

Notice is given that an ordinary meeting of the Full Council will be held on:

Date: Tuesday 28 August 2018
Time: 9.30am
Meeting Room: Tasman Council Chamber
Venue: 189 Queen Street
Richmond

Full Council

AGENDA

MEMBERSHIP

Mayor	Mayor Kempthorne	
Deputy Mayor	Cr King	
Councillors	Cr Brown	Cr McNamara
	Cr Bryant	Cr Ogilvie
	Cr Canton	Cr Sangster
	Cr Greening	Cr Tuffnell
	Cr Hawkes	Cr Turley
	Cr Maling	Cr Wensley

(Quorum 7 members)

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AGENDA

1 OPENING, WELCOME

2 APOLOGIES AND LEAVE OF ABSENCE

Recommendation

That apologies be accepted.

3 PUBLIC FORUM

4 DECLARATIONS OF INTEREST

5 LATE ITEMS

6 CONFIRMATION OF MINUTES

7 PRESENTATIONS

Nil

8 REPORTS

8.1 Waimea Community Dam Project 5

8 REPORTS

8.1 WAIMEA COMMUNITY DAM PROJECT

Decision Required

Report To:	Full Council
Meeting Date:	28 August 2018
Report Author:	Janine Dowding, Chief Executive Officer; Mike Drummond, Corporate Services Manager; Susan Edwards, Community Development Manager; Richard Kirby, Engineering Services Manager; Rob Smith, Environmental Information Manager
Report Number:	RCN18-08-1
File Reference:	

Preamble

This report is in two sections. Section One is structured in Council's standard report template. Section Two provides information to support section one. This section contains information including that requested by the Full Council at its meeting on 9 August 2018.

1 Executive Summary

- 1.1 This report provides Council with the information it needs to make a decision on whether to proceed with the Waimea Community Dam (the Dam) Project.
- 1.2 During the development of its Long Term Plan 2018-2028, Council consulted on the Waimea Dam Project with an estimated investment of \$75.9 million. At the completion of the Early Contractor Involvement (ECI) process the project estimate has increased to \$102.2 million which is an increase of around \$26.3 million. It is apparent that around \$3.0-\$3.5 million of savings can be made in some aspects of the design and it is intended that these savings will be achieved. This reduces the funding gap to \$23.0 million. However, for this report we will continue to state the project estimate at \$102.2 million.
- 1.3 The Waimea Dam Project must reach financial close by 30 November 2018. The Crown Irrigation Investment Limited (CIIL) and the Ministry for the Environment Fresh Water Improvement funding will no longer be available after 15 December 2018. CIIL have indicated that the funding will still be available if the Local Bill is not passed by the 15 December 2018 deadline, provided all other matters have been resolved and contracts have been signed.
- 1.4 The report covers:
 - 1.4.1 the key principles Council should consider when making its decision on whether to proceed with the project;
 - 1.4.2 the drivers of the project since its inception;

- 1.4.3 changes which have occurred in the environment over time;
 - 1.4.4 the factors which have made the Dam the preferred option over a number of years;
 - 1.4.5 the alternatives and how they compare to the Dam option;
 - 1.4.6 the impacts of Council meeting its share of the funding gap;
 - 1.4.7 the consequences of a decision to proceed with the Dam;
 - 1.4.8 the consequences of a decision that would end the project;
 - 1.4.9 other factors relevant to the decision; and
 - 1.4.10 balancing expert and staff advice against information provided by other parties.
- 1.5 Council has the following options to consider:
- 1.5.1 Option 1: Proceed with the Dam to financial close and fund Council's share of the increased project cost; or
 - 1.5.2 Option 2: Decide not to proceed with the Dam and commence work towards finding a combination of alternative options for affordable and effective solutions, that will provide a secure urban water supply and meet our regional council obligations.
- 1.6 The advantages and disadvantages of Options 1 and 2 above are outlined in the body of the report.
- 1.7 The report also discusses the Council's decision making obligations, the policy and legal context surrounding the decision and the financial implications of the decision Council is being asked to make.
- 1.8 We have also provided an extensive amount of supplementary information to this report, should Council wish to have further information to assist its decision making.
- 1.9 Unless the Council decides to help close the funding gap, the Dam will not proceed despite the compelling case for it. In addition the alternatives, which will cost more, do not deliver the same security of supply and long-term growth benefits that the project does, nor the social, environmental, economic and cultural co-benefits.
- 1.10 The Council needs to reconsider the funding contribution it proposed in the Long Term Plan 2018-2028 and decide whether to increase it. Waimea Irrigators Ltd have indicated their commitment to review their position and funding in order to reach financial close.

