

Hawke's Bay Regional Council 30 Year Infrastructure Strategy

2018 - 2048



ISBN 978-0-947499-09-9

Hawke's Bay Regional Council:

30 Year Infrastructure Management Strategy

2018 - 2048

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October 2017
HBRC Publication Number 4960
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EXECUTIVE SUMMARY

The Local Government Act (LGA) 2002 Amendment 2014 now sets out requirements for Council's in regard to infrastructure strategies and asset management planning.

The Act requires identification of issues that may impact on infrastructure management over the coming 30 year period and strategies that are to be put in place to address those issues.

In regard to the management of the Haweks Bay Regional Council's flood protection infrastructure assets, the following issues have been identified:

- Aging assets
- Levels of Service
- Climate change
- Managing risks of natural hazards
- Residual risk
- Economic conditions
- Growth and development.

Strategies and actions have been identified in relation to these issues some involving the continuance of present asset management practice and policy, others requiring specific steps to be taken, or new initiatives.

This 30 Year Infrastructure Strategy needs also to be considered in the context of other council documents and processes including Financial Strategy, Long Term Plan and Council's Asset Management Plans.

1.0 INTRODUCTION

This is Hawke's Bay Regional Council's first review of its Infrastructure Strategy document, originally established in 2015. It has been prepared from Council's 2017 suite of Asset Management Plans, Asset Databases and the 2018 – 2028 Long Term Plan of which it forms part.

The requirements for an infrastructure Strategy are described within the Local Government Act 2002 Amendment Bill Section 101B – *Infrastructure Strategy*, which states:

- (1) *A local authority must prepare and adopt, as part of its long term plan, an infrastructure strategy for a period of at least 30 consecutive financial years*

And

- (6) *In this section, **infrastructure assets** includes-*

- a. *existing or proposed assets to be used to provide services by or on behalf of the local authority in relation to the following groups of activities:*

iv) *flood protection and control works:*

- b. *any other assets that the local authority, in its discretion, wishes to include in the strategy."*

The purpose of the strategy is to determine significant infrastructure issues arising within the next 30 years in the Hawke Bay Region, describe options for managing them and identify the implications associated with applying those options.

This strategy recognises the current level of knowledge, complexity and challenges within the infrastructure environment. Issues associated with water quality and quantity, climate change, environmental degradation and natural hazards are all significant issues impacting infrastructure management decisions. Infrastructure plays an important part in a much wider integrated approach to catchment and regional management of issues, with other regional initiatives relating to afforestation, environmental improvements, land use change and regulation also forming a critical component to management of issues within the region.

When formulating these management options HBRC have taken the following into consideration;

- How best to manage renewal or replacement of assets over their intended lifespan
- How to respond to growth or decline in demand
- Planned increases or decrease in levels of service
- Safeguarding the community and improving the environment
- Address risk associated with natural hazards in terms of providing resilience and ensuring sufficient financial provision

This Strategy covers the following infrastructure assets;

- Flood Protection and River Management
- Pathways
- Regional Parks
- Coastal

There are a suite of documents that support and have relevance to this 30 Year Infrastructure Strategy* document, including;

- Asset Management Policy*;
- Scheme Asset Registers;
- Scheme Asset Management Plans*;
- Scheme Maintenance Contracts;
- Various Scheme Review reports, economic assessment reports and annual audits.

* These Asset Management documents are publicly available on the HBRC website (www.hbrc.govt.nz).

2.0 OUR REGION, INFRASTRUCTURE AND ASSETS

2.1 Our Region and Schemes

The Hawke's Bay region on the central east coast of the North Island has a total land area of 1.42 million hectares. It is bounded in the west by the Kaweka and Ruahine Ranges. The area comprises the local authority districts of Wairoa in the north, Hastings, Napier and Central Hawke's Bay, together with small areas of Rangitikei and Taupo districts.

The current Hawkes Bay population of 161,500 is expected to increase by 12,800 people (8%) during the life of this strategy. Population is predicted to increase in Napier City and Hastings District (9.7 and 12.5% respectively) and reduce in Wairoa (24%) and Central Hawke's Bay (4.2%). The recent increase in skilled immigration coupled with a number of initiatives within the region focussing on the freshwater, coastal management and marine ecology space, may increase these population growth forecasts.

Hawke's Bay contains 24 river catchments comprising 7 major rivers (the Wairoa, Mohaka, Esk, Tutaekuri, Ngaruroro, Tukituki and Waipawa) and numerous smaller rivers and streams. Between the mountain ranges and the coast lie flat river plains (Heretaunga, Ruataniwha and Wairoa) containing rich alluvial soils which provide the basis for the important Hawke's Bay rural economy and horticultural sector.

Historically, where frequent flooding or poor drainage have been an issue for local land owners, the Hawke's Bay Regional Council or its predecessor organisation, the Hawke's Bay Catchment Board, have worked with them to establish a flood control and/or drainage schemes. This then enabled the land owners to use their land with reduced risk of flooding and associated improvements to drainage, provided they have been willing to meet a significant portion of both the capital and ongoing maintenance and operating cost for the scheme. HBRC now administers 25 flood control and drainage schemes throughout the region shown in Figure 2-1 below. It is the assets associated with these Schemes that form the significant infrastructure managed by HBRC.

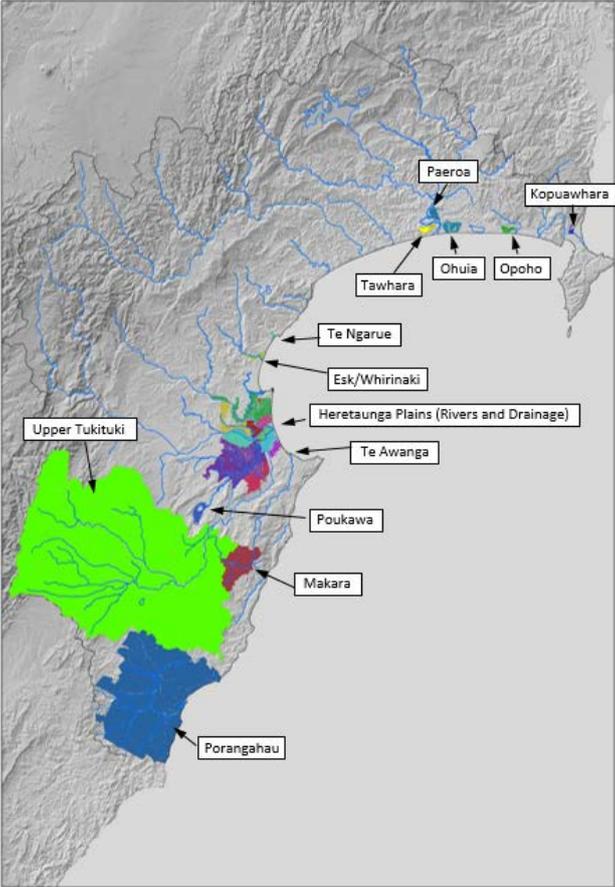


Figure 2-1: Our Regions Flood Protection schemes

The largest Scheme is the Heretaunga Plains Flood Control and Drainage Scheme which protects the cities of Napier and Hastings and highly productive lands in their vicinity.

The schemes have enabled areas benefiting from them to improve the productivity from the land, with resulting benefits to the economy and resilience of the region. To reflect this wider benefit HBRC sources the majority of funds to meet the ongoing operation, maintenance and improvement cost of the scheme from targeted rates levied on properties benefiting from the Schemes, and a minority portion from general funding sources on a calculated private/public good split basis. General funds are sourced from general rates levied on all properties across the region and from dividends and interest from HBRC investments. HBRC believes that the current level of funding for each of the Schemes is adequate to fund maintenance necessary to maintain Scheme assets such that they continue to deliver the level of service they were designed to provide, however ongoing Scheme reviews consider both the current levels of service and increasing demand for potential higher levels of protection, resulting from land intensification and climate change predictions. A review of any one of the Schemes could result in a proposal to increase the level of service and maintenance, and or improvement expenditure.

In recent years HBRC has acknowledged the significant potential for the corridors associated with rivers and streams as habitat and refuge for regional biodiversity, as well as being an integral part of the social and cultural fabric of the region. Significant work has been done to quantify those values and a number of projects are now funded through scheme funds to enhance those biodiversity, environmental, cultural, recreational and social values. Approx 95km of cycleways associated with HB Trails have been constructed on land and assets associated with HBRC infrastructure. These together with other recreational uses of river berm land provide significant opportunities for public health and wellbeing.

HBRC is also seeking to reduce, or where possible, eliminate any adverse environmental effects of activities associated with the operation or maintenance of the Schemes. Recent studies completed relative to this are The Environmental Code of Practice for River Control and Waterway Works (2017) and The Hawke's Bay Riverbed Gravel Management Plan (2017), adopted and approved by HBRC in mid 2017 and Ecological Management and Enhancement Plans developed and operational for the main river systems.

2.2 Critical Assets

A significant portion of HBRC infrastructure assets is associated with flood control and drainage schemes that have been established under the Soil Conservation and Rivers Control Act 1941 to provide benefit to defined areas within the region.

All Schemes have the primary purpose of reducing flood risk and/or the time taken to drain stormwater runoff from the land following a major rainstorm event. The Schemes also allow increased productivity from the land by utilising existing small streams along with a network of man-made drains, together with low level pumps which enable the natural near surface water table to be lowered to a manageable level.

The most significant of these Schemes services the Heretaunga Plains. The Heretaunga Plains Flood Control and Drainage Scheme includes significant stopbanking and river control works on the three major rivers (Tutaekuri, Ngaruroro, and Tukituki) crossing the Heretaunga Plains and a network of small streams, drains and pumping stations under 9 internal catchment drainage areas. The Heretaunga Plains Flood Control and Drainage Scheme is divided into 10 separate catchments for management and funding purposes. (Rivers and 9 separate drainage catchment areas).

The Upper Tukituki Flood Control Scheme is the second largest Scheme. This Scheme includes significant stopbanks and river control works on the Tukituki, Waipawa, and Tukipo Rivers and a number of their tributaries across the Ruataniwha and Takapau Plains.

The remaining Schemes cover small catchments with minor infrastructure, and are each considered small compared to the above Schemes.

The integrity of the Heretaunga Plains and Upper Tukituki flood Control Scheme assets are critical to the Hawke's Bay economy as they protect a large percentage of the urban Hawke's Bay population and significant areas of horticultural and agricultural infrastructure. Stopbanks and associated river control assets on the three major rivers crossing the Heretaunga Plains are considered critical assets.

Details of the infrastructure assets are tabled below.

