expenditure is presented in the AMP, and links to Council's financial spreadsheets.	The Scheme and our Customers	HBRC	2011-2012	Asset Engineer
	Training programme	• Training is developed and monitored by each group. • Corporate (e.g. H&S, records management), job, and individual (e.g. career development) training is available as required.	31. Staff will undertake training as needed. 32. Review training budget annually (linked to 'R10' – Risk Register).	Total AMP	HBRC	2011/2012	Manager, Engineering
	AM roles	• Current AM roles and responsibilities are determined by the Group Manager, Asset Management and the Manager, Engineering.	33. Undertake annual review of job responsibilities and resourcing to align with improvement programme needs. 34. Co-ordinate suitable projects and timeframes to provide opportunities for student holiday employment and 12 month internships for graduates (linked to 'R10' – Risk Register).	Total AMP	HBRC	2010/2011	Group Manager, Asset Engineering & Manager, Engineering

11 APPENDICES

11.1 References

Table 34 Reference List

Ref in Text	Reference Details
CINTA 2008	2008 Environmental Survey, prepared for Hawke's Bay Regional Council by Cinta Research. October 2008
DUNLOP 1992	Catchment: A History of the Hawke's Bay Catchment Board and Regional Water Board. JD Dunlop. 1992
HBRC 1998	Ruataniwha Plains Flood Hazard Study. Prepared by Woodward-Clyde (NZ) Ltd for Hawke's Bay Regional Council. June 1998.
HBRC 1998b	Environmental Management Strategy. February 1998. Prepared by Boffa Miskell Ltd for Hawke's Bay Regional Council.
HBRC 2008	Upper Tukituki Stopbank Upgrading. September 2008. Paper to Council Prepared by Gary Clode. Hawke's Bay Regional Council
HBRC 2008b	Drains to Streams - adopting a Multi-Value Philosophy to Waterway Management in Hawke's Bay. October 2008. DRAFT Report. Prepared by Lisa McGlinchey, Hawke's Bay Regional Council.
MfE 2008	Preparing for climate change. A guide for local government in New Zealand. July 2008. Ministry for the Environment.
NAMS 2007	Developing Levels of Service and Performance Measures - Creating Customer Value from Community Assets, NAMS Group 2007
Williams 1985	Upper Tukituki Catchment Control Scheme. August 1985. Prepared by Gary.J.Williams, Hawke's Bay Catchment Board and Regional Water Board

11.2 Asset Condition Categories

Channel Condition Descriptions	
1	Channel in poor condition, overgrown with vegetation, bed well armoured, significant anomalies in bed levels, visual aggradation/degradation. Significant variations from design width. A large flood (20-50yr event) would be required to initiate bed movement.
2	Channel has significant unwanted growth or armouring established which is likely to take a 10-20 year flood event to initiate gravel movement. Variations in design width are apparent.
3	Channel is in moderate condition. Annual vegetation growth evident and armouring not disturbed. It is likely to take a 5 year flood event to initiate gravel movement. Nominal variations in design width.
4	Channel is in good condition. Minimal growth with channel raking completed within last 6 months. Significant gravel movement is expected with a 2 to 5 year flood event.
5	Channel is in excellent condition, free of unwanted growth, with armouring layer disturbed. Channel is stable and within grade tolerances of MBL +- 200 mm. Significant gravel movement is expected in an annual flood event.

Planted Zones - Edge Protection Condition Descriptions	
1	No established works, but works are needed.
2	Newly established works, not yet layered (1-3 years growth).
3	Work moderately established (3-5 years growth), no layering carried out.
4	Established vegetation, (5-7 years growth). Edge Protection trees recently layered, new growth not yet fully developed.
5	Fully established (7-10 years growth). Edge protection trees layered and have developed a dense zone of vegetation over entire area.
Secondary Descriptors	
a)	Noxious plants present.
b)	Permeable groynes, rope & rail retards, structural works.
c)	Slotted edge.