2 Draft Resolution

That the Full Council:

- 1. receives the Waimea Community Dam Project ; and**
- 2. re-confirms its decision of 27 July 2017 (CN17-07-1) that the proposed Waimea Community Dam in the Lee Valley is the best solution for meeting the community's need for good quality local water supply infrastructure; and**
- 3. agrees in principle to fund its share (51%) of the \$23m projected capital cost increases in the proposed Waimea Community Dam Project; and**
- 4. notes that the \$23m in 3 above may be offset by a Provincial Growth Fund grant; and**
- 5. instructs staff to progress negotiations and work streams through to a final agreement for Council approval as part of financial close in late November 2018; and**
- 6. notes that the reasons for reviewing the Council's funding position include:**
 - the broad range of benefits offered by the proposed Waimea Community Dam compared to the alternatives, including addressing Council's water management obligations under the Resource Management Act; the National Policy Statement on Freshwater Management; and the National Policy Statement on Urban Development Capacity; and**
 - the costs, lesser benefits, risks and uncertainty associated with the alternatives; and**
 - the obligation to provide good quality infrastructure that is most cost effective for households and businesses; and**
- 7. notes that Waimea Irrigators Limited and Crown Irrigation Investments Limited have indicated their commitment to review their position and funding in order to reach financial close.**

3 Purpose of the Report

- 3.1 The purpose of this report is to provide Council with the information it needs to make a considered, well-informed and robust decision on whether to proceed with the Waimea Community Dam project.**

Section 1

4 Background and Discussion

Introduction

- 4.1 The Waimea Community Dam project has reached a critical juncture after 14 years (the Waimea Water Augmentation Committee started work in 2004) and Council must decide whether to progress with the project. Any decision not to proceed at this time is in effect a decision to end the project. Council is in the unenviable position of having the responsibility to reach a decision, which will be unpopular with some.
- 4.2 The Dam project has been analysed, tested, challenged and peer reviewed more than any other project in Council's recent history.
- 4.3 Council over the years has made numerous decisions to get us to the point we are today. Council has made those decisions following rigorous analysis and advice from staff, and numerous professional experts in their fields, along with input from various stakeholders and from the community.

Key decision making principles

- 4.4 As an elected Councillor, you hold an important leadership role and your primary duty is to serve the interests of the Tasman District as a whole.
- 4.5 You are responsible, following advice from commissioned experts and Council staff, for the strategic decision making that impacts the provision of services for the current and future ratepayers of the District.
- 4.6 The Code of Conduct articulates general principles of good governance. These principles dictate that, when approaching this decision, you must:
- 4.6.1 act with impartiality, making your decision based on merit, and with the best interest of the District in mind (please refer to section 12.12 of this report); and
 - 4.6.2 act with openness, accountability, honesty and integrity; and
 - 4.6.3 exercise personal judgment, taking into account the views of others but reaching your own conclusions on the issues before you; and
 - 4.6.4 ensure that Council maintains sufficient resources to meet its statutory obligations, whilst using resources prudently and for lawful purposes; and
 - 4.6.5 respect the impartiality and integrity of Council staff.

