



Bay of Plenty Regional Council Long-Term Plan

2015-2045 Infrastructure Strategy (Flood Protection and Control Works)

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Document control

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Purpose

The purpose of the Infrastructure Strategy document is to highlight to Council the issues and implications that Council faces over the next 30 years with regards to flood protection and control works, as required by the Local Government Act 2002 Amendment Act 2014. The Infrastructure Strategy for the Bay of Plenty Regional Council must include assets for flood protection and control works and Council may at its discretion include other assets.

The Infrastructure Strategy will be reviewed in 2016 in line with the next long-term plan.

A suggested capital and operation spend to meet the levels of service, as agreed with the community, for flood risk management is included. Council is forecast to spend \$55m on capital works and \$307m on operations over the next 30 years on River Scheme and Drainage Infrastructure.

Flood risk management faces significant issues over the next 30 years; including sea level rise, more intense and more frequent storms, subsiding ground levels, declining population in the east (where our schemes are based) and rising population in the Tauranga area (where flood damage and associated sediment loss into Tauranga Estuary has been significant in recent years), and stopbanks that are geotechnically unstable during high and prolonged river flows.

Fortunately Council had the foresight to recently initiate the River Scheme Sustainability Project as well as the Regional Flood Risk Management Project. Completed components of these projects have been included in this Infrastructure Strategy. However, the main benefits and associated finances are yet to be clarified and will be incorporated into future Infrastructure Strategies.

The Infrastructure Strategy is aligned and linked to other key Council documents and strategies including; the Regional Policy Statement, Invest Bay of Plenty, Spatial Plan, Financial Strategy, Rivers and Drainage Asset Management Plan and the Long-Term Plan.

The Infrastructure Strategy is adopted as part of the long-term plan process.

2 **Linkages to other Council documents**

The Infrastructure Strategy has linkages with other key Council documents. A number of examples are discussed below.

2.1 **Regional Policy Statement**

The Regional Policy Statement of October 2014 highlighted a number of significant issues. These include:

- Air quality.
- Coastal environment.
- Energy and infrastructure.
- Geothermal resources.
- Integrated resource management.
- Iwi resource management.
- Matters of national importance.
- Urban and rural growth management.
- Water quality and land use.
- Water quality.

A number of these issues are directly related to the Infrastructure Strategy and are discussed in this document. One example is the impact of climate change on infrastructure.

2.2 **Invest Bay of Plenty**

The Invest Bay of Plenty Project has undertaken a number of interlinked work such as:

- Ageing trends and transitions.
- Infrastructure analysis.
- Summary of Bay of Plenty Strategy documents.
- Analysis of Bay of Plenty employment and skills.
- Environment Report for Invest Bay of Plenty.
- Invest Bay of Plenty Māori Migration.
- The State of Readiness of BOP's Local Government Infrastructure for Growth by Berl.
- Bay of Plenty: Settlement and agglomeration impacts by Berl.
- Bay of Plenty situational analysis.
- 2014 Review of Demographic and Labour Force Projections for the Bay of Plenty Region for the Period 2013-2063.

These documents are relevant to the Infrastructure Strategy as they inform the Council on future scenarios, and help guide the Council to make informed infrastructure decisions. Generally infrastructure is both expensive to build and maintain, thus we need to ensure it is affordable and meets the needs of future generations in a sustainable manner.

2.3 **Spatial Plan**

Council is currently working on a Bay wide spatial plan.

Future versions of the Infrastructure Strategy will incorporate the outcomes of the spatial plan to ensure infrastructure is fit for purpose and meets the needs of growing or declining economic and population areas.

2.4 **River Scheme Sustainability**

The high costs of \$18m of repairing damage to the region's river schemes after the 2010 and 2011 floods has raised questions around whether the current levels of service, scheme management and growing scheme funding requirements are sustainable into the future. As a result Council included projects in the Ten Year Plan 2012-2022 to investigate these matters.

The River Scheme Sustainability Project is considering the long-term risks of the flooding hazard. The project work includes reviewing the current levels of flood protection provided by the schemes, determining the economic value added by the schemes, assessing the affordability of the schemes, assessing flood risk and the level of community acceptance to different levels of flood risk, as well as their willingness to pay for flood protection. The project will also consider the appropriate timing for any rating reviews that may be required.

Flood management options in the longer term may be different to the structural solutions that are currently the core components of the schemes. Non-structural and other alternative solutions will be identified and evaluated.

The Council has also developed a region-wide Flood Risk Management project to lead and guide the region's local authorities in flood management planning, including areas not within a major scheme.

The outcomes of these projects will be incorporated into future Infrastructure Strategies.

These projects have highlighted, to date, that a 100-year whole of catchment approach that collaborates with multiple stakeholders will lead to a sustainable outcome that mitigates risk to the Council and community, as well as returns a net gain around sustainable flood protection management.

These projects will significantly reduce the risk to Council around flood protection and control works.

2.5 **Financial Strategy**

The Infrastructure Strategy and Financial Strategy are integrated. Outcomes such as benefits, affordability and equity of rates are critical for the long-term well-being of the community.

The 30-year financial projections of the Infrastructure Strategy have been integrated into financial models which in turn generate the LTP rating requirements.