	Asset description	Physical dimension/ number*	Replacement value	Average Annual operations and maintenance budget (2018-28)	Level of service summary
Heretaunga Plains Flood Control and Drainage Scheme	Stopbanks	157km	\$138,758,848	\$4,799,018	Currently the design Level of Service (LOS) (1%AEP capacity) is provided on the major rivers, however HBRC has committed to increasing the LOS to convey flood water with a 0.2% chance of occurrence in any one year. Current assessment is that the River control assets provide 100% effectiveness for 1% AEP capacity and is at no more than a low risk of failure. A Level of Service (LOS) review for the drainage network is underway and scheduled for completion in the next three years.
	River channels and edge protection	129km			
	Drainage channels	447km			
	Pumping stations	18			
	Structures and culverts	217			
Upper Tukituki Scheme	Stopbanks	76km	\$31,637,715	\$927,552	Currently the design LOS (1%AEP capacity) is provided over 95% of the stopbanked reaches. The remaining 5% of reaches remain with reduced free board (distance between design flood level and the top of the stopbank).
	River channels and edge protection	206km			
	Drainage channels	12km			
	Structures and culverts	44			
Small Schemes	Stopbanks	15km	\$14,476,397	\$805,948	Current Levels of Service are being achieved across most the smaller schemes. Levels of Service vary across the schemes, depending on their purpose. Estimated to be operating at 95% or higher after allowing for periodic flood damage.
	River channels and edge protection	31km			
	Drainage channels	85km			
	Pumping stations	4			
	Structures and culverts	37			
Total replacement value			\$184,872,960		

* as at October 2017

2.3 Current Asset Condition and Reliability

The current approach to determining scheme asset condition and reliability is detailed in each of the respective Asset Management Plans (Section 8.4 & 8.5 of HPFCS AMP, Section 7.3 & 7.4 of UTTFCS AMP). Assets are separated into component categories within the asset registers relative to their function and significance.

A condition matrix is applied to relevant scheme assets that provides a condition scoring, taking account of criteria such as asset conformance to design specifications, physical condition of the asset, level of establishment for tree plantings and plant quality, as examples.

Annual audits and inspections of components of the scheme are undertaken by a Professional Engineer with the production of an annual report, which is used to record overall asset condition and performance and also to advise any remedial work required as a result of the inspection process.

Critical assets have a current average condition rating score of 4 and 5 for stopbanks, where a score of 1 is very poor condition with defects to 5 which is an asset in excellent condition.

2.4 Other Assets

Pathways

HBRC manages approximately 105 km of pathways which have been constructed on land it owns or administers. The majority of the pathways form a portion of the NZ Great rides known as HB Trails, and are constructed along stopbanks and berm areas which are assets of the flood protection schemes.

While HB cycle trails are not significant infrastructure assets, the cost of constructing these has been met in part by the regional ratepayers and in part by central government through their NZ Cycle Trails initiative. The replacement value of the pathways is \$2,512,514. HBRC therefore has an ongoing obligation for the management and maintenance of these pathways in accordance with the agreement HBRC entered into with the then Ministry of Economic Development (22 Nov 2011) which states that

“Under this agreement HBRC is required to brand the Hawke's Bay Trail as forming part of the Nga Haerenga, New Zealand Cycle Trail, and has agreed to comply with such reasonable conditions as required by the Ministry, including that the Hawke's Bay Trail be managed and maintained in a manner that is consistent with the objectives of Nga Haerenga, New Zealand Cycle Trail.”

Regional Parks

HBRC also manages and administers a Regional Park network including:

- Pakowhai Regional Park
- Pekapeka Regional Park
- Waitangi Regional Park
- Tutira Regional Park
- Waipatiki Reserve and contribute towards the management of Te Mata Park.

Prior to 2014, the narrower term Wetlands was used to describe what are now known as Regional Parks. Within these parks are various recreational facilities, pathways, observation points etc.

It is acknowledged that the pathways and these parks are important community assets. HBRC has made financial provision in its long term plan for ongoing management and maintenance of these assets, and for their development and improvement. The replacement value of the regional parks assets is \$2,186,663 (exclusive of land value).

Coastal Assets

HBRC currently has a small number of coastal assets it has constructed and maintains, and at present funding for these assets is covered by financial provisions within the flood protection schemes. HBRC began a coastal hazards strategy in 2016 with community representatives and is currently progressing the detail and outcomes of the strategy through 2017 with the intention for any proposed works to be considered in the 2018 – 2028 LTP. Further direction for the Coastal Project is dependant on the outcome of the LTP process and any special consultative processes that may be required with the community and other Territorial Local Authorities.

The current strategy work, identified as the Clifton to Tangoio Coastal Hazards Strategy 2120, includes the Hawke's Bay Regional Council, Napier City Council and Hastings District Council as partner contributing councils. While this area is the focus of the project at this time the project needs to ensure coastal issues are considered in a regional context and have flexibility to incorporate future potential coastal issues within the timeline of the 30 year strategy. This will enable areas within Wairoa District Council and Central Hawke's Bay District Council to be considered as and when issues arise.

Due to the potential significant size, complexity and scale of the Coastal Hazards Strategy, likely covering all Council areas within the Hawke's Bay region, it will be structured into its own project structure for funding, delivery and management, with any assets separately identified.

3.0 STRATEGIC ISSUES, TRENDS AND RELATED IMPACTS

The task of building, operating and maintaining these infrastructure assets in an affordable manner is becoming increasingly challenging. This section highlights the projected changes in demographics, economy, policy, cultural trends and geography that have the potential to impact our management approach in future. Being aware of the potential for change, will allow us to adapt our approach accordingly.

The following key strategic issues have been identified;

- Demographic Changes
- Economic Trends
- Natural Hazards
- Legislation and Guidance
- Changes in Community Values
- Iwi Representation

3.1 Demographic Changes

The table and graph below show predicted population changes in the Hawke’s Bay region and each of the districts that make up the region. The analysis set out below is based on recent updates to the projections first compiled in 2013, following the national census. These latest figures take into account the recent influx of skilled migration to our region, a trait which is echoed on a national basis.

The Statistics NZ most optimistic or ‘High’ population growth figure for HB in Year 2043 is 195,900 compared to the Medium or Status Quo figure of 170,710. The Upper Tukituki Scheme is likely to remain unaffected by any changes in the local population in Central Hawkes Bay, so this position needs to be considered when the Levels of Service review of the current 1% design standard are carried out.

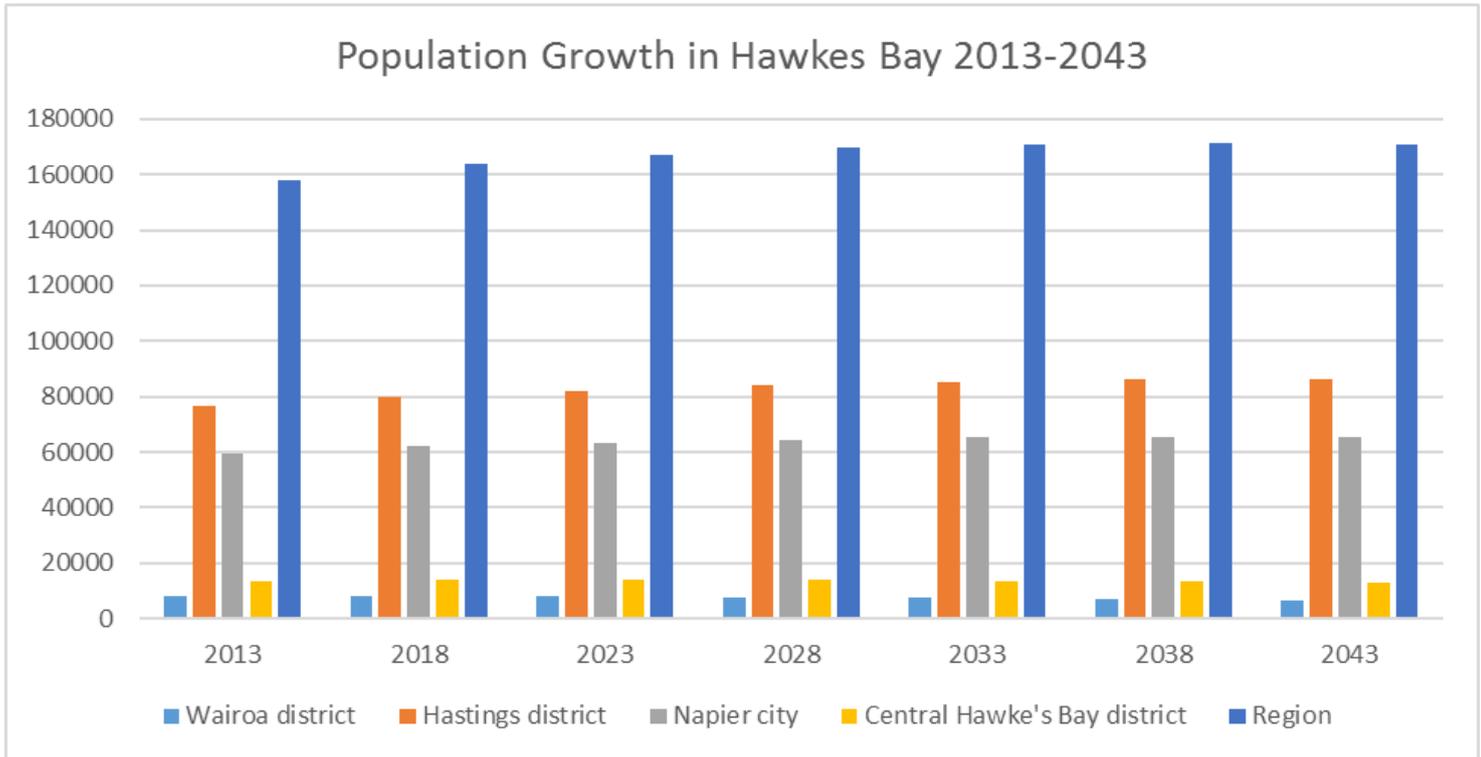
The potential for population growth on the Heretaunga Plains will be taken into account in the levels of service reviews for the individual drainage catchment areas programmed to be undertaken over the coming years.

HBRC manages a number of Schemes in the Wairoa area. It is essential that the Schemes remain affordable to their benefiting community. As the majority of the Schemes service rural areas, this means that farming operations must be able to remain profitable and the cost of maintaining Schemes continues to be exceeded by the value of the benefit provided.

While little population growth is expected to occur within Hawke’s Bay, the average number of people occupying each house is reducing and is expected to continue to reduce. Drainage catchment areas servicing urban and peri-urban areas need to accommodate this trend. This will be considered in the programmed reviews of these areas.

Year	Wairoa District	Napier City	Hastings District	CHB District	Hawkes Bay
2013	8300	59600	76700	13250	157850
2018	8140	62100	80000	13850	164090
2023	7890	63400	82100	13900	167290
2028	7610	64400	83900	13800	169710
2033	7250	65100	85200	13550	171100
2038	6810	65300	86000	13150	171260
2043	6310	65400	86300	12700	170710

Note: Statistics NZ records for forecast population figures only extend to 2043 from the 2013 census. The 2018 census will further extend this range.