Discussion on key matters to address in this report

The Drivers of the Project Since Inception

- 4.7 The Waimea Plains and surrounding towns draw their water from the Waimea River and its associated aquifers. Since the 1980s, water in the Waimea Plains has been over-allocated (i.e. there is not enough water for all the people who have consents to take water, including urban water supplies, rural irrigators, commercial and industrial water users). Extended periods of dry weather or droughts have meant Council has had to impose water restrictions nearly every summer since 2001. These water restrictions affect the lives of everyone living

and working in the Waimea Plains and the viability of businesses, which rely on a secure water source.

- 4.8 Minimum water flows are required in the Waimea River to maintain ecological, cultural and recreational values. We cannot achieve these values under the existing water allocation regime, which is likely to lead to severe reductions in water allocations to permit holders if a water augmentation scheme for the river is not undertaken.
- 4.9 If there is no Dam and river flows are low, all water take permits from the Waimea aquifers and river system could be cutback by as much as 100%, depending on the severity of the drought. This includes urban water supply permits also, but by a lesser amount. These cutbacks are required in order to protect the health of the Waimea River and avoid saltwater contamination of groundwater, by seeking to maintain a minimum river flow of 800 litres per second. This minimum flow is well below the 1,300 l/s required to maintain the river flows at the seven day mean annual low flow (MALF) level.
- 4.10 Water cutbacks would have a large impact on Waimea Plains urban, rural restricted and industrial water users in Richmond, Brightwater, Redwood Valley, Mapua and Nelson South; on commercial water users in the surrounding area; and on horticultural and agricultural water users.
- 4.11 Security of water supply, particularly over the summer period with peak water demands, is essential for the local economy. A third of all employment in the Tasman District is in the primary industries and manufacturing sectors. 50% of Council's urban water supply for the areas mentioned in 4.10 is used by businesses.

Changes that have occurred in the environment over time

- 4.12 With changing climatic conditions, our Region is projected to experience more extreme and more frequent drought conditions. Without a dam or other water augmentation project, we would currently have some form of water rationing for nine out of ten years. NIWA predicts that due to changing climatic conditions, parts of the Tasman Region, including the Waimea Plains, will by the year 2070 -2090, experience a 10% increase in the frequency of droughts that it currently experiences (NIWA August 2015 *Climate Change and Variability – Tasman District*).
- 4.13 Statistics New Zealand's medium series of population projections show Tasman's population growth is projected to be 9% between 2018 and 2038, with growth in the Waimea catchment area expected to be higher. However, recent population and dwelling growth rates indicate that growth is likely to be higher than the Statistics New Zealand medium growth scenario. Due to the combination of population growth and a trend for smaller households, we expect that housing demand will grow at a higher rate over this period, placing more pressure on our water supply.
- 4.14 The previous Government introduced a National Policy Statement for Urban Development Capacity (NPS-UDC). This new NPS-UDC requires us to plan and provide the necessary infrastructure such as water and wastewater to meet projected housing and business demand.
- 4.15 The demand for water will increase and Council must manage and meet this demand. That includes pressure to increase the minimum flows in the river above the current 1,100 l/s provided under the Dam option.

The factors which have made the Dam the preferred option over a number of years

- 4.16 For many years, Council has accepted that ‘doing nothing’ is not an option when it comes to addressing the water allocation and water quality issues in the Waimea River catchment. There is an equally compelling case for action to secure the urban water supply against droughts and growth demand.
- 4.17 Council has broadly accepted that the proposed Waimea Community Dam in the Lee Valley is the preferred solution to the need to augment the Waimea River and its aquifers. This is in part due to it being the most cost effective and feasible solution to provide multiple benefits to urban water users (residential, commercial and industrial), the environment and to water users on the Waimea Plains.
- 4.18 This Council, as recently as 27 July 2017, has also confirmed this preference when it passed the following resolution (CN17-07-1):