2.6 **River and Drainage Asset Management Plan**

The Infrastructure Strategy has made use of the existing River and Drainage Asset Management Plan to assist with forecasting future asset requirements and costs.

3 Context

As caretakers of our land, air and water, Bay of Plenty Regional Council monitors the effects of human activities on our environment. We also promote the sustainable management of our natural and physical resources for present and future generations.

Our Vision is: “Thriving together – mō te taiao, mō ngā tāngata”.

Bay of Plenty Regional Council’s work guides and supports the sustainable development of the Bay of Plenty. We want to make sure our region grows and develops in a way that keeps its values safe for future generations.

Our community outcomes are:



A major focus of our work involves looking after the environment. We manage the effects of people’s use of freshwater, land, air and coastal water. However, we also have a broader responsibility with others for the economic, social and cultural well-being of the regional community.

Our work includes:

- Managing the risks posed by our major rivers (including managing the region’s major flood control schemes).
- Planning and prioritising the region’s land transport needs, including major roading improvements.
- Organising passenger transport services, including Tauranga’s Bay Hopper and Rotorua’s Cityride.
- Supporting sustainable economic development.
- Strategic thinking for our region’s future.

3.1 Legislature context

On 7 August 2014 the Local Government Act 2002 Amendment Act 2014 required under Section 101B Infrastructure Strategy that:

- (1) A local authority must, as part of its long-term plan, prepare and adopt an Infrastructure Strategy for a period of at least 30 consecutive financial years.
- (2) The purpose of the Infrastructure Strategy is to:
 - (a) Identify significant infrastructure issues for the local authority over the period covered by the strategy; and
 - (b) Identify the principal options for managing those issues and the implications of those options.

The infrastructure strategy for Bay of Plenty Regional Council must include assets for flood protection and control works and Council may at its discretion include other assets.

A copy of Section 101B Infrastructure Strategy is shown in Appendix A.

3.2 Assets included in and excluded from the Infrastructure Strategy

The Local Government Act 2002 Amendment Act 2014 requires that the Infrastructure Strategy for the Bay of Plenty Regional Council must include assets for flood protection and control works and Council may at its discretion include other assets.

This Strategy deals with assets only associated with flood protection and control works, as per our Rivers and Drainage Asset Management Plan (AMP). Assets providing flood protection have a value of \$221m, comprising the bulk of Bay of Plenty Regional Council's +\$260m assets).

The Rivers and Drainage AMP has a 50-year timeframe and financial projection. This 30-year Infrastructure Strategy draws off this knowledge base as well as key projects such as the River Scheme Sustainability, Water Programme and Spatial Plan.

This Strategy excludes infrastructure associated with:

- (a) Regional Parks AMP (\$6m).
- (b) Property AMP (\$18m).
- (c) Rotorua Lakes AMP (\$17m).
- (d) Maritime AMP (<\$1m) and similar programmes.
- (e) Special projects such as Kopeopeo Canal Remediation (\$11m), Kaituna Re-diversion (\$6m) and similar.
- (f) And other assets that may be associated with shareholdings in Quayside Holdings Limited or similar.