Planted Zones - Buffer Zone Condition Descriptions	
1	No established works, but works are needed.
2	Newly established works, not yet layered (1-3 years growth).
3	Work moderately established (3-5 years growth), not yet layered.
4	Established vegetation (5-7 years growth), with some layering completed.
5	Fully established (7-10 years growth), with a dense zone of vegetation over entire area.
Secondary Descriptors	

a)	Noxious plants present.
b)	Permeable Groynes.

Planted Zones - Near Stopbank Condition Descriptions	
1	No established works, but works are needed.
2	Newly established works (1-3 years growth).
3	Work moderately established (3-5 years growth).
4	Established vegetation (5-7 years growth).
5	Fully established (7-10 years growth).
Secondary Descriptors	
a)	Noxious plants present.

Stopbank Condition Descriptions	
1	Stopbank in poor condition. Unable to confirm quality of construction. No freeboard allowance. Foundation conditions are unknown.
2	Stopbank construction details unknown, with freeboard less than design. Sections of rank growth or noxious plant infestations. Evidence of bank damage. Foundation conditions are unknown.
3	Stopbank in moderate condition. Banks generally conform to specification with minimal freeboard variations. Some rank growth and noxious plant growth evident and minor problems associated with pests, stock damage or rutting.
4	Bank conforms with specifications and freeboard allowance with minimal rank growth or noxious plant infestation. Any foundation anomalies have been identified and addressed in stopbank design.
5	Stopbanks in excellent condition. Banks constructed to specifications, with freeboard allowance, fully grassed, no noxious plants, well maintained, no stock damage, no rutting on crest. Foundation conditions are known and are addressed in stopbank design.
Secondary Descriptors	
a)	constructed to specs.
b)	plant quality.
c)	pest, rabbit, stock damage.
d)	rank growth or inadequate grass cover.

Drain Condition Descriptions	
1	Poor: Drain poorly maintained, not well defined, rank growth.
2	Average: Drain maintained, minimal excess growth, water able to discharge adequately.
3	Good: Drain well maintained, no rank growth, no restrictions.

Floodgate Condition Descriptions	
1	Poor: Floodgate is in poor condition with obvious signs of deterioration. Floodgate needs works to ensure operation as intended.
2	Average: Floodgate in average working condition, signs of deterioration evident, but still functions as designed.
3	Good: Floodgate is in good working order, with no concerns about gate materials or operation.

Culvert Condition Descriptions	
1	Poor: Culverts in poor condition, evidence of pipe damage, misalignment, or discharge ability affected
2	Average: Minimal damage to pipes evident, water able to discharge freely.
3	Good: Pipes in good condition, with no evidence of damage.

Headwall Condition Descriptions	
1	Poor: Evidence of significant damage and deterioration of headwall material.
2	Average: Headwall is functioning as intended with minimal damage or deterioration.
3	Good: Headwall in good condition with no concerns about construction or materials.

11.3 Council Financial Policy

The following sections outline the Scheme Disaster Reserve and Council Funding Policy. With respect to this policy, Council's Corporate and Strategic Committee recommended on 9 November 2011 that:

- Hawke's Bay Regional Council advises LAPP of its intention to withdraw from the fund in accordance with the LAPP Trust Deed, on 30 June 2013; and,
- Instructs staff to undertake a further review of Council's infrastructure asset insurance arrangements prior to 30 June 2013 and determine whether a more cost effective and secure arrangement is available; and
- Agrees that in the interim, the Regional Disaster Reserve account is grown through increases in investment value and the reinvestment of dividends to a maximum of $5.0M. Should the value exceed $5.0M, then surplus investments will be transferred to Council's operating account, with the Chief Executive to decide what investments should be sold and the timing of any sale. Any such sale will be reported to Council.

These recommendations will be implemented over the next two years, and will require the revision of Council's Funding Policy as set out below. This work is included in the Improvement Programme in Section 10.