That the Full Council

1. *receives the Waimea Community Dam – Project Report RCN17-07-07; and*
 2. *confirms, having sought and considered further advice about the alternative urban water supply augmentation options, that the proposed Waimea Community Dam in the Lee Valley is the best solution for meeting the community’s need for good quality local water supply infrastructure; and*
 3. *... (parts 3-5 of the resolution covered different matters relating to the Dam).*
- 4.19 The Council is obliged to meet the current and future needs of communities for good quality local infrastructure, in a way that is most cost effective. Under the Local Government Act 2002:
- ...good quality in relation to local infrastructure, local public services and performance of regulatory functions, means infrastructure, services and performance that are:*
- a) *efficient*
 - b) *effective; and*
 - c) *appropriate to present and anticipated future circumstances.*
- 4.20 In mid-2017, Council reviewed a wide range of options prior to passing the resolution on 27 July.

The alternatives and how they compare to the Dam option.

- 4.21 Since 1991, Council has been involved in the investigation of water supply augmentation options for the Waimea Basin. We have commissioned many reports over the years including a feasibility study undertaken between 2004 and 2007 that looked at 18 different sites. Of all of the water augmentation options investigated, a dam in the Lee Valley was the preferred option.
- 4.22 In order to determine the effectiveness of the various options, we assessed the potential urban demands to determine the quantities of water required now and into the future. We then assessed the potential demand against the supply available under the various options and the gaps in supply were identified.
- 4.23 Over the years since 2004, several of the 18 alternatives originally identified have been re-assessed and presented to Council in various forms. We have also considered options to

reduce demand by water harvesting (e.g. rain water tanks). The demand requirements, scope and outcomes of these alternatives varied significantly. In June/July 2017, staff reviewed all the reports on these alternatives or variations of them. Staff recast the scope and deliverables of each of the alternatives utilising the urban demand and supply information. Staff presented the revised alternatives to Council at its meeting 27 July 2017. Essentially the water storage options fall into four categories:

Option 1: Riverside Ponds storage (on banks of Waimea River);