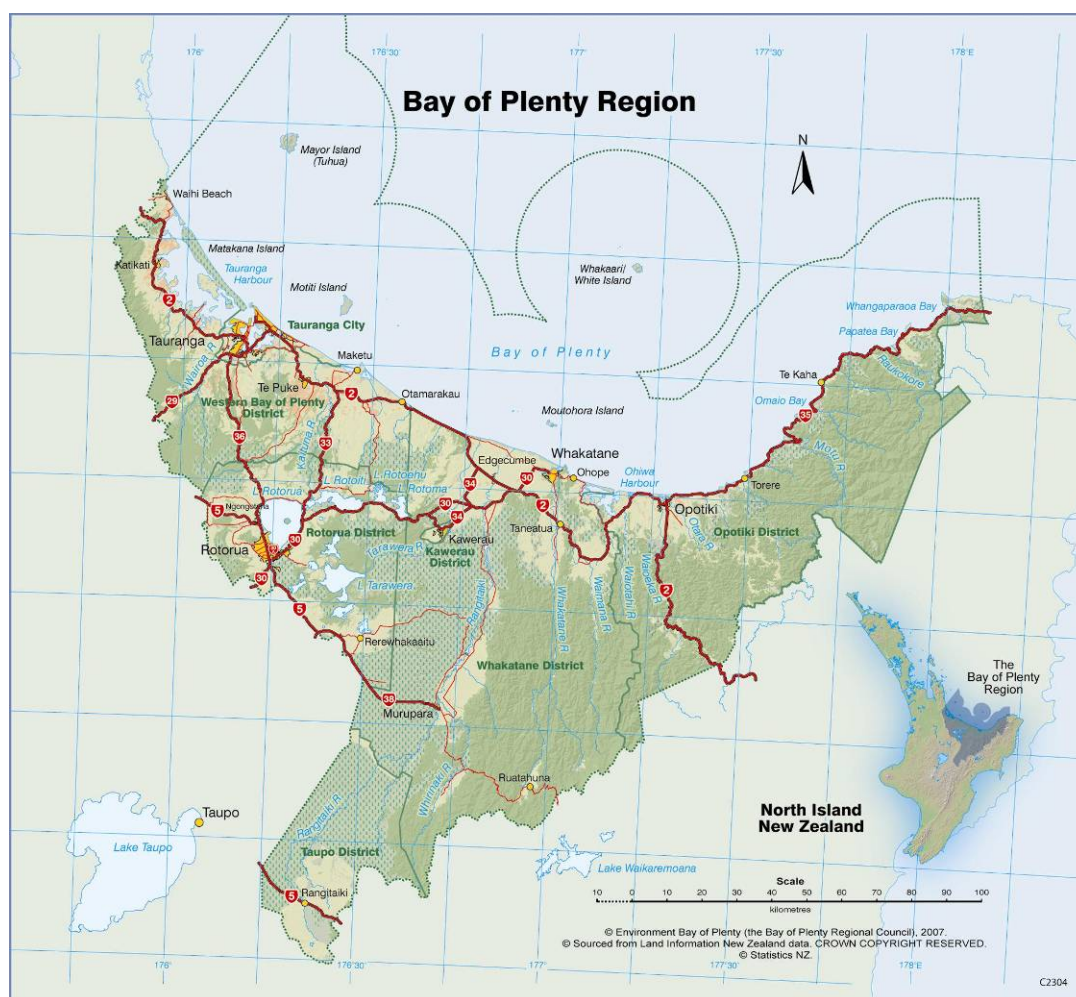
3.3 Geographic context

The Bay of Plenty is located on the east coast of the North Island of New Zealand. The region incorporates the full extent of the coastline from Cape Runaway in the east, to Waihi Beach in the west. It captures the coastal City of Tauranga, the township of Whakatāne and the inland city of Rotorua.

On the landward side, the region is mostly bounded by the watersheds of the catchments that flow into the Bay of Plenty; this includes the lakes in the Rotorua District.

The region includes 18 offshore islands including the volcanically active White Island, and the sea extending out to the 12-nautical-mile boundary.

The area of the region is 21,740 square kilometres, comprising 12,231 square kilometres of land and 9,509 square kilometres of coastal marine area.



3.4 Demographic context

The Bay of Plenty area consists of a number Territorial Local Authority (TLA) areas. The Strategy Group of Council has undertaken reviews of the future population growth of all TLAs in the Bay of Plenty region. These are summarised below.

- Virtually all growth in the Bay of Plenty Region, across all household and family types occurs in Tauranga City and the surrounding Western Bay of Plenty District.
- There is a projected increase over the region of around 55,000 households (50%) with particularly strong growth in the number of single person households, an increase of 28,000.
- This is made up of 10,700 households in the Western Bay and 47,000 households in Tauranga City (a 100% increase).
- Rotorua sees a modest projected increase of 1-2% (350 households), Whakatāne District a decline of 1,900 households (15%). Kawerau shows the largest percentage decline (31% or 790 households).

The baseline trends suggest that Tauranga City will increase its share of the region's population from just below 42% in 2013 to almost 58% in 2063. In 2033 Tauranga City will account for almost half of the region's population.

The population trends are important for flood management because:

- 1 The river schemes are in declining population areas. Thus affordability will most likely become an issue in the future if cost repayments of infrastructure exceeds the ability to pay.
- 2 The high growth areas in the west, that span multiple Council and stakeholder boundaries, require good flood risk management policy and town planning that incorporates sound flood risk management principles. A number of these areas already suffer from multimillion dollar flood damage and high sediment runoff into Tauranga Harbour and it is imperative that the Council collaborate with its partner stakeholders to ensure sustainable 100-year integrated catchment plans are in place. Council is currently leading the collaboration, through the Regional Flood Risk Project, in three pilot catchments that span multiple Councils and stakeholders. This work ensures we do not place expensive retrofit burdens on future generations.

Future projected demographic details per TLA are shown below.

Western Bay of Plenty

The population in the Western Bay of Plenty is projected to grow from 46,110 to around 57,546 in 2033 (24.8%) and a further 2.6% in 2063. These trends will see growth at 65+ years account for 85% of all growth in the Western Bay of Plenty 2013-2033.

Tauranga City

The population of Tauranga City is projected to grow from 117,280 in 2013 to around 161,646 in 2033 (+37.8%), and to 196,014 in 2063 (+14.3%). As was the case for the Western Bay of Plenty, the majority of the growth occurs prior to 2033.

Rotorua District

The population of Rotorua District is projected to grow very slightly from 68,590 in 2013 to 69,127 by 2033 (0.8% over 2013), and then decline to around 52,702 in 2063 (-22.4%).

Whakatane District

The population of the Whakatane District is projected to remain approximately stable until around 2033, albeit experiencing both minor growth and decline until 2029 and numbering approximately 33,408 in 2033; the population will then decline more rapidly to around 22,507 by 2063 (-30.1%).

Kawerau District

The population of Kawerau District is projected to undergo a steady decline, from 6,710 in 2013 to 5,542 by 2033 (-17.4%) and then more rapidly to around 3,155 by 2033 (-40% over 2033)

The 2001 and 2006 Census recorded small population decreases in the Kawerau District and there have been no major industry expansions identified that would be likely to create growth in the future.

Opotiki District

The population of the Opotiki District is projected to undergo steady decline, from 8,580 in 2013 to 7,395 by 2033 (-13.8%) and then decline more rapidly to around 4,897 by 2033 (-29.6% over 2033).