3.2 Iwi Representation

Iwi relationships form a significant component of Councils responsibilities and obligations. Cultural significance and awareness are paramount to achieving Councils objectives and policies, with particular relevance to managing water, protecting the land, environmental enhancement and ensuring protection for future generations.

Treaty of Waitangi settlements will facilitate increased kaitiakitanga over the rivers and their environs by Maori and therefore increase HBRC's involvement with Maori. Cultural values impacted by activities associated with the ongoing operation, maintenance and improvement of flood control and drainage Schemes and their environment will be of greater importance. As financial settlements and redress occur in Hawkes Bay Iwi will be more empowered and better positioned to provide shared input into scheme management.

HBRC has a Joint Planning Committee with both elected and Tangata Whenua representatives involved in environmental decision making.

3.3 Economic Trends and Affordability

The most recent figures indicate Hawkes Bay's regional GDP had an annual growth of 2.8% and it continues to grow above the national average of 2%. This is driven by a combination of factors, though most relevant to this strategy are transport, manufacture and agriculture.

Our assets are fundamental to the continuing economic prosperity of our region. In particular, the Heretaunga Plains Flood Control Scheme (HPFCS) is the economic 'engine room' of the Hawke's Bay region, accounting for approximately 85% of the regional economy across different indicators. The catchment comprises the majority part of the Hawke's Bay primary production/processing and related servicing base. It is an important component of the national fruit and horticultural sector in particular and forms the main part of the Napier-Hastings urban area which is itself the fifth largest urban centre in New Zealand.

The HPFCS currently protects a very significant level of residential and business assets, investment and community infrastructure. Further significant demographic, economic, rural production and other industry growth is forecast for the catchment area over the longer-term.

The economic impact losses of three major flooding stop bank breach scenarios were modelled as part of an economic study which will feed into the Level of Service Reviews. These were breaches at Roys Hill on the Ngaruroro River, Taradale and Moteo on the Tutaekuri River within the Heretaunga Plains. The associated direct industry production losses for these areas were \$468.3 million, \$356.2 million and \$24.4 million respectively. Regional economic impact modelling of these figures indicated resulting total Hawke's Bay-wide GDP/Value Added economic impact losses, including direct and flow-on backward and forward linkage multiplier impacts, of \$526.0 million, \$317.2 million and \$31.7 million respectively. The Net Present Value/discounted annualised value of these impacts over a 100-year (return flood event) timeframe is the Roys Hill breach \$39.5 million, Taradale breach \$23.8 million and Moteo \$2.4 million.

These figures highlight the critical part our flood protection assets play for our economy.

3.4 Natural Hazards

Hawkes Bay experiences a number of natural hazards which have the potential to impact our critical assets. These include;

- Flooding
- Earthquakes
- Tsunami
- Landslides
- Coastal Erosion and Inundation

Severe weather events drive a large number of these hazards and therefore understanding these hazards, both now and in the future as a result of climate change is vital to managing risk. The levels of service review currently underway will identify the risk posed to flood protection assets on our rivers within the HPFCS relative to climate change guidelines published by the Ministry for the Environment.

Floods and the potential impacts these can have under current conditions is well understood by HBRC. Flood Forecasting and the potential for overtopping of stopbanks can be assessed quickly and our models are tied into our monitoring networks which provide real time data to validate our forecasting models.

Regular risk and condition assessments of our assets also ensure any potential risk of stopbank failure is understood and maintenance works are performed in a timely manner.

Coastal Communities around New Zealand, and the world, are becoming increasingly aware of coastal hazards, such as coastal inundation (flooding by the sea), coastal erosion and tsunamis.

In Hawke's Bay we have faced these hazards in the past and understand some of the concerns. We can use this knowledge to look ahead to ensure we are prepared to deal with the challenges of coastal hazards in the future, creating more resilient communities. All work being considered in the coastal space will be aligned with the New Zealand Coastal Policy Statement and the need to consider 100 year time horizons.

Coastal Erosion maps have been compiled and can be accessed online at the HB Coast website. Layers of probability (likely, possible, very unlikely and highly unlikely) that coastal erosion will affect land in the present day, at 2065 and at 2120.

Similarly, the extent of coastal inundation (flooding by sea water) possible in a 1% storm event (i.e. there is 1% chance of a storm of that magnitude happening every year) in the present day, at 2065 and at 2120 has been mapped and is available on the HB Coast website.

The impacts of Tsunami, including maps identifying evacuation zones are also available and HBRC have developed methods to forecast wave heights relative to different magnitude earthquakes occurring from both local and distant source. These forecasts, together with those provided by GNS are used by CDEM to manage disaster risk in our region.

3.5 Climate Change Context

The Hawkes Bay Regional Council Strategic Plan recognises that provision needs to be made for the effects of climate change in natural hazard risk assessment. It promotes strategic planning for future coastal erosion and sea level rise with our Territorial Local Authority partners. Work currently being undertaken in the Clifton to Tangoio Coastal Hazards Strategy 2120 is considering a range of soft and hard engineering solutions for the short to medium term, up to 50 years and possible options of managed retreat or retreat the line options for the long term, 100 years. This adaptive approach is being used in an attempt to ensure any response options being considered provide the maximum amount of flexibility and adaptability to climate change impacts and the significant variability of current predictions. The community are playing a significant part in developments in this area.

3.6 Legislation and Guidance

Legislation, regulations, new policy and our Regional Resource Management Plan (RRMP) are significant part of HBRC's investment programme. Key regulation include;

- Local Government Act (2002)
- Resource Management Act (1991)
- Soil Conservation and Rivers Control Act (1941)
- National Statement for Freshwater Policy (2014)
- New Zealand Coastal Policy Statement (2010)
- Hawkes Bay RRMP
- Health and Safety at Work Act (2015)

The way land and water resources are managed in the greater Heretaunga and Ahuriri area is under review. The area encompasses the Tutaekuri, Ahuriri, Ngaruroro and Karamu catchments ('TANK'), plus the Heretaunga Plains aquifer system. The focus is on water quality, quantity, flows and allocations in the four catchments, including for wetlands and estuaries.

The whole community across the plains has a stake in the outcome of the TANK project and there are a number of opportunities for people to have a say in this process – both informally and formally.

This catchment-wide approach to managing water and land will lead to Regional Resource Management Plan (RRMP) changes that may impact scheme levels of service obligations. Subject to the impact of any changes, HBRC will need to consider how this is accommodated and managed within the schemes.

3.7 Changes in Community values

The flood control and drainage schemes administered by Council were designed at various times over the past 50+ years and reflect the knowledge and understanding of that time. These schemes have modified the natural environment to varying degrees relevant to practices of the time, eg; drainage, tree clearing, watercourse modifications. The community values and climate impacts with respect to the natural environment have changed and continue to change at a significant rate. Legislation such as the Resource Management Act 1991, that requires that any adverse effects of future modifications to the natural environment are avoided or mitigated are pivotal elements of law driving parts of this change. More recent impacts, such as climate change and the prediction of more extreme weather events is influencing community thinking and direction as these experiences are felt in Hawkes Bay.

Public increasingly seek multiple values in addition to the original single purpose of flood protection or drainage at the time many of the Schemes were established. There are significant opportunities within scheme areas, particularly where they include river and stream corridors, for these to be enhanced for aquatic and terrestrial biodiversity, and for public recreation.

The flood control Schemes have substantially reduced the incidence of major flooding in Hawke's Bay. As a result many of the Hawke's Bay public and businesses have little or no knowledge of the potential impact of a major flood on them and are not well prepared for the consequences should a significant flood occur.

The National Policy for Fresh water increases the focus on water quality in the region's rivers. HBRC leases for grazing the major flood channels of the Heretaunga Plains Flood Control and Drainage

Scheme and has established fencing where necessary to prevent cattle entering water. Grazing is a cost effective way of maintaining a short dense grass sward over the berm areas and stopbanks to reduce the risk of localised scour in a flood event and to minimise fire risk. However there is now an increasing expectation that stock will be excluded from the vicinity of waterways. The presence of fences (especially electric) on the river berms is resented by a portion of the community. In the long term there is likely to be an expectation that significant areas of Scheme land currently grazed are managed through other approaches. This will result in increased costs as alternative means of maintaining appropriate vegetative cover on these areas will need to be found.

These issues form part of a current programme of work for HBRC to consider the whole river berm use for the schemes as part of this LTP round.

Hawke's Bay rivers, particularly the Ngaruroro, Tukituki and Waipawa are noted as important braided rivers that provide essential habitat for many endangered bird species and fish including gamefish. As such, braided rivers are popular with anglers. It is important that the braided nature of the rivers is allowed to form and not be choked up with unwanted trees such as willow and lupin. Future river management will most likely require extending the flood protection scheme upstream boundary together with additional funding to allow for the ongoing removal of unwanted tree species from the braided river bed. It is essential that the gravel be transported through the river system to the lower reaches and coast to maintain both channel capacity and the braided channels.

Community consultation and awareness is dealt with in a number of ways, dependent on the size of the scheme and scale and significance of the issue at hand. Scheme ratepayers are able to engage in the wider consultation process as part of the development of Long Term Plans and Annual Plans processes, which typically deal with any new initiatives, review of scheme maintenance costs, inflation considerations and any minor adjustments proposed for the schemes.

Issues of a more substantial nature, such as major level of service reviews, or significant capital works are dealt with through targeted meetings such as Liaison Committees where they are established for the scheme or in focussed ratepayer meetings in the area where the issue has relevance, such as specific drainage areas in the Heretaunga Plains drainage catchments. Consenting processes, where they are required for substantial assets, provided another forum for public and ratepayer input and influence. All members of the public have direct access to Council and scheme managers via websites or direct contact.

4.0 SIGNIFICANT INFRASTRUCTURE ISSUES

There are a number of significant infrastructure issues that are expected to be addressed over the life of this Strategy. These have been identified in the Scheme asset management plans. These issues will be managed and where possible mitigated as part of scheme levels of service reviews.

A level of service review will include a wide range of actions, such as consideration of;

- National and international advice on climate change predictions;
- Experience and learnings from other schemes nationally;
- Community expectations for appropriate levels of flood protection;
- Community expectations of environmental and ecological standards;
- Appropriate social and cultural involvement and commitment within scheme reviews;
- Affordability and willingness to pay.

There are a number of options available to achieve improved levels of service, particularly where climate change predictions provide adequate lead time, in some cases decades. This allows time to undertake a rigorous level of service review and consider longer timeframes for rating implications, intergenerational funding opportunities and loan funding. For shorter timeframes issues such as reprioritising and greater innovation around methods and techniques will be required.