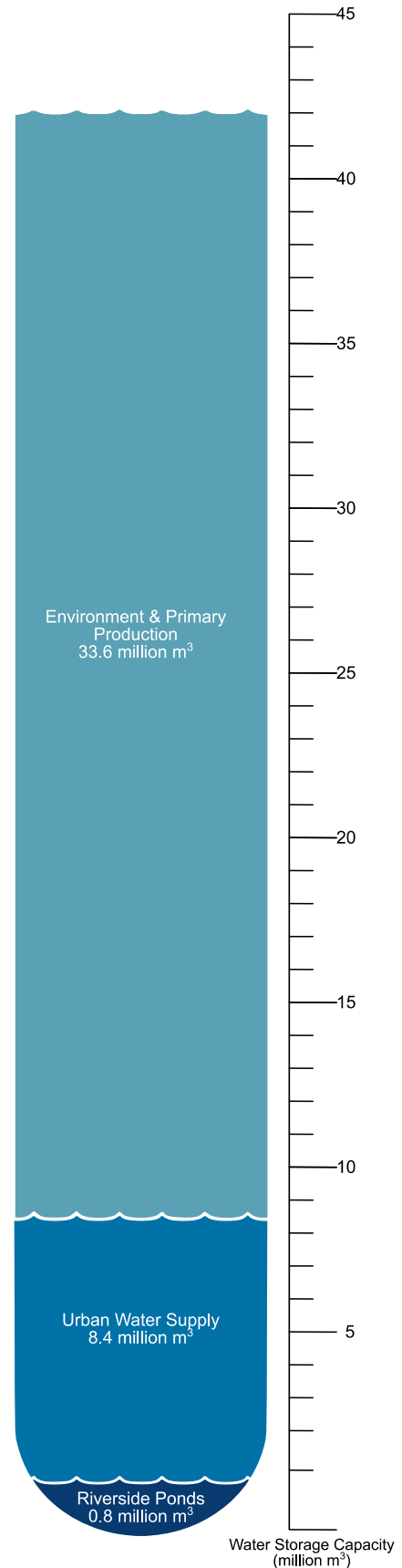
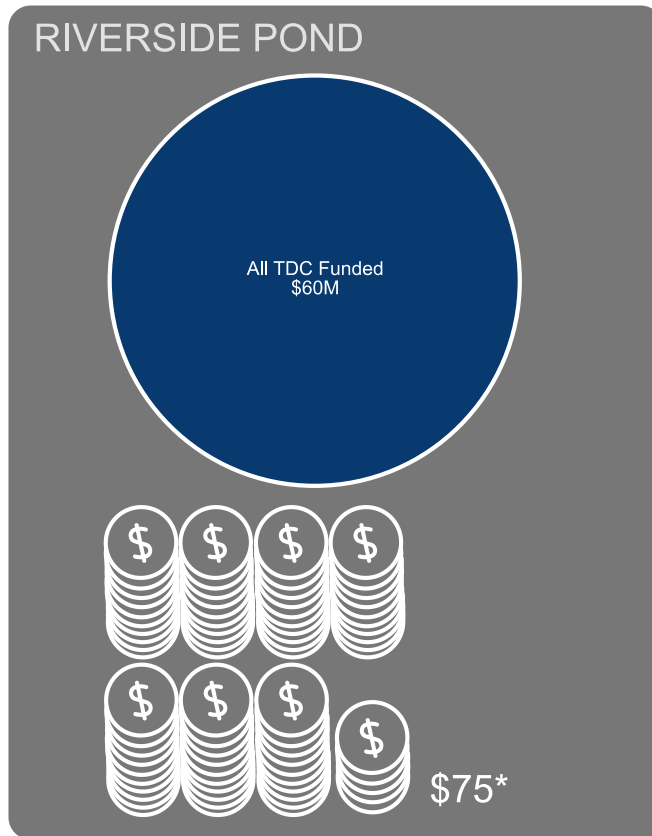
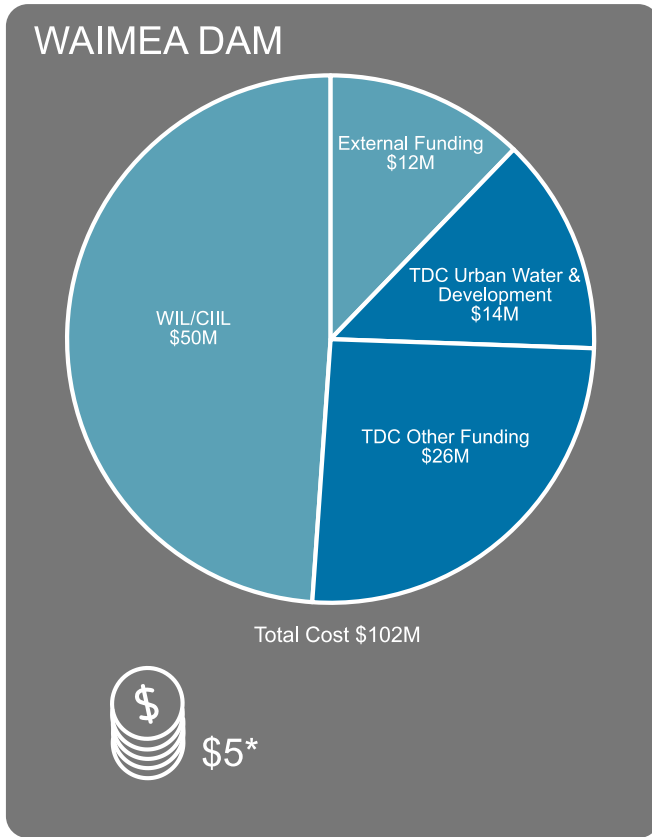
Option 2: Motueka aquifer (piping from Motueka to Mapua/Richmond);

Option 3: Roding River storage (impoundment of Roding River); and

Option 4: Teapot Valley storage (impoundment in Teapot Valley).