3.5 Flood infrastructure in the Western Bay of Plenty

The River Scheme Sustainability Project is focussed on the schemes which are located in the central and eastern area of the Bay.

The Regional Flood Risk Management project focusses on flood management for the Bay of Plenty as a whole.

The combined knowledge that will emanate from these two projects will guide Regional Council and its partner district councils how best to manage hard and soft engineering solutions for flooding.

These projects take a long-term (100-year) view in establishing integrated long-term plans for each catchment across the Bay, with flood mitigation a key output. The infrastructure costs associated with this flood mitigation will be incorporated into future Infrastructure Strategy financials.

3.6 Climate change context

The Regional Policy Statement recognizes that provision needs to be made for the effects of climate change in natural hazard risk assessment.

It promotes that authoritative up-to-date projections of changes in sea level, rainfall, temperature, and storm frequency and severity will be used as updated scientific data becomes available.

The RPS currently uses a 0.6 m to 0.9 m projection of base sea-level rise above the 1980-1999 average, and a 10 mm/annum rise beyond 2112.

Some predictions are indicating that new infrastructure should allow for a 1.5 m to 2 m sea level rise for the next 100 years.

These climate change factors increase the cost of hard engineering solutions. Thus, it behoves Council to work with nature and use soft engineering solutions where applicable, to minimise direct and indirect costs of dealing with climate change and its impact on our infrastructure.

The River Scheme Sustainability Project incorporates climate change for future decision making.

4 Significant infrastructure issues

The following tables summarise the significant infrastructure issues facing the Bay of Plenty Regional Council (BOPRC), the proposed response to those issues and the implications of taking or not taking the action proposed by the response.

The risk management processes used by the BOPRC are consistent with Australian/New Zealand Standard AS/NZ 4360 which defines risk assessment and management. A full description of the risks identified in the table below can be found in the Rivers and Drainage Asset Management Plan.

Rivers and Drainage Scheme Management		
Issues	Options	Implications
Climate change (through sea level rise and increased intensity and frequency of storm events).	<ul style="list-style-type: none"> Incrementally increase the capacity of assets (by topping up stopbanks over time) to meet anticipated climate change predictions. Use River Scheme Sustainability Project outcomes to use alternative methods to obtain sustainable outcome. 	<ul style="list-style-type: none"> Significant cost when stopbanks have to be redesigned and constructed when structural integrity is compromised due to greater hydrostatic loads. Significant cost when pump stations have to be upsized to pump higher volumes to higher heads.
Residual risk to communities.	<ul style="list-style-type: none"> Whole of catchment planning using 100-year vision for catchment. Update flood maps and encourage Territorial Authorities to update District Plans and LIM reports. 	<ul style="list-style-type: none"> Rerun models as updated information becomes available. A business-as-usual task. Generate 100-year vision catchment plans. Use soft and hard engineering solutions.
Levels of service (appropriate and affordable flood protection given declining number of ratepayers in scheme catchments).	<ul style="list-style-type: none"> Use River Scheme Sustainability project outcomes to guide least-cost whole of catchment solutions. Level of service reviews. 	<ul style="list-style-type: none"> Solutions will include over 30 different structural and non-structural options, which could include the use of wetland or preferentially floodable areas (multiple use of assets). Long-term work programmes will be developed to ensure land purchases, or similar, are signalled well in advance. Level of service reviews as required.

Greater than the design flood events (cause overtopping of stopbanks and widespread inundation behind the stopbanks).	<ul style="list-style-type: none"> • Use models to understand the level of destruction for over design events. • Design for failure at predetermined locations to ensure best protection for community. 	<ul style="list-style-type: none"> • Flood damage will create a significant financial and indirect burden on the rate payer and central government. • Flood Management and Emergency Management plans will become operative.
Requests from landowners to increase level of service. Both within existing schemes and in areas where there are currently no flood protection/drainage schemes.	<ul style="list-style-type: none"> • Assess change and costs to change asset capacity. Assess cost of maintaining those assets. 	<ul style="list-style-type: none"> • Investigate implications of requests.
Growth/Decline issues		
Decline of population/households within all the schemes.	<ul style="list-style-type: none"> • Review long-term affordability and ensure future spend creates an affordable net gain for the catchment/scheme/society. • Level of service review. 	<ul style="list-style-type: none"> • Flood management in 100 years will be different from how it is undertaken today. • Flexibility is required to implement a suite of options that together create an enhanced and affordable flood mitigation paradigm.
Growth in Tauranga may result in demand to build in flood prone areas.	<ul style="list-style-type: none"> • Provide flood management and engineering advice to reduce flood risk. • Develop 100-year catchment plans. 	<ul style="list-style-type: none"> • Ensure the Regional Flood Risk Management Framework gains traction to ensure Territorial Authorities and Regional Council manage catchments in a holistic manner. • Failure to understand whole-of-catchment solutions will result in an escalation of flood damage and possible loss of life, along with environmental degradation.
Geotechnical issues		
Tectonic subsidence and ground shrinkage in floodplains. Ground levels are expected to drop by around 1 metre over the next 100 years in some floodplains.	<ul style="list-style-type: none"> • Engineering options will review the best ways to manage the lower ground levels, higher pumping heads and greater hydrostatic loads on stopbanks. 	<ul style="list-style-type: none"> • Structural solutions will be expensive. • Trigger levels will be identified to determine when to migrate towards an alternative fit for purpose solution that may, for example, results in different land use practices.
Geotechnical condition of existing stopbanks.	<ul style="list-style-type: none"> • Engineering is currently establishing the extent of the geotechnical condition of all its stopbanks. • Establish a response plan to manage the known conditions. This may include stopbank rebuilding or lowering the level of service. 	<ul style="list-style-type: none"> • Structural solutions will be expensive. • Alternative solutions will be investigated.