11.3.1 Scheme Disaster Reserve

A review of Council's Disaster Damage Risk Management was last completed in February 2007. This review updates previous reviews kept on File 2/44, and also as report AM01/13, HBRC plan number 3055. The February 2007 review is documented in Regional Council agenda item 10, 27 September 2006 and Asset Management and Biosecurity Committee agenda item 6, 14 February 2007; and the minutes from those meetings.

This review was based on a report prepared in August 2001 (Library reference ADMA98) and dealt specifically with disaster damage risks to Council-owned infrastructure assets. The review concluded that Council continues to face considerable ongoing risk from natural disasters.

It was concluded the Council may qualify for some Central Government assistance for the repair or restoration of Council infrastructure assets in the event of a disaster, however the amount of any assistance would only be significant in a major disaster. It is therefore prudent to ensure Council can meet the expectations of central government with regard to risk management, by providing for small to medium disasters where Council's financial risk appears greatest, and for large disasters where central government funding may not be forthcoming.

Council agreed in September 2006 to become a member of the LAPP scheme by 1 July 2007 and delegate to the Chief Executive: authority to commit Council to joining the scheme and negotiating with the LAPP managers, arrangements for Council to obtain cover under the Scheme, and details of the insurance cover period.

11.3.2 Risk Management Initiatives

In 1996, Council considered a range of options for risk management. The options were not reconsidered as part of the February 2007 review but Council confirmed that the following risk management initiatives (i, ii and iii below) remain the most prudent:

i) **Disaster damage to Council-owned fixed assets**

- Insurance policies to be held with appropriate indemnity or replacement value cover; and

- On-going asset protection.

ii) **Disaster Damage leading to Third Party Liability**

Reliance by Council on statutory defences which should be ensured by following Council Policy and sound Technical practices for the maintenance of Council assets thereby minimising any exposure through negligence.

iii) **Disaster impact on Council's Business Continuance Ability**

A Business Continuance Plan was completed in June 2001 which contains specific actions and on-going requirements to help ensure Council is able to continue to operate after a disaster.

In February 2007 Council reviewed its disaster damage risk management approach for its infrastructure assets and revised its approach as set out in (iv) below.

iv) **Disaster Damage to Council owned infrastructure assets**

Risk to Council will be reduced and managed by a combination of measures including:

- Maintenance of infrastructure assets to their original design criteria; and
- Where feasible and economic, the protection of assets from the effects of natural disasters, and ongoing improvement of their resilience to damage; and
- Financial strategies to provide for the cost of repair and restoration of assets damaged in a disaster, which will include;
  (a) The maintenance of funding provisions to meet disaster damage insurance excess amounts, meet the cost of managing the response and recovery from a disaster event, and meet 60% of the cost of the unfunded portion of asset reinstatement costs.
  (b) Membership of the Local Authority Protection Programme (LAPP), a mutual fund specifically established to meet 40% of the cost of reinstatement of Council's infrastructure assets following a disaster (above an excess amount set by the fund).
  (c) Insurance cover to meet 60% of the cost of reinstatement of Council's infrastructure assets following a disaster, with a loss limit of 60% of $19M and an excess of 60% of $1M.

11.3.3 Disaster Damage Insurance Excess

This is to be provided for in a combination of ways including:

- Disaster Reserve Investment Funds accumulated by the Regional Community.
- Disaster Damage Investment Funds accumulated by each individual Council managed Flood Control and Drainage Scheme.
- A proportion of annual maintenance budgets of various Flood and Drainage Schemes able to be redirected to repairing disaster damage.

These funding sources are to be referred to as 'Disaster Damage Insurance Excess Reserves'.

11.3.4 Disaster Damage Reserves

These reserves will be available to deal with any situation resulting in damage to infrastructure assets regardless of the level of financial loss, but within specified criteria.

The disaster reserves for each scheme shall be built up to a level in excess of the minimum amount required to meet the costs of a single disaster. The disaster reserve for each scheme may be capped at a target level of the greater of 1.5 times the level required to meet the scheme excess of one disaster event, less 20% of each scheme's current years maintenance budget; or the level required to meet the scheme excess for one disaster event. Furthermore, all schemes with infrastructure assets will have a disaster reserve of at least $5,000. The table below sets out the required Scheme excess and target levels. If any scheme account ends with a significant surplus in any one year, and the disaster reserve target level has not been achieved, consideration will be given whether or not to increase the level of contribution made to the scheme disaster fund.