- 4.24 An assessment of these options and their variations is contained in section 16 of this report.
- 4.25 Council requested an independent review by specialists of three of the alternatives:
- 4.25.1 Riverside Pond with Storage 500,000 m³ and delivery of 4,000 m³/day;
 - 4.25.2 Riverside Pond with storage of 800,000 m³ and delivery of 13,000 m³/day; and
 - 4.25.3 Motueka Aquifer to Mapua delivering 5,900 m³/day.
- 4.26 In addition, staff have examined the potential for Nelson City Council to supply Tasman, delivering up to 5,000 m³ / day.
- 4.27 It is important to note that these options will only contribute to addressing the urban water supply problem, and will not address river health, biodiversity, economic, recreational or cultural matters.
- 4.28 Section 16 of this report contains updated costs estimates and further analysis of these options.
- 4.29 This analysis shows that the Waimea Community Dam is the most cost effective, reliable, and complete solution for providing water for the urban water supply. The Waimea Community Dam will provide a very high level of security of supply for abstractive users, including Council.
- 4.30 While the dam will hold around 13M m³ of water at any point in time, its effective storage is much higher, at around 42M m³. The Dam storage is dynamic - it will continually be “refilled” from the catchments above. The urban water supply’s share of the Waimea Community Dam’s effective storage is 8.4M m³.
- 4.31 The Riverside Pond option with storage of 500,000m³ and delivery of 4,000m³/day is not likely to sufficiently mitigate rationing for urban and industrial users. Although it could meet the current demand gap during Stage 3 restrictions, it is likely that some form of rationing will occur concurrently. This option is therefore not considered viable for the associated investment of \$25 million. The Northington Report August 2018 reaches a similar conclusion.
- 4.32 The next best alternative to the Waimea Community Dam is the riverside pond option providing 800,000 m³ (0.8M m³) of storage. The cost of pursuing this option is \$60m.
- 4.33 The difference in the value proposition between these two options is stark. Council can pursue a complete solution together with others in our community for a total Council contribution of \$39m or it can go it alone and pursue a partial solution with a lower level of water security for the urban water supply only, at \$60m.

4.34 The difference between the costs and the amount of water secured between these two options is illustrated below.



*Council capital cost per cubic metre of urban water supply storage

- 4.35 As noted above, “doing nothing” is not an option when it comes to addressing water allocation and water quality issues in the Waimea River catchment or for securing the urban water supply against droughts and demands from growth.
- 4.36 For Stage 3 rationing (which we can expect nine years out of 10), the water gap is 4,900 m³/day at its peak, and it will grow to around 12,300 m³/day in 100 years in the medium growth scenario. If we want to secure households and businesses against Stage 5 rationing (one in five years) then the peak water gap is 13,000 m³/day now and will be 21,000 m³/day in 2117.
- 4.37 Cost is not the only factor contributing to Council’s previous decisions that the Waimea Community Dam is the preferred option. The wider social, economic, environmental and cultural benefits of the options were also relevant to the decision making. When other non-financial matters are considered, the choice becomes even clearer. The other matters include benefits such as to the environment, to irrigators and others in the community, as well as leveraging private and government funds.
- 4.38 There are also risks or dis-benefits of the options to consider. In the case of the Waimea Community Dam most of the risks have been mitigated through the Plan Change process, design, consenting, procurement process and use of the Public Works Act. There are residual (unmitigated risks) to be considered with the Dam such as flooding during construction and legal challenges. Those risks exist with every option on top of the risks that have already been managed in the case of the Dam.
- 4.39 The case for the Council investing in the Waimea Community Dam for the benefit of urban water users is compelling. The case is further strengthened because of the contribution the Dam makes to meeting the National Policy Statement on Freshwater Management objectives, Resource Management Act objectives (particularly in relation to water management) and Council’s strategic goals.

The impacts of Council meetings its share of the funding gap for the project.