The requirement for informing and educating scheme ratepayers to possible impacts and threats to schemes and scheme assets is a challenging area. Recent experiences within New Zealand, such as the Canterbury and Kaikoura earthquakes and Edgecumbe floods reinforce the changing climate and provide a level of tangible evidence and proof that levels of services and past approaches to management need to adapt and be flexible to a changing environment. This is particularly relevant to Hawkes Bay.

There is a clearer and greater level of certainty around future impacts on schemes meaning there are a greater number of challenging issues for Schemes, Scheme Managers, Councils and ratepayers to confront, with doing nothing becoming less of an acceptable option. With early intervention and commitment of Councils and Scheme Managers to addressing and educating scheme ratepayers on predictions and possible alternative solutions, a number of the challenging issues confronting schemes can be planned, programmed and implemented in an affordable manner.

Refer to Section 5.4 for more specific review detail.

A brief explanation of the most significant of these and options for addressing these are set out below.

Significant Infrastructure Issue	Description	Principal Management Options	Implications of Management Options
Climate change	Prediction is for Hawke's Bay to be drier but with the potential for increased storminess. Severe storms are predicted to bring more intense rainfall which will result in increased flood flows. Sea level rise will also affect assets in the vicinity of the coast.	Provision for the impacts of climate change on flood flows and sea level rise will be considered when the levels of service provided by schemes are reviewed. The impacts of increased drought risk on environmental and river control plantings will be considered as an operational matter.	The potential impacts of climate change are being considered as part of proposed levels of service reviews. Public consultation will be part of these reviews. If preferred option(s) are for retention of existing levels of service, or increased level of service, a capital works programme to increase current capacity

Significant Infrastructure Issue	Description	Principal Management Options	Implications of Management Options
		<p>The implications on maintaining the status quo will be increasing exposure of the schemes to more extreme rainfall and flood events and more challenging growing conditions due to extended drier summer conditions.</p>	<p>of Schemes is expected to be required.</p> <p>Issues such as greater freeboard allowances for stopbanks, greater capacity within stopbanks and more resilient plant species will be considered as part of scheme reviews.</p> <p>Doing nothing will see a steady decline in levels of service or a more intensive response required for flood events and damage caused by more extreme events, as climate change predictions take effect.</p>

Significant Infrastructure Issue	Description	Principal Management Options	Implications of Management Options
Levels of Service reviews	<p>Land use change and climate change are predicted to result in increased runoff from the land into the waterways</p> <p>The service currently provided by the Schemes to the Hawke's Bay public includes</p> <ul style="list-style-type: none"> • The conveyance of flood water in the major rivers safely to the sea up to a flow with a 1% chance of occurrence in any one year. • The drainage of flood water from the Heretaunga Plains without significant ponding for rain storm events that have a 20% chance of occurrence in any one year. • A reduction in the frequency of flooding in areas serviced by smaller schemes managed by HBRC to levels defined in their asset management plans. <p>Over the next 15 – 20 years HBRC has committed (through its 2012/22 LTP) to increasing the level of protection provided by the Heretaunga Plains Scheme – Rivers infrastructure to convey flood water with a 0.2% chance of occurrence in any one year.</p>	<p>There are a number of options for improvement to current levels of service. These are being explored through the level of service review process which will include consultation with benefiting communities and/or land owners.</p> <p>Improvements over time in environmental, cultural, aesthetic values of the environs of waterways under schemes on public land as measured by the Stream Environmental Valuation (SEV) methodology.</p>	<p>If the current levels of service are to be maintained or improved, improvements are required to the Scheme infrastructure. If no work is undertaken then the level of service will decline over time.</p> <p>Generally enhanced riverine environment, biodiversity and recreational opportunities are expected to be required in addition to an increased level of protection against flood risk.</p>

Significant Infrastructure Issue	Description	Principal Management Options	Implications of Management Options
Land Use Change	<p>There are a number of potential changes to land use that can impact on the amount of water running off the land and into waterways during heavy rainfall events. Climate change is predicted to result in increased storminess and increased severity of rainfall events. A 5% increase in peak rainfall falling in an event with a 1% chance of occurrence in any one year, may result in an increase peak flow in a waterway of up to 25%. Improvements to urban stormwater systems, increased building and/or urban expansion, changes in crops grown on the land – particularly forestry, can all result in changes to the speed and quantity of runoff from the land.</p>	<p>Reviews of all of the Schemes will be undertaken over time. This process will take at least 10 years, however reviews of some of the larger schemes are programmed to be undertaken within the next 5 years.</p>	<p>The potential for increased runoff through land use change associated with urban areas may be managed to some extent through regulation in Regional and District Plans. The impacts on runoff through land use change in rural areas will be considered as part of the Scheme reviews and appropriate provision made in improvement options that flow from the reviews.</p>
Flood channel capacity management	<p>Significant quantities of sediment are carried by the major rivers. While soil conservation initiatives may reduce the amount of sediment finding its way into rivers over time, New Zealand's geology is young in geological terms and erosion will continue to occur in heavy rain events for many centuries even with the best soil conservation efforts in place. The flood carrying capacity of waterways will be compromised by aggradation of sediment unless appropriate measures are put in place to manage that risk.</p>	<p>A range of river management practices are in place to manage this risk. These include river bed beach raking and commercial silt and gravel extraction.</p> <p>Tree (eg unwanted willows and lupin) removal from the braided riverbed within and outside the current scheme areas.</p> <p>A significant gravel management review programme (7 years) was completed in 2017 and provides the basis for managing gravel riverbeds.</p>	<p>The gravel management review process has enabled the establishment of a management regime that will ensure a sustainable and resilient gravel (& sediment) management process.</p> <p>River management will need to extend outside the current scheme areas to protect the braided rivers, and encourage transport of sediment through the system.</p> <p>The implications of this can largely be managed within existing budgets and programmes as the physical efforts will be redirected from the areas within the schemes, where flood capacity is at manageable levels, to peripheral areas that would benefit the schemes</p>

Significant Infrastructure Issue	Description	Principal Management Options	Implications of Management Options
			from more intensive management.
Environmental and Ecological Management & Enhancement	<p>The majority of the schemes were developed and constructed in an era when economic growth and development were the primary focus of the time. Drainage, flood protection and land clearance enabled farm land and agricultural initiatives to develop and prosper and generate the wealth needed to support the schemes. Some of this development has occurred at the expense of the natural environment with significant impacts on wetlands and rivers and the surrounding habitat. Initiatives are now included in appropriate areas of the schemes to reinstate, enhance or offset environmental and ecological opportunities.</p>	<p>There are a wide range of management options available for environmental enhancement. These include riparian retirement and planting, removing stock from waterways and berm areas and fencing, modifying water courses to more natural forms, improving water quality by shading, community and Iwi engagement in improvement initiatives. A number of these initiatives are included in sections of a number of the schemes.</p>	<p>Inclusion of a wide range of environmental enhancement initiatives within scheme budgets will ensure long term improvements to water quality, development of more natural channel forms and native planting resulting in habitat enhancements.</p> <p>The financial commitment involved in achieving better ecological outcomes is modest alongside scheme maintenance budgets and typically involves refocusing existing budgets to alternative species planting and lessening intensive maintenance activities such as weedboating once shading efforts take effect.</p> <p>Ratepayer and community involvement can offset the cost of these initiatives.</p> <p>Doing nothing is not considered an acceptable option due to the high expectation of scheme ratepayers for the schemes to deal with water quality and ecological issues, particularly in proximity to urban areas.</p> <p>This initiative is also consistent with Councils refocussed commitment to improving environmental and ecological outcomes.</p>
Coastal Asset Management	<p>Our coast is eroding and in particular the coastal communities from Clifton to Tangoio are at most</p>	<p>The Clifton to Tangoio 2120 Strategy is being developed to understand coastal hazards risks and</p>	<p>If the results of the multi-criteria analysis being undertaken as part of the strategy indicate</p>

Significant Infrastructure Issue	Description	Principal Management Options	Implications of Management Options
	<p>significant risk. With sea level rise, the northern and southern coastal settlements will face increasing risk of erosion and inundation.</p>	<p>the management options for this key part of the Hawke's Bay coastline. It has begun with the priority areas between Clifton and Tangoio, but will move to focus on other coastal areas in the future.</p> <p>To date the Strategy has identified the areas that will be affected by various coastal hazards over the next 100 years to 2120 and the risks to public and private property, cultural sites and areas, recreational use and infrastructure services. A multi-criteria analysis has been carried out with a pathways approach determined by the community representatives to best deal with the future hazards.</p>	<p>intervention is needed in terms of hard engineering solutions for safeguarding our coastline, then major construction works would commence in the lifetime of this strategy.</p> <p>The next phase of the project will determine the cost of the various options, timing and funding options between the partner Councils. This is likely to be determined through a special consultative process, with costs in the order of \$150 – 200m for the 100 year life of the strategy.</p> <p>The cost of doing nothing is estimated to run into 100's of millions of dollars.</p>

5.0 MANAGEMENT APPROACH

Our management approach takes into consideration the entirety of an assets lifecycle, from build, through to operation and maintenance and finally renewals. We tailor our asset management to fit the needs of our community and local businesses, providing infrastructure to an agreed level of service with the associated risks being well understood and more importantly well communicated.

The four key areas are the focus for decision making around key infrastructure investment;

- Maintenance of existing assets (operation and maintenance)
- Improvements to existing assets (levels of service)
- Replacement of existing assets (renewals)
- Providing new assets to allow for community growth (capital works)

5.1 Maintenance Approach

An annual maintenance programme for all infrastructure assets is prepared prior to the commencement of each financial year. Maintenance work is largely undertaken by HBRC's own internal contractor (HBRC Works Group) under an annual negotiated maintenance contract.

The annual programme of maintenance is designed to ensure that the infrastructure assets continue to be maintained in accordance with the Scheme asset management plans such that the Scheme continues to deliver its designed level of service.

Inspections of sections of representative assets are undertaken as part of the annual programme of works, with all assets inspected over a 5 yearly interval. The annual audit of the Schemes is undertaken by a Registered Engineer with experience in river and drainage control works and reported to Council.

Cost effective delivery of services

In terms of section 10 (Purpose of local government) there is a clear requirement to meet the current and future needs of communities for good-quality local infrastructure, local public services, in a way that is most cost-effective for households and businesses.

(2) In this Act, good-quality, in relation to local infrastructure, local public services, and performance of regulatory functions, means infrastructure, services, and performance that are—

(a) efficient; and

(b) effective; and

(c) appropriate to present and anticipated future circumstances

The HBRC Works Group operates a fleet of specialist plant and equipment that is specifically designed to deliver the maintenance contracts efficiently and effectively. In addition the Group undertakes other less-specialist work utilising local contractors. The Works Group also tenders for work within their area of expertise from other organisations allowing them to test their competitiveness in the open market.

Any surpluses made by the Works Group on these maintenance contracts are returned to the respective Scheme at the end of each financial year.