5 **Infrastructure Investment Programme**

The issues, options and implications highlighted in Section 4 require an investment programme to manage the risks. The current programme utilises the Rivers and Drainage Asset Management Plan and other projects such as the River Scheme Sustainability Project.

Risks are noted in the Corporate Risk Register.

5.1 **Infrastructure Strategy Investment Programme assumptions**

The Infrastructure Strategy Investment Programme is based on the following assumptions:

- The Rivers and Drainage Asset Management Plan (AMP) has been used as the primary source of capital infrastructure and operational costs. Assumptions of this AMP have been adopted by the Infrastructure Strategy.
- The AMP has an improvement programme. This includes enhancing the asset and renewal forecasting processes.
- There is significant variance in the confidence of the capital project costs. Some projects in the first years of the programme are at 90% confidence level, whereas some placeholder projects in the later years are at a 10% confidence level. The confidence of these projects will improve as assumptions and risks are clarified.
- The River Scheme Sustainability and Regional Flood Risk Management Projects have been influential in highlighting projects such as rating review requirements, backlog of floodplain management work, soft/non-structural engineering options, ecosystem integration and collaborative modelling support. However, the projects have not yet reached a position to advise on specific alternative options that can replace existing hard engineering programmed works.
- Asset lifecycle costs are based on useful remaining lives, condition assessments (where completed) and risks consistent with the International Infrastructure Management Manual 2011.
- All expenditure figures are based on the current levels of service. This could change particularly if the effects of the significant issues tabled in this strategy are realised.
- Flood protection works outside the schemes are not included in the costs noted in this strategy. The Regional Flood Risk co-ordination project will clarify roles and responsibilities across the region and hence the allocation of costs.
- Growth for the Western Bay of Plenty has not been included in flood protection and drainage levels of service in the Lower Kaituna Scheme.
- Growth projections for the Eastern Bay of Plenty indicate a significant population drop. The effect of this population drop and any land change use has not been included in the Works Programme. Affordability could become a significant issue in these areas.
- No major disasters affecting asset life have been included in lifecycle costs or level of service requirements. A flood insurance and flood damage reserve is included, however, it should be noted that for the 2010/2011 floods \$15m of the \$18m repair cost was not covered by insurance.

5.2 Total expenditure (flood control)

In addressing the issues identified in the previous section of this strategy, the BOPRC expects to spend \$55m on new or replacement infrastructure, in our Rivers and Drainage Schemes, between 2015 and 2045. Over the same period, \$307m is expected to be spent on operations which includes maintenance, insurance, limited flood damage repairs, engineering analysis and modelling and loan repayments in our Rivers and Drainage Schemes.

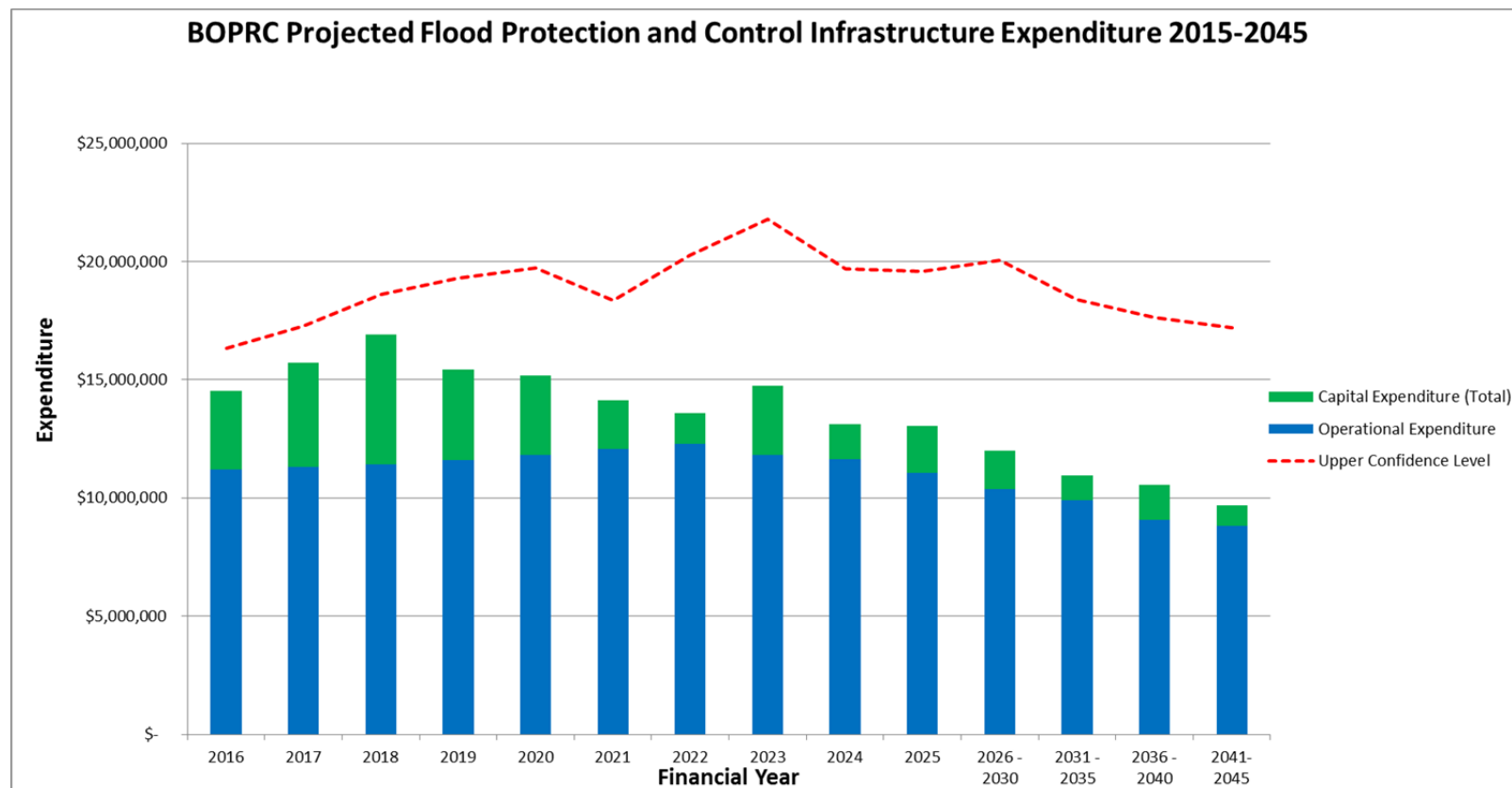
Infrastructure activity	Capital expenditure	Operational expenditure
River Scheme Management	\$55m	\$307m