- 4.40 Council will meet its share of the funding gap through use of rates, fees and charges on the same basis as the existing model for funding the project. Council’s approach to the allocation of these costs across the District is contained in Council’s Revenue and Financing Policy. The increased capital and likely operating costs have been estimated and the revised rating impacts are set out later in the report. The allocation of costs have also been impacted by growth in households and the 2017 District wide revaluation. Any grant funding from the Provincial Growth Fund (PGF) would have a positive impact on reducing the level of rates required across the District to fund the environmental and public good aspects of the project and make the project more affordable for the community.

Consequences of a decision to proceed with the Dam.

- 4.41 If Council decides to proceed with the Dam it will need to make a commitment to fund its share of the additional costs of the project, on the understanding that other funding sources are not yet finalised and may not eventuate. The final decision to proceed or not will be made by all Joint Venture partners prior to financial close in late November 2018.
- 4.42 The portion of the project that is subject to overruns (i.e. not fixed) is \$18m. There is a contingency of \$2.355m (13%) built into this figure. Given the rigour applied to the project to date, it is not expected that this would be exceeded.
- 4.43 There are tight timeframes to complete all of the work streams required to reach financial close. Council’s cost for negotiations and professional support will be met from within the

already approved budget. There is \$247,000 remaining available to fund the Council unrecoverable costs out to financial close.

4.44 There is still a risk, albeit unlikely, that the Local Bill will not be enacted. This is the only matter that can be outstanding at financial close if the Crown Irrigation Investments Limited and Ministry for the Environment funding is to be retained.

4.45 If the Dam proceeds, provision will be made for installation of hydroelectricity generation to utilise the stored energy in the water as it is released into the Lee River. This will generate some income. The marginal cost for installing (or providing for) hydroelectricity will need to be met by Council.

The consequences of a decision that would end the project.

4.46 If Council was to make a decision not to proceed with the Dam, a combination of alternative water solutions that are affordable and effective for present and anticipated future circumstances, must be found for:

- river health;
- urban demand (residential and commercial uses);
- horticulture and agriculture needs; and
- industry needs.

4.47 We will need to scope, investigate, design and obtain necessary consents and land, and consult on any alternative solution with the public. Any alternative is likely to take several years to develop to the stage of being implementable, assuming there is an affordable alternative to the Dam. Any alternatives to date will likely only address the short-term urban water needs.

4.48 Council and ratepayers will need to fully fund any alternative. At the moment, under the Council's Revenue and Financing Policy, the funding allocation for the most likely alternative would all go to the Urban Water Club. If Council wished to change that allocation due to affordability concerns, it would need to publicly consult on an amendment to its Revenue and Financing Policy.

4.49 Until we have identified and implemented an alternative water solution, the Waimea River will continue to have compromised health.

4.50 The Tasman Resource Management Plan rules under a no dam scenario will come into immediate effect. These rules will bring in greater controls on water use for all users and will mean restrictions on new residential, industrial and business development until we identify and commission any alternative urban supply solutions.

4.51 Under the Tasman Resource Management Plan rules, Stage 3 rationing could occur nine out of every ten years (based on the last 16 years of data). This level of rationing would require the greater of a 25% reduction in urban water consumption and a 50% reduction in water for the other consented takes. Stage 5 rationing, which could occur one in every five years based on last 16 years of data, allows for water takes of only 125 litres per day, per person for essential human health.