Table 35 Disaster Damage Reserves Scheme Excess and Target Levels

Scheme	Excess (2011/12 asset values)	Maintenance expenditure able to be redirected	Target level for disaster reserve	Balance at 30 June 2011	Year achieved target level
Heretaunga Plains Rivers	$997,445	$100,000	$1,326,315	$1,158,872	2012/2013
Heretaunga Plains Drains					
Napier Meeanee	$122,507	$30,000	$130,003	$106,025	2012/2013
Brookfields Awatoto	$17,084	$7,500	$16,843	$14,187	2012/2013
Pakowhai	$19,950	$11,500	$20,299	$20,712	2010/2011
Muddy Creek	$27,392	$17,000	$32,036	$25,853	2012/2013
Haumoana	$22,305	$9,000	$24,543	$19,188	2012/2013
Karamu	$193,703	$59,500	$236,695	$200,539	2012/2013
Twyford Raupare	$32,084	$16,500	$39,270	$39,936	2012/2013
Tutaekuri Waimate Moteo	$34,805	$20,000	$43,689	$37,770	2012/2013
Puninga	$12,713	$8,000	$9,630	$10,499	2010/2011
Upper Tukituki	$495,148	$67,500	$646,446	$454,013	2015/2016
Small Schemes					
Makara	$27,993	$2,500	$39,365	$37,459	2012/2013
Paeroa	$18,891	$3,100	$26,714	$30,260	2010/2011
Poukawa	$9,829	$3,100	$12,660	$13,801	-
Esk	$7,305	$2,000	$5,170	$14,976	-
Whirinaki	$9,380	$1,000	$12,479	$13,895	2010
Ohuia Whakaki	$14,222	$2,800	$19,473	$16,216	2014/2015
Te Awanga	$8,813	$1,000	$11,600	$14,353	2010
Kopuawhara	$1,322	$1,000	$5,170	$2,707	-

The Regional Disaster reserve will:

(a) Meet any extraordinary costs of managing the response and recovery to a disaster event.

(b) Meet 60% of any unfunded portion of asset reinstatement cost following a disaster event.

The Regional Disaster Reserve will generally be managed such that the value of its investments (including any cash) remains within the range $2.75M to $3.75M.

If investments exceed $3.75M in value then some investments may be sold and the proceeds credited to Council's general funding operating account. The Chief Executive of Council shall have discretion to decide what investments should be sold, and the timing of any sale, and shall report any sales to Council.

11.3.5 Criteria for the Build Up, Use and Maintenance of Disaster Damage Insurance Excess Reserves

- Reserves will always be a funding call of last resort (e.g. if priorities can be re-established to cover the expenditure, or if unbudgeted income is received, these sources of funds will be used).
- Reserves will be used to meet the cost of reinstatement of infrastructure assets (to an equivalent standard to that in place before the damage was incurred).
- The initial cost of restoring the Council's infrastructure assets (to be referred to as Scheme Excesses) will be met by each relevant Flood Control and Drainage Scheme to a maximum level per Scheme of 2.5% of the replacement value of edge protection; plus 2% of the replacement value of stopbanks and detention dams; plus, 1.5% of the replacement value of all drainage assets of each Scheme. This obligation will be met by Disaster Damage Investment Funds and annual maintenance budgets able to be redirected to repairing disaster damage.
- All efforts will be made to maximise any disaster recovery contributions from Central Government or any other sources.
- Income earned on Reserve investment funds may be used to meet the cost of commercial insurance cover taken on Council "generally uninsurable" infrastructure assets.
- Income from all Disaster Reserve and Disaster Damage investments will be credited to the respective Reserves until such time as the Reserves build up their required level of funding. At such time as each Reserve meets the target level, income will be available to help meet the funding requirements of Council or Flood and Drainage Scheme annual operational expenditure.
- Once Reserves have met their target level of funding and are subsequently reduced below the scheme excess, the Reserve must be reinstated to the target level for each disaster reserve within 10 years.