The maintenance activities are defined for each of the respective schemes, with the majority of the activities defined and established over a considerable period of time. Issues such as seasonal influences, effectiveness of the maintenance regime and consideration of new techniques and technologies are considered by Scheme Managers on a regular basis, with programmes modified as necessary. A typical example of the scheme maintenance regime is tabled below.

Heretaunga Plains and Upper Tukituki Scheme Maintenance Plan Table

Asset Group	Maintenance Regime	
	Activity	Frequency
Stopbanks	Mowing	2-6 times/year
	Spraying	20km/year (as required)
	Fertiliser	20km/year
	Misc. repairs	As required
	Inspections	Rotating monthly
Berms and Buffers	Spraying	Annually
	Lopping	As required
	Mowing	2-6 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 50 years)
Groynes	Inspections	After significant flood events

Annual contractual maintenance expenditure is in the order of;

- HPFCS – Rivers \$875,000
- HPFCS – Drainage \$1.33m
- UTFCS – Rivers \$625,000
- Small Schemes (Total) \$670,000

Figure 5-1 below sets out the predicted ongoing maintenance costs. Section 7.0 of this Strategy sets out the assumptions under which these estimates have been developed.

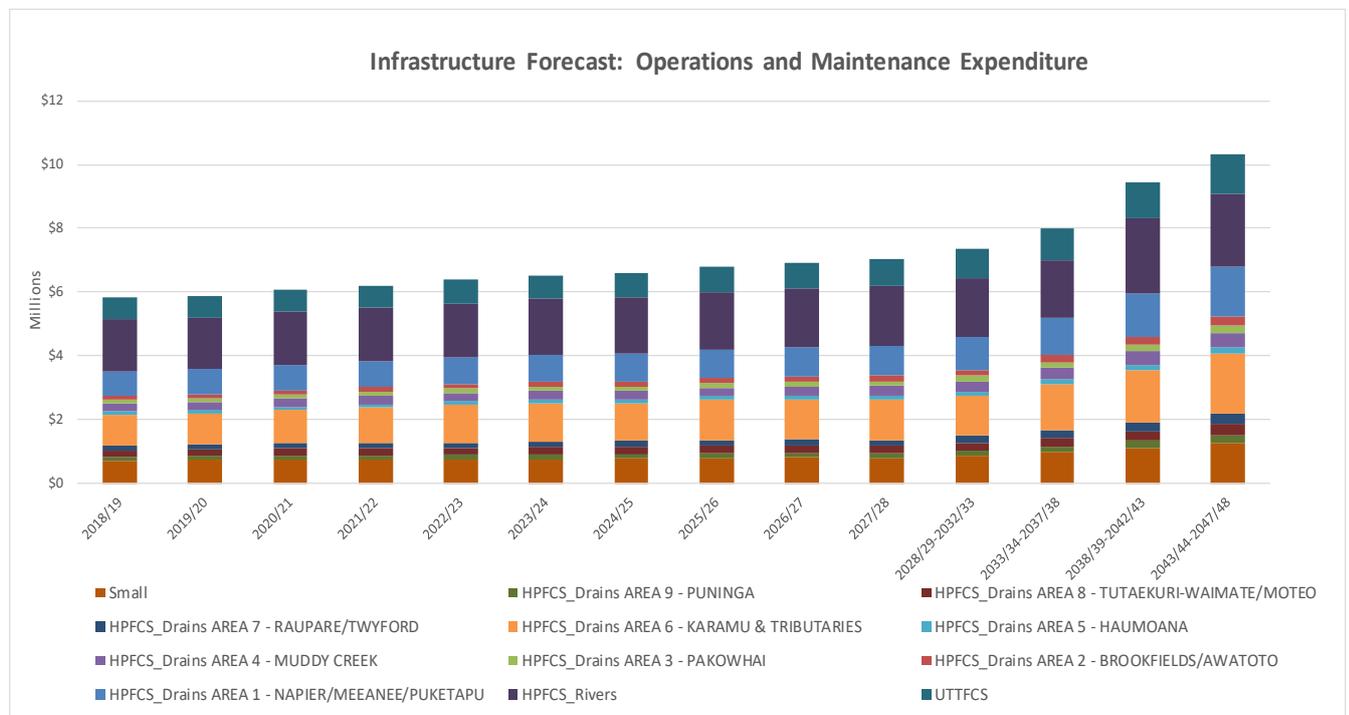


Figure 5-1: Projected Operational Expenditure – Infrastructure Assets

5.2 Scheme funding

A separate operating account is held for each specific scheme. All Scheme funds (targeted rates, general funding allocated to the Scheme, other Scheme income and interest on accumulated funds) are credited to the operating account. Scheme costs (operating, maintenance, and improvement costs, rate collection costs, depreciation, and interest on Scheme deficits) are debited from the account. Any balance remaining in the account (credit or debit) is carried forward from one financial year to the next as a reserve balance.

The major beneficiaries of the Schemes are the owners of land within the scheme areas that are able to use their land more productively. These beneficiaries pay the majority of the cost of operating and improving each scheme through a rating classification approach using targeted rates. However HBRC recognises that there are wider benefits to the region from land being used more productively, continued access to major urban areas and critical infrastructure and accordingly a portion of the Scheme costs are funded from HBRC's general funding sources, i.e. general rates and interest and dividends from HBRC investments.

The table below sets out the funding sources for each Scheme.

Economic assessments of the wider benefit to the Hawke's Bay Region have assisted HBRC in establishing the proportion of direct benefit vs region wide benefit for the major schemes.

This work showed that the Heretaunga Plains Flood Control and Drainage Scheme – Rivers provided an environment within which significantly increased economic activity was able to occur across the whole region resulting in increased population and facilities to support that population. Accordingly 30% of the cost of the Scheme is met by HBRC general funding.

The Schemes covering the individual catchment areas on the Heretaunga Plains have resulted in improved productivity from the land which is assessed as justifying 10% of the cost of those Schemes being met from general funding sources.

Similarly the Upper Tukituki Scheme provides approximately half the benefit attributable to the Heretaunga Plains Flood Control and Drainage Scheme – Rivers to the whole region, but the cost of maintaining this Scheme is exacerbated by gravel flowing from the Ruahine Ranges. This is deemed to warrant an additional 2.5% of general funding input.

The principles used for the small schemes are as follows.

- Schemes that provide protection to a State Highway receive 12.5% general funding contribution
- Schemes that provide protection to local roading networks receive 10% general funding contribution
- Other Schemes receive 5% general funding contribution.

Scheme	Targeted rate portion (Private)	General funding portion (Public)
Heretaunga Plains Flood Control and Drainage Scheme <ul style="list-style-type: none"> Rivers 	70%	30%
Drainage catchment Schemes <ul style="list-style-type: none"> Napier/ Meeanee Awatoto/ Brookfields Pakowhai Muddy Creek Haumoana Karamu and tributaries Raupare/ Twyford Tutaekuri -Waimate Puninga 	90%	10%
Upper Tukituki Scheme	82.5%	17.5%
Small Schemes <ul style="list-style-type: none"> Upper Makara Paeroa Porangahau Poukawa Ohuia – Whakaki Esk Whirinaki Te Awanga Te Ngarue Kopuawhara Kairakau Opoho Wairoa Rivers and Streams Central and Southern Area Rivers & Streams 	90%	10%
	87.5%	12.5%
	90%	10%
	95%	5%
	95%	5%
	87.5%	12.5%
	87.5%	12.5%
	90%	10%
	90%	10%
	90%	10%
	90%	10%
	90%	10%
	87.5%	12.5%
	87.5%	12.5%

The Hawkes Bay Regional Council established public/private good benefit allocations for the various schemes many years ago. A variety of rationale was used to initially establish the splits such as economic performance, population areas and access to urban areas and State highways and roading networks. These have generally been reviewed as part of LTP deliberations or as part of significant scheme reviews, such as Level of Service reviews. The most recent review was completed by Sean Bevin of Economic Solutions Ltd in October 2010.

Information from that review indicated that private benefit proportions for other New Zealand schemes similar to those in Hawkes Bay ranged from 50 – 100%, with an average benefit proportion of around 80%. While every scheme has their own peculiarities and nuances the report concluded that the approach of using capital valuation for the rating basis, along with specific rationale applied to each respective scheme to develop the above public/private good rating splits was a reasonable balance of all these parameters within the Hawkes Bay Schemes.

5.3 Renewal approach

The effective life of each asset (and in some cases components of an asset) have been identified, assessed and recorded as part of the HBRC Infrastructure Asset Database. Some examples are set out in the table below

Asset type	Expected effective life
Stopbanks, live trees for river control and drainage channels	Maintained in perpetuity. Do not deteriorate over time if they are adequately maintained and therefore have infinite expected life.
Pump station buildings, Concrete structures and culverts	Depreciated up to 70 years
Pump station electrics	Depreciated from 25 to 30 years
Exposed steelwork e.g. weed screens on pump stations	Depreciated from 5 to 30 years depending on environmental conditions.

Depreciation is charged to each Scheme based on the assets deterioration on a straight line basis over the estimated asset life. No depreciation is charged on assets that have an infinite life, e.g. stopbanks, on the assumption they are maintained in perpetuity. An asset replacement reserve is held for each scheme to which the annual depreciation charge and any interest accruing to the reserve is credited, and the cost of asset replacements is debited. A ceiling is set for funds in each asset replacement reserve at a level sufficient to fund future anticipated replacements. Any depreciation charges and interest in excess of the ceiling are credited to the Schemes operating account.

The condition of any asset is assessed prior to a decision being made to replace it. Where the assessment determines the asset has a further residual life the replacement date of an asset is extended and documented in the database. Prior to replacing any asset a review is undertaken to determine whether or not there is justification to change the level of service provided by that asset, and particularly for significant assets to consider a range of alternatives to determine the most cost effective approach to its replacement. This is particularly relevant where the depreciated asset forms part of a wider asset component configuration, such as pump station electrics.