5.3 Capital expenditure highlights

Figure 1 shows the expected year on year expenditure up to 2025 and then takes an average spend over five-year blocks up to 2045. The figure also includes the operational expenditure to show how expenditure is dominated by operational requirements.

Example key capital projects include:

- Rangitaiki Floodway and Spillway.
- Replacement of the Ford Road Pump Station and adjacent stopbanking on the Kaituna Scheme.
- Raising of stopbanks due to climate change and stopbank reconstructions on the Waioeka/Otara Rivers.



Notes:

- 1 2026-2030, 2031-2035, 2036-2040, 2041-2045 are average spend per year.
- 2 The Upper Confidence Level represents a confidence band within which the total costs per year may occur. This takes into account the unknown and unquantified assumptions and risks. Future improvements to the AMP model will allow for enhanced forecasting of Renewals and Asset build Programmes, and will also incorporate the beneficial influences of programmes like the River Scheme Sustainability project.
- 3 The peak in 2018 is associated with Rangitāiki Reid's Floodway work and the Kaituna Ford pump station. The peak in 2023 is associated with Waioeka-Otara climate change works.
- 4 Operational Expenditure reduces from 2025-2045 due to the current assumption of loan repayments and associated finance costs reducing.

Figure 1 BOPRC Flood Protection and Control Infrastructure Expenditure Projections 2015-2045.

Table 1 below depicts the projected operational spend through to 2045. The majority of the categories are consistent in their value throughout the 30 years with only the loan repayments and finance costs reducing as loans are progressively paid off.

AMP cost categories	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026 -2030	2031 - 2035	2036 - 2040	2041- 2045
Maintenance costs	\$ 4,904,330	\$ 4,904,330	\$ 4,904,330	\$ 4,904,330	\$ 4,904,330	\$ 4,904,330	\$ 4,904,330	\$ 4,904,330	\$ 4,904,330	\$ 4,904,330	\$ 24,521,650	\$ 24,521,650	\$ 24,521,650	\$ 24,521,650
Finance costs	\$ 2,280,744	\$ 2,242,900	\$ 2,170,152	\$ 2,221,622	\$ 2,243,687	\$ 2,286,317	\$ 2,198,642	\$ 2,101,895	\$ 1,926,562	\$ 1,738,489	\$ 7,266,230	\$ 6,063,571	\$ 4,919,329	\$ 5,213,364
Infrastructural Insurance	\$ 631,484	\$ 631,484	\$ 631,484	\$ 631,484	\$ 631,484	\$ 631,484	\$ 631,484	\$ 631,484	\$ 631,484	\$ 631,484	\$ 3,157,420	\$ 3,157,420	\$ 3,157,420	\$ 3,157,420
Flood damage reserve	\$ 724,000	\$ 724,000	\$ 724,000	\$ 724,000	\$ 724,000	\$ 724,000	\$ 724,000	\$ 724,000	\$ 724,000	\$ 724,000	\$ 3,620,000	\$ 3,620,000	\$ 3,620,000	\$ 3,620,000
Special Engineering charges	\$ 394,782	\$ 394,782	\$ 394,782	\$ 394,782	\$ 394,782	\$ 394,782	\$ 394,782	\$ 394,782	\$ 394,782	\$ 394,782	\$ 1,973,910	\$ 1,973,910	\$ 1,973,910	\$ 1,973,910
Loan repayments	\$ 2,280,038	\$ 2,421,923	\$ 2,593,856	\$ 2,716,374	\$ 2,907,257	\$ 3,134,031	\$ 3,427,412	\$ 3,080,290	\$ 3,061,894	\$ 2,654,516	\$ 11,334,163	\$ 10,155,842	\$ 7,117,006	\$ 5,682,589
											\$ -	\$ -	\$ -	\$ -
Total Opex	\$ 11,215,378	\$ 11,319,419	\$ 11,418,604	\$ 11,592,592	\$ 11,805,540	\$ 12,074,944	\$ 12,280,650	\$ 11,836,781	\$ 11,643,053	\$ 11,047,601	\$ 51,873,372	\$ 49,492,393	\$ 45,309,316	\$ 44,168,933