11.3.6 Provision to Meet Disaster Damage Insurance Excesses and Commitments

Regional Community
The required reserve is in place and is managed in accordance with Council's investment policies.

Flood and Drainage Schemes
The Group Manager, Asset Management, will periodically establish the make-up of the Scheme Excess and report any changes to Council. The make-up will be a mix of Disaster Damage Insurance Excess Reserves and annual maintenance budgets able to be redirected. Contributions to reserves shall be of such an amount to ensure that, subject to no draw down of those reserves, the target level for the disaster reserve for each scheme is reached before the dates set out in the Table 35 above.

Should a call be made on scheme disaster reserve funds, but insufficient funds are available to meet the required disaster damage excess, Council will decide at the time, and for each individual scheme, whether to borrow externally or to loan funds from other Council funding sources.

However, the Group Manager Asset Management is authorised to transfer credit balances in individual scheme rating account balances to their disaster damage insurance excess reserves if this is appropriate.

11.3.7 Frequency of Disaster Damage Risk Management Reviews

Reviews will be carried out at least once every five years.

11.3.8 Relationship to Council's Funding Policy

The policy contained in this Section, relating to the cost of reinstatement of assets as a result of a disaster event, will override Council's policy for general funding contributions to Flood Control and Drainage Schemes.

a) Agree to meet the entry cost to the Local Authority Protection Programme (LAPP) of $575,000 from the proceeds from investments held as part of Council's Regional Disaster Reserve, with payment to LAPP being made before 30 June 2007.

b) Agree that the annual contributions to LAPP will be met from operating accounts of the individual Schemes in accordance with the following formula:

(Value of scheme drainage channel assets x0.2 + value of scheme culverts and structures x0.2 + value of scheme stopbanks and flood detention dams x0.4 + value of scheme live edge protection x1.0);

Divided by

(total value of Council drainage channel assets x0.2 + total value of Council culverts and structures x0.2 + total value of Council stopbanks and flood detention dams x0.4 + total value of Council live edge protection x1.0);

Multiplied by

Annual LAPP contribution.

(c) Agree that Council take out insurance on the international insurance market for its "generally uninsurable" infrastructure assets, excluding live tree edge protection to meet 60% of the cost of reinstatement of those assets following a disaster, with a loss limit of 60% of $19M and an excess of 60% of $1M; and meet the annual premium for that insurance from proceeds from investments held as part of Council's Regional Disaster Reserve.

The Scheme Disaster Reserve Target and the reserve situation are set out in the Scheme budget. It should be noted that interest generated by the reserve remains in the reserve until the reserve achieves its target. The target is adjusted annually, in accordance with inflation, as future revaluation of assets is expected to result in an increased Disaster Damage Investment Fund target.

The use of the Disaster fund will depend on the value of flood damage incurred in any one event. After each significant event (greater than AEP 5%) an assessment of the assets will be made, areas of damage will be reported together with costs of reinstatement of damaged assets.

The cost of reinstatement will be met as follows:

- If the cost of repair is less than the value provided for redirected maintenance in the calculation above, then the work shall be undertaken within existing Scheme budgets by deferring other maintenance, or in some instances, capital work.

- If the cost of repair is between the value provided for redirected maintenance and the value specified for the Scheme Disaster Reserve, then the value of the work in excess of the redirected maintenance value shall be met from the scheme disaster reserve, with the remainder being undertaken within existing Scheme budgets by deferring other maintenance, or in some instances, capital work.

- If the cost of repair is greater than the value specified for the Scheme Disaster Reserve, the cost of the work up to the value specified for the Scheme Disaster Reserve shall be met as above and the difference between the estimated cost and the specified Scheme Disaster Reserve shall be met from the regional disaster reserve.