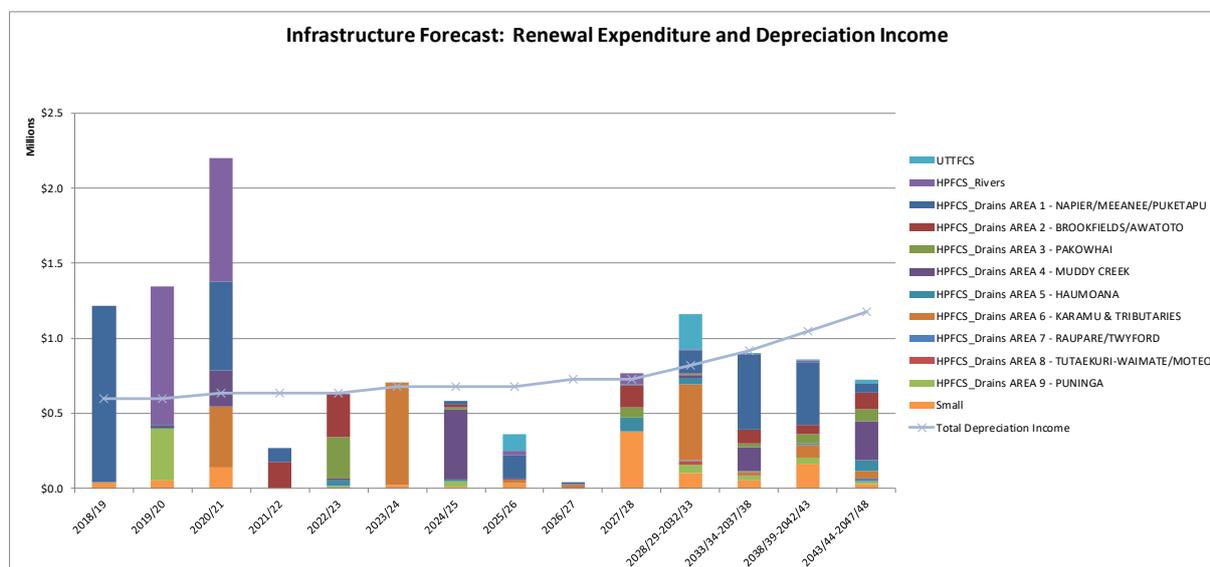


Figure 5-2: Projected Renewal Expenditure - Infrastructure Assets

The spike in renewal expenditure schedule at 2020/2021 is the result of a large number of items such as culverts which have been given a nominal life of 50 years, and are programmed for replacement. This spike results from the fact that a large portion of the scheme was constructed during 1960/70's and

are therefore a coincident number of assets are nearing the end of their useful lives. The condition of these assets will be reassessed over the next 3 to 6 years, and where appropriate, programmed replacement dates will be revised. Any amendment or revision of renewals dates based on condition assessment reviews will also be reflected in subsequent funding and budget reviews.

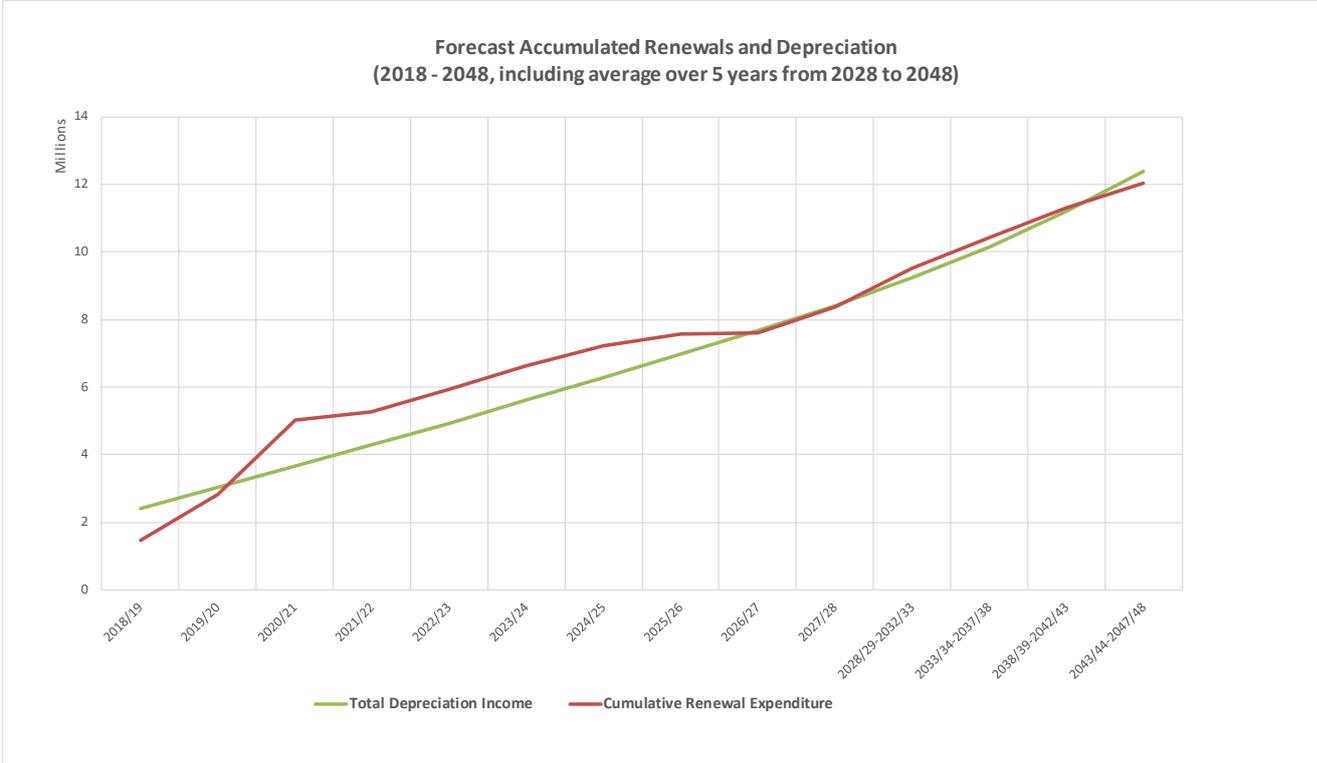


Figure 5-3: Projected Cumulative Renewal and Depreciation Income/Expenditure- Infrastructure Assets

5.4 Projected Capital Works covering enhancements and increased level of service

Capital or improvement works are undertaken on some Schemes in accordance with direction determined within the asset management plans. However the majority of capital works will be undertaken to improve the level of service provided. In its 2015-25 Long Term Plan, HBRC consulted on a proposal to increase the level of service provided by the river control and flood mitigation works on the Heretaunga Plains Scheme – Rivers, from a 1%AEP to a 0.2% AEP (or alternatively from a 1 in 100 year to 1 in 500 year standard). Significant work has been carried out to determine what this means in terms of design discharges for the major rivers. Using these values, the next phase is to look at the effects of confining the flow, dealing with high shear stresses and gravel movement and final design requirements. Concurrent with this process is also an ongoing review of individual drainage catchment areas within the Heretaunga Plains Drainage areas which measures current scheme performance and considers opportunities for scheme enhancements or improvements. This includes waterway capacity, environmental enhancement and recreational opportunities.

Capital works will be funded through loans or funded directly from Scheme funds as necessary. The identification of an appropriate funding source is determined by the size and scale of any proposed works and through a long term plan or annual plan process, or through a special consultative process if one is considered necessary.

Key capital projects expected to be undertaken within the life of this Strategy are set out in the table below. HBRC has consulted and received support from the community for increasing the level of service provided by the stopbanks protecting the Heretaunga Plains from floods with a likelihood of occurrence of 1% in any one year (100 year return period) to 0.2% (500 year return period).

HBRC has yet to determine changes in levels of service provided by the Upper Tukituki Flood Protection Scheme and the other smaller schemes as the effort to date has been committed to the Heretaunga Scheme. Level of service change options will be determined after the level of service reviews for each respective scheme are completed progressively over the next 6 years. The principal options Council expects to consult on are whether to increase the level of service, and by how much, or whether to retain the current service levels. This will probably be decided on a willingness to pay.

A “Status quo” scenario is manageable for the scheme based on the current level of development and land use within the protected areas of the scheme. Maintenance costs would progressively increase to respond to ongoing issues of gravel accumulation and the increased levels of risks posed by climate change. This, along with potential further urban and rural development likely on the Ruataniwha Plains will provide background to the levels of service review.

These decisions will be significant decisions for HBRC prior to commencement of any capital works. Expected timing and costs (for the maximum expected level of service changes) are set out in the table below.

Scheme	Capital works description	Indicative project value	Timing
Heretaunga Plains Flood Control and Drainage Scheme - Rivers	<p>Increase level of service from current nominal 100 year protection to 500 year protection.</p> <p>Complete work associated with Karamu stream realignment and floodgate by-pass.</p>	<p>**\$20M for the the first 10 years (2018-2028)</p> <p>The costs for the remaining 10 years are approx. \$2M pa plus inflation</p>	<p>Funding provision included in proposed LTP for a twenty year project commencing 2018.</p>
Heretaunga Plains Flood Control and Drainage Scheme - Drains	<p>Increase the level of service through;</p> <p>a) enhancement of urban open waterways in Napier and Hastings districts.</p> <p>b) enhancement of Karamu Stream and tributaries flood channel</p> <p>Capital works identified as a result of level of service reviews</p>	<p>*Unknown, depends on outcome of levels of service reviews. Estimate \$20M</p>	<p>Funding provision included in previous LTP for development and capital works. 2017 est. start time (Work on napier urban waterways begun). Karamu Stream enhancement begun in 2007 and continuing.</p>
Upper Tukituki Scheme	<p>Complete the LOS review, consult with the community and begin capital works identified as a result of level of service reviews.</p>	<p>*Unknown, depends on outcome of levels of service reviews. Estimate *\$10M</p>	<p>2019 complete LOS reviews ready for consultation.</p> <p>2028 estimated construction start time.</p> <p>No funding included in the LTP for capital works at this stage.</p>

*Uncertainty: - costs and timing are only very rough order at this stage as the levels of service reviews have only just commenced. Costs/timings will depend on the outcomes of the reviews as well as further community consultation and demand.

**Funding: - A more reliable estimate of cost will only be available once design philosophy and detailed design have been completed. At this stage it is not proposed to loan fund the project. The project will be undertaken over many years. The length of time for completion will vary depending on the total cost and amount of annual funding allocated through the relevant Scheme.