Table 1 *BOPRC Flood Protection and Control Operational Expenditure 2015-2045.*

Notes:

- Maintenance costs and some other operational costs are identical for each year, based on the assumption that most capital works replace like with like and there will be limited new infrastructure that does not replace infrastructure already maintained. The current figures are generated by the AMP model to create annualised figures to create a smoothing for rates.*
- Future improvements to the AMP model will allow for improved forecasting of operational costs based on the Renewal and Asset Programme, area serviced, and other system influences such as the beneficial influences of programmes like the River Scheme Sustainability Project.*
- Special engineering charges are associated with business as usual engineering costs such as survey and model maintenance. The capital costs in Figure 1 include costs of 15% for engineering and project management, 20% for resource consents and 30% contingencies.*

5.4 Major Flood Control Capital Works Programme summary

Major new flood control infrastructure projects (defined as being \$0.5M or more of capital expenditure in the Rivers and Drainage Asset Management Plan) that are expected to be undertaken in the 2015-2045 period are shown in the table below. The estimated capital costs are expressed in 2014 New Zealand Dollars.

Major work	Cost \$000	Timing	Assumptions
Kaituna Catchment Control Scheme			
Ford Road Pump Station Replacement	2,200	2017/2018	Timing to suit Kaituna Diversion Project.
Utuhina Stopbanks (Stage 1)	630	2019/2020	
Utuhina Stopbanks (Stage 2)	500	2020/2021	
Stopbanks reconstruction following geotechnical investigations & capacity review	1,900	2024/2025	Geotechnical investigations are scheduled 2018/2019 to identify any issues. Modelling of catchment undertaken 2020-2023.
Kaituna River Climate change capital	810	2026-2030	Improvement to achieve LOS, dependant on climate change forecasts.
Stopbanks reconstruction following geotechnical investigations	1,160	2036-2040	
Kaituna River Climate change capital	810	2036-2040	Improvement to achieve LOS, dependant on climate change forecasts.
Rangitāiki – Tarawera Rivers Scheme			
Rangitāiki Floodway Stage 3	2,700	2015/2016	
Rangitāiki Floodway stopbank raising	8,140	2016/2017-2018/2019	
Rangitāiki Spillway	1,740	2019/2020	Dependant on gaining a new consent to alter the preferred solution and acceptance by landowners.
Rangitāiki River Capacity Upgrades	1,150	2020/2021	
Stopbanks reconstruction following geotechnical investigations	1,800	2021/2022-2023/2024	Scope dependant on geotechnical investigations that are scheduled 2017/2018 to identify any issues.
Stopbanks reconstruction following geotechnical investigations	1,460	2036-2040	
Climate change capital works	760	2036-2040	Improvement to achieve LOS, dependant on climate change forecasts.
Stopbanks reconstruction following geotechnical investigations	770	2041-2045	

Whakatāne – Waimana Rivers Scheme			
Stopbanks reconstruction following geotechnical investigations	570	2023/2024	Geotechnical investigations are scheduled 2018/19 to identify any issues.
Climate change capital works	730	2026/2030	Improvement to achieve LOS, dependant on climate change forecasts.
Stopbanks reconstruction following geotechnical investigations	1,570	2026-2030	
Climate change capital works	1,380	2026-2030	Improvement to achieve LOS, dependant on climate change forecasts.
Stopbanks reconstruction following geotechnical investigations	2,000	2036-2040	
Climate change capital works	1,110	2036-2040	Improvement to achieve LOS, dependant on climate change forecasts.
Waioeka-Otara Rivers Scheme			
Stopbanks reconstruction following geotechnical investigations	765	2022/2023	Geotechnical investigations are scheduled 2018/2019 to identify any issues.
Climate change capital works	850	2022/2023	Improvement to achieve LOS, dependant on climate change forecasts.
Stopbanks reconstruction following geotechnical investigations	1,040	2031-2035	
Climate change capital works	990	2031-2035	Improvement to achieve LOS, dependant on climate change forecasts.
Stopbanks reconstruction following geotechnical investigations	590	2041-2045	
Climate change capital works	960	2041-2045	Improvement to achieve LOS, dependant on climate change forecasts.

5.5 Implications of uncertainty

Cost estimates for the major capital works are indicative and will be refined through detailed investigations including hydraulic modelling, capacity reviews, geotechnical studies and detailed design. It is expected that with each Asset Management Plan and Long-Term Plan revision, the cost estimates will be updated, particularly those in the early parts of these plans which will reflect updated estimates based on the more detailed work. Later estimates will remain uncertain and uncertainty increases in later years.