11.3.9 Funding

Scheme funding

Council adopted the following operational and rating policies in April 2008 for inclusion in the development of Asset Management plans for Council's Flood Control and Drainage Schemes:

- The funding of all Schemes shall comply with the requirements of the Local Government Act 2002 (sections 100 – 102), which provide for setting the Scheme funding levels to maintain predicted levels of service, the service capacity and integrity of assets throughout their useful life; and to achieve inter-generational equity.

- Scheme targeted rates shall be set at a level (annually adjusted by inflation) that ensures adequate funding is provided for the level of service agreed for each Scheme, which will include the renewal of assets in any new capital works.

- Scheme targeted rates are levied on those ratepayers that benefit from the Scheme.

- For each Flood and Drainage Scheme, and to ensure compliance with the Local Government Act 2002, section (100)(2)a, by meeting the following tests for financial prudence for each scheme:

    - The accumulated Scheme operating surplus over any 10 year period results in the Scheme balances being in credit; and

    - The accumulated funds (rates, scheme operating balance and depreciation reserve) provide for sufficient funds, which over the 10 year LTP period, unless a longer time period can be justified, meet the renewal and capital improvement needs of the Scheme either through direct funding of capital or through the servicing of loans raised to fund such purchases.

- The period of borrowing complies with the Local Government Act 2002 Section 100 (2)c and recognises intergenerational equity principles, affordability to the ratepayer, and risks associated with the assets (this will mean that borrowing will be for a period of 25 years unless there is justification otherwise).

Financing Of Infrastructure Assets

Council is required by the Local Government Act, section 102, to have revenue and financing policies for financing of infrastructure assets. The following Council policies, subject to possible amendment through the LTP consultation process, are in place:

a) Assets with infinite life
   i. These assets include stopbanks, berm edge protection, sea or river groynes, drainage works etc and are considered not to deteriorate over time and are maintained in accordance with Councils Asset Management plan. No depreciation is provided on these assets.

   ii. For significant new asset purchases under this category, borrowed funds are used as Council's preferred method of financing. If however sufficient accumulated funds are held in the Scheme operating reserve and/or the Scheme infrastructure depreciation reserve, then where provided for in the Asset Management plans for that Flood and Drainage Scheme, such new asset purchases can be directly funded from these accumulated reserves or those reserves may be used to service a loan raised to fund such a purchase.

b) Assets with a finite life
   i. These assets include culverts, detention dams, pump stations, etc and are depreciated over their useful life. Depreciation is set at a rate that is consistent with the requirements of the Local Government Act 2002 section 100 – 102, and as provided for in the adopted Asset Management Plan for each Scheme. Such depreciation is placed in an infrastructure depreciation reserve for each Flood and Drainage Scheme.

   ii. Renewal of these assets will be funded from this depreciation reserve, any accumulated credit balances in the Scheme operating account and loan funding where considered appropriate, and as set out in the adopted Asset Management plan.

   iii. Where (new) assets that will result in improved levels of service or additional capacity are to be purchased or constructed, then it is Council's preference to fund this through external loan funding other than where adopted Asset Management plans provide for such new assets to be funded from accumulated infrastructure, depreciated reserves, and/or Scheme operating balances for each flood drainage Scheme.

Funding necessary for the Heretaunga Plains Flood Control Scheme to continue to provide the required levels of service will be obtained from the following sources:

- Rental income from Scheme owned land leased for grazing or other purposes;
- Works rates levied specifically for the purpose of funding scheme works;
- Council general funding;
- Interest from the Disaster Damage Investment Fund once the interest is no longer required to bring the fund to its required target;
- Miscellaneous minor income sources.

Long Term Plan Linkages

Scheme budgets will be adopted as part of the Council LTP 2012/22. Budgets presented in this Asset management plan are preliminary budgets and will be included in Council's draft LTP 2012/22 for public consultation.

Minor adjustments to budgets will be made on an annual basis as part of Council's annual plan process, however changes that are deemed to be significant under Council's significance policy, will only be made after a special consultative procedure in accordance with the Local Government Act 2002.