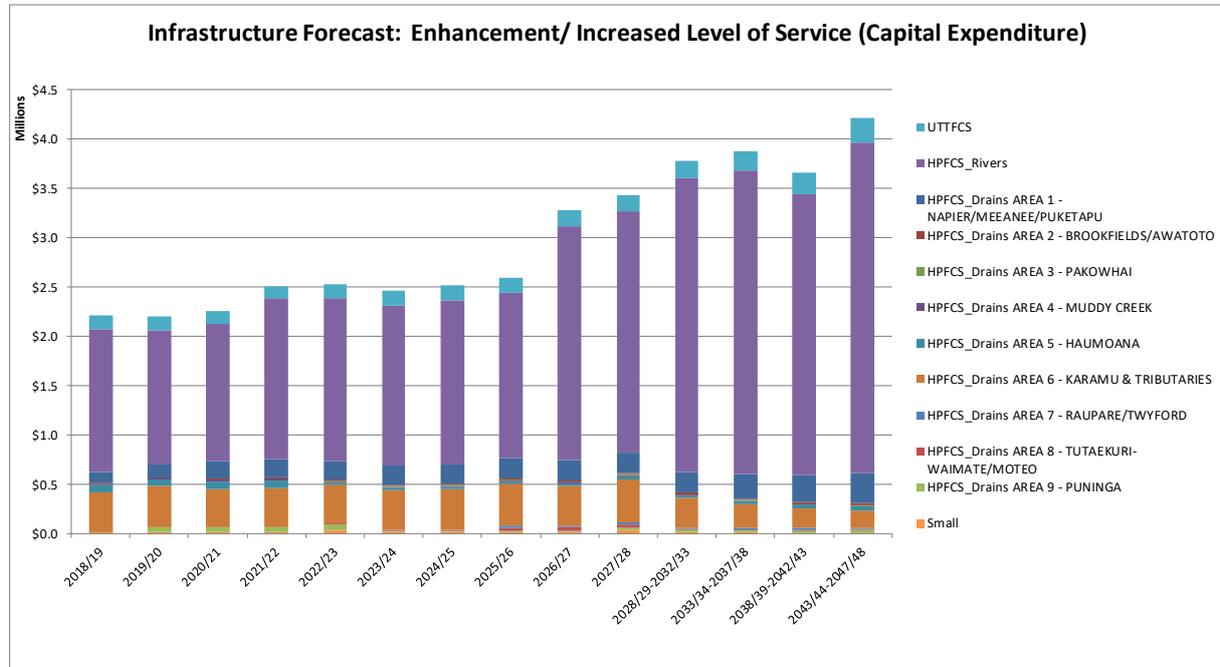


Figure 5-4: Projected Capital Works Expenditure covering enhancements and increased level of service

The following graph shows the totals for the combined capital works, (which provides enhancements and increase level of service), and the renewals.

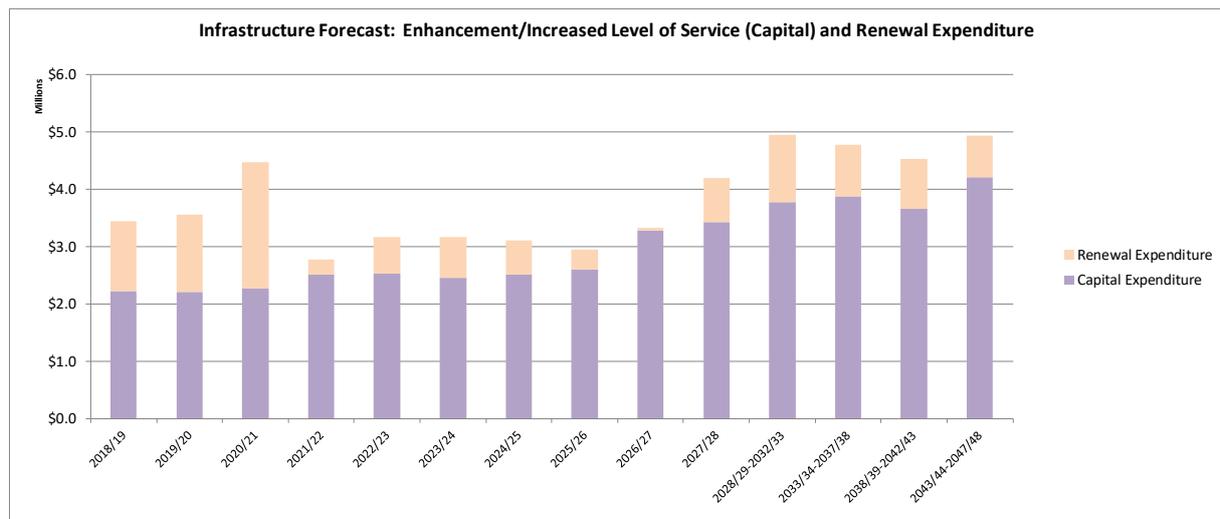


Figure 5-5: Projected Capital Works (covering enhancements and increased level of service) and Renewal Expenditure

5.5 Resilience

Scheme beneficiaries have a high expectation of continuing functionality and ongoing protection against flooding. Reviews of the level of service provided by each of the Schemes are progressing as programmed. These reviews will include risk assessments of Schemes, including climate change, and where appropriate may recommend changes or improvements that reduce the risk of premature failure, or enable the level of service to be reinstated more rapidly following a natural hazard event that impacts on the scheme. The reviews will also consider alternative techniques to scheme reinstatement where the risk exposure is considered too great, eg; structural works in lieu of live edge protection.

5.6 Risk Management

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

Risks and risk management is covered in detail in Section 5 of the specific Scheme Asset Management Plans, with HBRC using “Quantate Risk” software to establish risk registers, likelihood of occurrence and consequence scoring to develop the levels of risk matrix.

There is an ongoing review process in place in HBRC considering all significant risk issues for Council. These are reviewed on a 6 monthly basis and reported to Council every 3 months. While the component parts of the scheme risk registers are reviewed as part of scheme reviews, the overall risks of scheme performance, impacts of climate change, ratepayers confidence and ability to pay, consideration of recent events (eg; Edgecumbe event) are considered within the wider HBRC regular review process.

Risks to Asset Performance

The main risks that would affect the performance of the infrastructural assets are listed below.

Risk	Description
Significant natural hazard event	A significant natural hazard event (e.g. flood, earthquake, tsunami) will impact on the Scheme assets and may affect their integrity or their ability to provide the level of service they were designed for.
Significant biological incursion	An essential part of river control work (and ecological enhancement) is live trees a variety of willows, some exotics and natives. Willows have in the past been damaged by a significant biological incursion e.g. willow sawfly which caused significant damage to willows in the mid 1990's. The response to this incursion involved a \$10m alternative species and structural works programme. Currently the schemes are experiencing an impact from the giant willow aphid that affects willow tree growth rates. This is presently being monitored and involves a review of resistant alternative plant species.
Inadequate funding	Ongoing maintenance is essential if the Scheme assets are to provide the design level of service. Maintenance is currently funded through rates levied on land benefiting from the Schemes. The cost of ongoing maintenance must however be affordable to the land owners and be outweighed by the benefits received by them. Where costs outweigh benefits an alternative level of service may need to be considered subject to agreement with ratepayers.

HBRC holds disaster reserves and insurance to fund reinstatement of Scheme levels of service should infrastructure assets be damaged in a significant natural hazard event. The highest risk event to

infrastructure assets is a significant flood event, followed by a major earthquake (or earthquake followed by a flood). HBRC disaster reserves are designed to meet the cost of reinstatement following damage by events with a 4 to 5% chance of occurrence in any one year. (ie on average events that occur more regularly than once every 20 to 25 years). Insurance secured through an external organisation is held and may be called upon should significant damage occur in a major, but infrequent, event.

6.0 MAJOR PROJECT SUMMARIES – THE BIG FIVE

There will be a number of potential major projects within the 30 year life of this Strategy, some of which either are, or will be, the subject of ongoing consultation process as to how they will proceed. The table below indicates significant projects that will begin in the early stages of the strategy.

Years	Project	Budget
2018 to 2028	Heretaunga Plains Flood Protection Scheme LOS flood capacity improvement to 0.2% AEP with climate change. Ngaruroro River stopbank upgrade, right bank, Chesterhope to Fernhill (4 km/year). Note that upgrading will continue past 2021 in other reaches and rivers (Tukituki and Tutaekuri). Hard edge protection using concrete Akmons in critical high stress locations.	\$1.3M per year Construction \$0.10M per year Environmental enhancement
2018 to 2028	Upper Tukituki Flood Protection Scheme. This includes river berm enhancement, habitat protection and improvement, maintaining braided channel network.	\$1.3M over next 10 years
2018 to 2022	Napier and Hastings urban open waterway network LOS upgrade. Ecological, cultural and recreational enhancement to the larger open waterways.	\$0.114M per year Capital works, and \$0.277M per year Environmental Enhancement
2019 to 2020	Clive River dredging. Disposal of silt from the lower Clive riverbed to land or out to sea.	\$0.92M
2018 to 2028	Open Spaces: Working together with hāpu develop Hawea Historical Park. Further Regional park development. River berm management alternatives (stock removal, recreational opportunities) .	\$1.6M over next 10 years

Note: This table is further expanded in Appendix 1 of this document, providing the 10 year project and budget in more detail.

7.0 SIGNIFICANT ASSUMPTIONS

Significant Assumption	Risk & Impact
<p>Budgets have been prepared on the basis that there will be no flood events in the next 10 years that cause major damage to HBRC's flood protection and drainage assets.</p>	<p>There is always a risk of a flood event occurring that causes damage to flood control or drainage assets. Flood control assets have a high degree of exposure to failure during times of significant or prolonged flood flows in the rivers. HBRC holds reserve funds to meet the cost of minor flood damage repairs, and insurance for repairs following a major event.</p> <p>Maintenance programmes and associated budgets will need to be reviewed following a significant event.</p>
<p>Current arrangements for gravel extraction will continue</p>	<p>The maintenance of the design flood capacity in river flood control schemes is reliant on the ongoing extraction of gravel within river channels by commercial gravel extractors. The economic downturn over the past several years has resulted in the significant reduction in gravel extraction particularly from the Upper Tukituki Scheme rivers. This has resulted in accretion of the river beds within some areas of the Scheme and a resultant reduction of flood carrying capacity.</p> <p>With the recent completion of the Gravel Management Plan a number of initiatives have been identified that attempt to address the gravel accumulation issue being experienced and these will be introduced and monitored during the life of this strategy.</p>
<p>HBRC maintains its current policy with regard to responsibility for funding of existing and new flood protection and drainage works</p>	<p>HBRC currently funds flood control and drainage schemes through a mixture of targeted rates and general funding. The current level of funding provides for the maintenance of designed levels of service (on the assumption that commercial gravel extraction is adequate to maintain scheme flood capacity).</p> <p>If funding is reduced the ability to maintain the current level of service provided by Schemes will be compromised.</p>
<p>There will be no changes to legislation that impact on the role of the Regional Council in land drainage and river control</p>	<p>Flood Control and Drainage Schemes have been established in accordance with the Soil Conservation and Rivers Control Act 1941. This Act provides specific powers to HBRC that enable it to protect assets on private land and to undertake works necessary to continue to deliver the Scheme levels of service.</p> <p>This legislation and the powers it provides are essential for HBRC to carry out its functions. Any changes to this legislation or the powers it provides may result in significant work and or expense for scheme beneficiaries and the region.</p>