Risks associated with these uncertainties are included in the Corporate Risk Register.

6 **Infrastructure Strategy Improvement Plan**

The Infrastructure Strategy is a requirement of the Local Government Act Amendment 3 of 7 August 2014 and to be considered during the development of Long-Term Plans.

The Infrastructure Strategy for the Bay of Plenty Regional Council must include assets for flood protection and control works and Council may at its discretion include other assets.

The current strategy has made use of the 50-year Rivers and Drainage Asset Management Plan to forecast the 30-year investment programme.

Council has projects like River Scheme Sustainability and Regional Flood Risk Management that are currently developing whole-of-catchment options for sustainable scheme and flood management. The outputs of these projects may lead to significant changes in the Long-Term Investment Programme. In addition, Council has infrastructure assets outside the flood control schemes, such as the Ohau Diversion Wall and similar.

The Infrastructure Strategy is a live document and will develop as new information is incorporated. The improvement plan will consider:

- 1 The results of the River Scheme Sustainability Project.
- 2 The Programme of Works that may result from pilot catchment work in the western area that is currently testing the pragmatism of the Regional Flood Risk Management Project.
- 3 Other asset management plans such as the regional park, Rotorua Lakes and similar.
- 4 Other assets as deemed significant from time to time.
- 5 Climate change, tectonic subsidence and other externalities that impact on flood infrastructure.
- 6 Other key council projects and programmes such as the Spatial Plan, Water Programme, Tauranga Harbour Programme and similar.

7 Conclusion

- This Infrastructure Strategy fulfils the requirements of Section 101B of the Local Government Act 2002, Amendment Act 2014 of 7 August 2014.
- The Infrastructure Strategy for Bay of Plenty Regional Council must include assets for flood protection and control works and Council may at its discretion include other assets.
- This 30-year Infrastructure Strategy draws off the knowledge base of our River and Drainage Asset Management Plan which has a 50-year timeframe.
- The Infrastructure Investment Programme signals a \$55m capital expenditure and \$307m operational expenditure over the next 30 years.
- The outcomes of the River Scheme Sustainability project and Region Flood Risk Management Project may lead to significant changes in the Long-Term Investment Programme. These projects look at the whole of catchment solutions to mitigate flood risk and reduce expenditure. The outcomes will be incorporated into future Infrastructure Strategies.
- The Infrastructure Strategy Improvement Plan ensures the document keeps track of key outcomes of other influencing council projects and programmes.
- The Infrastructure Strategy is adopted as part of the Long-Term Plan process.

Appendix A

Local Government Act 2002 Amendment Act 2014

Public Act - 2014 No. 55

Date of assent - 7 August 2014

36 New Section 101B inserted (Infrastructure strategy)

After section 101A, insert:

“101B Infrastructure strategy

- “(1) A local authority must, as part of its long-term plan, prepare and adopt an infrastructure strategy for a period of at least 30 consecutive financial years.
- “(2) The purpose of the infrastructure strategy is to-
 - “(a) identify significant infrastructure issues for the local authority over the period covered by the strategy; and
 - “(b) identify the principal options for managing those issues and the implications of those options.
- “(3) The infrastructure strategy must outline how the local authority intends to manage its infrastructure assets, taking into account the need to-
 - “(a) renew or replace existing assets; and
 - “(b) respond to growth or decline in the demand for services reliant on those assets; and
 - “(c) allow for planned increases or decreases in levels of service provided through those assets; and
 - “(d) maintain or improve public health and environmental outcomes or mitigate adverse effects on them; and
 - “(e) provide for the resilience of infrastructure assets by identifying and managing risks relating to natural hazards and by making appropriate financial provision for those risks.
- “(4) The infrastructure strategy must outline the most likely scenario for the management of the local authority’s infrastructure assets over the period of the strategy and, in that context, must-
 - “(a) show indicative estimates of the projected capital and operating expenditure associated with the management of those assets-
 - “(i) in each of the first 10 years covered by the strategy; and
 - “(ii) in each subsequently period of 5 years covered by the strategy; and
 - “(b) identify-
 - “(i) the significant decisions about capital expenditure the local authority expects it will be required to make; and
 - “(ii) when the local authority expects those decisions will be required; and

- “(iii) for each decision, the principal options the local authority expects to have to consider; and
 - “(iv) the approximate scale or extent of the costs associated with each decision; and
- “(c) include the following assumptions on which the scenario is based:
 - “(i) the assumptions of the local authority about the life cycle of significant infrastructure assets:
 - “(ii) the assumptions of the local authority about growth or decline in the demand for relevant services:
 - “(iii) the assumptions of the local authority about increases or decreases in relevant levels of service; and
- “(d) if assumptions referred to in paragraph (c) involve a high level of uncertainty,-
 - “(i) identify the nature of that uncertainty; and
 - “(ii) include an outline of the potential effects of that uncertainty.
- “(5) A local authority may meet the requirements of section 101A and this section by adopting a single financial and infrastructure strategy document as part of its long-term plan.
- “(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 or activities:
 - “(i) water supply:
 - “(ii) sewerage and the treatment and disposal of sewage:
 - “(iii) stormwater drainage:
 - “(iv) flood protection and control works:
 - “(v) the provision of roads and footpaths; and
 - “(b) any other assets that the local authority, in its discretion, wishes to include in the strategy.”