Rental Income

Land owned by the Scheme in areas where full vegetation of the berms is not required, where the costs of fencing can be justified, and where there will be no significant adverse affect on native flora or fauna, will be leased for grazing. Lessees will be chosen based on their proximity to the area to be leased and their willingness to ensure stock remains well contained within the area; to manage stock numbers to avoid over grazing; and to control plant pests. Land protected from flooding shall be leased for agricultural use. Rental income from leased land currently equates to approximately $3,000/year.

Works Rates

Works rates will continue to be levied and collected specifically for the purpose of funding scheme works. It is anticipated that works rates will remain at their present level in real terms in the foreseeable future. Rate collection costs will be met solely by works rate contributions.

Borrowing

The need for any future Scheme debt would be specifically considered by Council and a repayment period chosen based on the prudent management of Scheme risk and finances.

Council General Funding

A contribution to the Scheme will be made from the Council general funding pool according to the following criteria:

- No contribution from the general funding pool will be payable on works rate collection costs.
- No contribution from the general funding pool will be payable on disaster contributions.
- No contribution from the general funding pool will be payable on servicing of repayment of existing debt.
- A 30% contribution from the general funding pool will be payable on all other River costs less any direct income to the scheme, excluding disaster fund income.
- A 10% contribution from the general funding pool will be payable on all other Drainage costs less any direct income to the scheme excluding disaster fund income.

NB: Works rate collection costs and disaster fund contributions will be met entirely from works rates.

Interest from the Disaster Damage Investment Fund

Interest from the Disaster Damage Investment Fund will only be credited to the scheme when the Disaster Damage Investment Fund exceeds its minimum target level.

Miscellaneous Minor Income Sources

Miscellaneous minor income is expected to be received by the scheme from time to time. This money will be credited directly to the scheme account.

11.4 UTTFCS Financial Summary Tables

The financial tables appended below summarise the operational/maintenance, renewal, and capital costs, relating to the UTTFCS assets, anticipated by Council over the next ten year LTP planning period. For reference, financial details are also included for this financial year (2011/2012).

Table 36 Forecast Operations and Maintenance Expenditure 2012-2022

Operations & Maintenance												
Year	**2011/12**	**2012/13**	**2013/14**	**2014/15**	**2015/16**	**2016/17**	**2017/18**	**2018/19**	**2019/20**	**2020/21**	**2021/22**	**TOTAL**
Cost	$635,341	$651,991	$669,076	$686,603	$704,582	$723,023	$741,935	$761,326	$781,206	$801,584	$824,462	$7,345,788

Table 37 Forecast Capital Expenditure 2012-2022

Capital												
Year	**2011/12**	**2012/13**	**2013/14**	**2014/15**	**2015/16**	**2016/17**	**2017/18**	**2018/19**	**2019/20**	**2020/21**	**2021/22**	**TOTAL**
Cost	$51,450	$79,413	$81,716	$112,114	$115,366	$118,711	$122,154	$125,696	$129,342	$133,093	$136,952	$1,154,558

Table 38 Forecast Renewals Expenditure 2012-2022

Renewals												
Year	**2011/12**	**2012/13**	**2013/14**	**2014/15**	**2015/16**	**2016/17**	**2017/18**	**2018/19**	**2019/20**	**2020/21**	**2021/22**	**TOTAL**
Cost	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0

Table 39 Total Forecast Scheme Costs 2012-2022

TOTAL Capital & Renewals	$51,450	$79,413	$81,716	$112,114	$115,366	$118,711	$122,154	$125,696	$129,342	$133,093	$136,952	$1,154,558
TOTAL Scheme Costs	**$686,791**	**$731,405**	**$750,792**	**$798,717**	**$819,948**	**$841,735**	**$864,089**	**$887,022**	**$910,548**	**$934,676**	**$961,414**	**$8,500,346**

Source: L:\Financial Data\10 Year Budgets\LTP 2012-22\UTTS_1119.xls