Significant Assumption	Risk & Impact
<p>The current multi-value approach to the management of waterways managed under the major schemes will continue to be accepted by the community.</p> <p>Co-governance or co-management arrangements under new Treaty of Waitangi Settlement legislation will inform and enhance the multi-value approach.</p>	<p>The construction of flood protection and drainage systems has resulted in significant changes to the natural hydrology of their associated catchments. These changes have included a reduction in areas frequently flooded, diversion and straightening of waterway reaches, removal of streamside vegetation, and the use of structures to control flows and erosion.</p> <p>These changes and the ongoing methods used to maintain the schemes have resulted in some adverse effects on river and stream ecology and habitats, as well as affecting the social and cultural values of the waterways. HBRC has initiated an enhancement programme, including alternative management of riparian areas, which will promote improvements in water quality and aquatic and terrestrial habitats. Work practices have been changed in order to comply with the Ecological Management and Enhancement Plans for the major rivers. Complimenting these plans is our Environmental Code of Practice, which ensures best practice measures are implemented to safeguard our waterways unique environment during performance of river control and drainage works.</p> <p>HBRC is currently working with iwi and hapu to enhance waterways, although only in limited areas to date. This work is programmed to continue, however there is the potential for a significant increase in demand for this type of work. HBRC has a Joint Planning Committee with both elected and Tangata Whenua representatives involved in environmental decision making. This enables a proactive and shared response to environmental matters.</p>
<p>Budgets have been prepared on the basis that there will be no new flood control and drainage schemes established within Hawke's Bay.</p>	<p>HBRC are approached by property owners from time to time requesting that HBRC, using their powers under the Soil Conservation and Rivers Control Act 1941, provide protection to their property. HBRC are willing to consider the establishment of new Schemes where there is a community willingness to meet a significant portion of the cost of any new works and its ongoing maintenance.</p>

Significant Assumption	Risk & Impact
<p>Budgets have been prepared on the basis that any changes to levels of service as a result of population growth will be considered as part of levels of service reviews.</p>	<p>The majority of Schemes are to be reviewed over the next 6 years. It is possible that these reviews will result in changes to the predicted level of capital expenditure included in this Strategy. While water quality and quantity issues continue to have a high profile in the region opportunities such as water storage or augmentation will be evaluated. The potential for water storage at scale has the potential to impact on population and economic growth in Hawke's Bay. Decisions on whether or not projects of this scale may proceed is expected to be made prior to levels of service reviews being completed.</p>
<p>The outcome of the TANK planning process will have no significant cost implications to scheme management.</p>	<p>Changes to the status quo for example riparian shading will have a significant effect on how the waterways are maintained. For instance this could be reverting from machine maintenance methods to hand maintenance.</p>

APPENDIX 1: MAJOR PROJECT DETAIL

Major Project Summaries - The Big Five (30 Year Infrastructure Strategy)							
Project	Years	Budget	2018/19	2019/20	2020/21	2021/22	2022/23
Heretaunga Plains Flood Protection Scheme LOS flood capacity improvement to 0.2% AEP with climate change. Ngaruroro River stopbank upgrade, right bank, Chesterhope to Fernhill (4 km/year). Note that upgrading will continue past 2021 in other reaches and rivers (Tukituki and Tutaekuri).	2018 to 2021	\$1.1M per year Construction. \$100,000 per year Environmental enhancement	Complete Karamu Channel realignment. Prepare ground for riparian enhancement. Work with hapu on planting programme ready to hand over for park development. Develop design and construction plans for Ngaruroro River	Construct LOS Capital improvements for Ngaruroro River, Chesterhope to Fernhill RIGHT BANK . Active edge erosion control with concrete Akmons. Stopbank upgrading. Continue with LOS design work for HPFCS.	Construct LOS Capital improvements for Ngaruroro River, Chesterhope to Fernhill RIGHT BANK . Active edge erosion control with concrete Akmons. Stopbank upgrading. Continue with LOS design work for HPFCS.	Construct LOS Capital improvements for Ngaruroro River, Chesterhope to Fernhill LEFT BANK . Active edge erosion control with concrete Akmons. Stopbank upgrading. Continue with LOS design work for HPFCS.	Construct LOS Capital improvements for Ngaruroro River, Chesterhope to Fernhill LEFT BANK . Active edge erosion control with concrete Akmons. Stopbank upgrading. Continue with LOS design work for HPFCS.
			CONSULTATION Consultation over increase in LOS standard completed through 2012/22 LTP process. Funding is through rates and has been included in the AP process.	CONSULTATION Typically throughout the construction phase consultation is with adjoining landowners and in some cases river users.			
Upper Tukituki Flood Protection Scheme. This includes river berm enhancement, habitat protection and improvement, maintaining braided channel network.	2018 to 2028	\$1.3M over next 10 years	Develop scheme concepts to increase the LOS for the UTTFCS. Develop enhancement plans. Develop plans to enhance and maintain the braided channel network. Continue with native planting on berms.	Complete plans to enhance and maintain the braided channel network. Consult with scheme ratepayers and wider public. Source funding. Continue with native planting on berms.	Begin braided riverbed enhancement as per plan. Continue with native planting on berms.	Begin braided riverbed enhancement as per plan. Continue with native planting on berms.	Begin braided riverbed enhancement as per plan. Continue with native planting on berms.
			CONSULTATION Consult scheme ratepayers over LOS options and proceed with recommendations from the consultation. If LOS upgrade required this will require updated work programme and rates review. If LOS upgrade not accepted, there will be no change to the programme.	CONSULTATION Consult with wider public and scheme ratepayers over braided river enhancement and funding options.	If CONSULTATION is unsuccessful, the impacts of loss of the braided river habitat could be of national significance and further work/discussion will continue. Riparian planting in scheme areas can continue.		
Napier and Hastings urban open waterway network LOS upgrade. Ecological, cultural and recreational enhancement to the larger open waterways.	2018 to 2022	\$114,000 per year Capital Enhancement works, and \$277,000 per year Environmental Maintenance	Continue with LOS options design and planning for Napier. Start public consultation and ongoing consultation with NCC. Contribute to joint TA/HBRC initiatives.	Start LOS upgrade planning and discussion with HDC. Finalise LOS plan and programme for Napier with NCC.	Finalise LOS upgrade planning with HDC. Implement recommendations of LOS improvements.	Implement recommendations of LOS improvements, together with TANK recommendations for NCC and HDC.	Implement recommendations of LOS improvements, together with TANK recommendations for NCC and HDC.
			CONSULTATION Consult scheme ratepayers and NCC over LOS options and planning. The 2012/22 LTP process was for the HP rivers. Funding impacts have yet to be allowed for. LOS improvements in flood capacity will need to align with NCC's urban drainage LOS upgrade.	CONSULTATION Consult scheme ratepayers and HDC over LOS options and planning.			
Clive River dredging. Disposal of silt from the lower Clive riverbed to land or out to sea.	2018 to 2022	\$920,000	Construction drawings and contract completed for 2019/20 construction season.	Start contract for silt removal of lower Clive River. Investigate options to improve the river reach above the Rowing Club, working with hapu.	Complete the dredging contract. Complete report on options to improve the river reach above the Rowing Club, working with hapu.	Consultation with affected river users on options for improving issues associated with silt aggradation including how to fund any such work.	
			CONSULTATION Consult with iwi, river users and adjacent landowners and HDC over proposal.	CONSULTATION If consultation is unsuccessful then further efforts will be necessary to accommodate issues where practicable and affordable. The dredging fund will accumulate. No effect on flood control works but recreational use will be restricted.		CONSULTATION Consult scheme ratepayers, iwi, river users and HDC over LOS options and planning. No flood control impact if this doesn't proceed, but could be cultural impact.	
Open Spaces: Working together with hapu develop Hawea Park. Further Regional Park development. River berm management alternatives (Stock removal, recreational opportunities)	2018 to 2028	\$1.6M over next 10 years	Working with hapu, complete a Hawea Park development plan and begin a maintenance and operational plan. Hold opening day and Start initial native planting. Complete concept plans and begin public consultation for berm management.	Complete the Hawea Park maintenance and operational plan. Continue with park layout and planting. Subject to public approval through the consultation process, proceed with implementation of berm improvements. Public access improvements.	Continue with Hawea Park layout and planting. Construct special features, information boards etc. Continue with berm enhancement programme, stock exclusion, recreation, berm management on Ngaruroro River	Continue with Hawea Park layout and planting. Continue with berm enhancement programme, stock exclusion, recreation, berm management on Ngaruroro River	Continue with Hawea Park layout and planting. Continue with berm enhancement programme, stock exclusion, recreation, berm management on Ngaruroro River
			CONSULTATION Consult with hapu over Hawea Park has been ongoing for a number of years and is continuing. Consult with other river users over the River Berm management proposals. Funding will be from the Open Spaces budget and the HP Rivers budget.	CONSULTATION Consultation with Hawea Park is unlikely to be successful given the efforts to date. Aspects of the River Berm management will be part of the LOS upgrade work which has already had high level approval. Consultation will be more about specific details.			

MAJOR PROJECT DETAIL

Major Project Summaries - The Big Five (30 Year Infrastructure Strategy)								13 February 2018
Project	Years	Budget	2023/24	2024/25	2025/26	2026/27	2027/28	
Heretaunga Plains Flood Protection Scheme LOS flood capacity improvement to 0.2% AEP with climate change. Ngaruroro River stopbank upgrade, right bank, Chesterhope to Fernhill (4 km/year). Note that upgrading will continue past 2021 in other reaches and rivers (Tukituki and Tutaekuri).	2018 to 2021	\$1.1M per year Construction. \$100,000 per year Environmental enhancement	LOS work continues for remainder of HPFCS	LOS work continues for remainder of HPFCS	LOS work continues for remainder of HPFCS	LOS work continues for remainder of HPFCS	LOS work continues for remainder of HPFCS	
Upper Tukituki Flood Protection Scheme. This includes river berm enhancement, habitat protection and improvement, maintaining braided channel network.	2018 to 2028	\$1.3M over next 10 years	Begin braided riverbed enhancement as per plan. Continue with native planting on berms.	Begin braided riverbed enhancement as per plan. Continue with native planting on berms.	Begin braided riverbed enhancement as per plan. Continue with native planting on berms.	Begin braided riverbed enhancement as per plan. Continue with native planting on berms.	Begin braided riverbed enhancement as per plan. Continue with native planting on berms.	
Napier and Hastings urban open waterway network LOS upgrade. Ecological, cultural and recreational enhancement to the larger open waterways.	2018 to 2022	\$114,000 per year Capital Enhancement works, and \$277,000 per year Environmental Maintenance						
Clive River dredging. Disposal of silt from the lower Clive riverbed to land or out to sea.	2018 to 2022	\$920,000						
Open Spaces: Working together with hapu develop Hawea Park. Further Regional Park development. River berm management alternatives (Stock removal, recreational opportunities)	2018 to 2028	\$1.6M over next 10 years	Continue with berm enhancement programme, stock exclusion, recreation, berm management. Tutaekuri River	Continue with berm enhancement programme, stock exclusion, recreation, berm management. Tutaekuri River	Continue with berm enhancement programme, stock exclusion, recreation, berm management. Tutaekuri River	Continue with berm enhancement programme, stock exclusion, recreation, berm management. Tukituki River	Continue with berm enhancement programme, stock exclusion, recreation, berm management. Tukituki River	