4.52 Council is currently considering a proposed bylaw, which will apply restrictions to manage water demand. The bylaw will require new enforcement and compliance action by Council, which will add additional cost to Council and frustration and dissatisfaction to urban water users who are subject to enforcement action, fines and prosecution. The level of restrictions

- required is likely to cause significant disruptions to our community and to many businesses connected to Council's urban water supply.
- 4.53 There will be less water available for irrigation in droughts and a reduced security of supply for businesses who rely on water. This will negatively impact on business investment and some businesses have already indicated that they may close down or relocate out of the District. Some businesses have indicated that they will not be able to operate, which will have impacts on their employees and the contracts they have with other providers and suppliers and customers.
- 4.54 Any attempt to amend the Tasman Resource Management Plan to enable more water abstraction from the Waimea River or aquifers, or to change the rules to give priority to urban water, is likely to be opposed, with the potential for even greater restrictions due to higher environmental flows and earlier triggers for cease takes being imposed. Council does not have an unfettered power to change the Tasman Resource Management Plan.
- 4.55 There will be a substantial financial and economic loss to the Nelson-Tasman region if the Dam does not proceed.
- 4.56 The loan funded investment in the project to date will need to be repaid or be written off, including:
- 4.56.1 \$2.5m unrecoverable costs and \$4-5m of Joint Venture project costs which were to be refunded by the joint venture and need to be loan funded over 5 years and rated for;
 - 4.56.2 The investment made to date by the multiple parties involved circa \$13m becomes a stranded investment.
- 4.57 The project will also lose all the external investment from Crown Irrigation Investments Limited, Ministry for the Environment Freshwater Improvement Fund, Nelson City Council, irrigators and any potential grant from the Provincial Growth Fund. The funding at risk totals approximately \$60 million. Any indication at this stage that Council will not be pursuing the Dam project will mean the loss of this funding and it will not be recoverable at any time in the future.
- 4.58 There is a strong belief within sections of the community that there is plenty of water in the aquifers and therefore abstraction restrictions are not necessary. It is true that there are large volumes of water in the aquifers, however the volume of water is not the issue. The issue is the water level in those aquifers. Abstraction will draw the water level down to a point where it detrimentally affects the flow in both the Wairoa and Waimea Rivers. The rivers dry up as the water naturally wants to drain into the aquifers to restore their water levels. The lower water level in the aquifers would also encourage salt water to drain into them from the Waimea Estuary thereby increasing the risk of salt water intrusion. It is therefore critical that the flow is maintained in the river to retain water levels in the aquifers as abstraction occurs.
- 4.59 A decision not to proceed with the Dam would also result in the lost opportunity for hydroelectricity generation.
- 4.60 Staff consider that a Council decision or indication not to proceed with the Dam would be of a high level of significance. Such a decision would be inconsistent with Council's Long Term Plan 2018-2028 (refer to section 9 for details).

Other factors relevant to the decision.

- 4.61 Council's decision on the Dam will impact the economy of the Nelson-Tasman region. The New Zealand Institute of Economic Research (2017) report suggests that if the Dam does not proceed, the Nelson-Tasman economy would be \$20 million smaller each year on average with water allocation cuts of 20%, and \$49 million smaller with cuts of 35%.
- 4.62 The Northington Partners Report (2017) estimated the potential financial and economic loss from a no dam option at \$859m assuming a 20% water take cut, or \$1,132m assuming a 35% water take cut. Of this total, an estimated \$29m was the lost opportunity cost of environmental improvement in the river system.
- 4.63 The decision on the Dam will have an effect on wider community well-being in terms of river health, recreational opportunities, employment opportunities and the cultural values of the river.
- 4.64 Council has applied to the Provincial Growth Fund for a grant towards the Dam project. The success or otherwise of this application is not yet known. If the application is successful, the funding would help bridge the gap in funding created by the increased project costs.
- 4.65 As noted earlier in this report, the projected impacts of climate change are likely to lead to increased droughts in the Waimea catchment and increase the incidents of water rationing if a water augmentation project is not undertaken.
- 4.66 The Government is reviewing the management and delivery of the three-water activities as a result of the Havelock North Inquiry. It has signaled that this broad-ranging review will be undertaken this year. The Government recognises that the local government sector is facing variable service delivery challenges and significant cost pressures related to the management and delivery of the three-water services.
- 4.67 There has been some commentary that with the pending three waters review; the Council should not invest in the Waimea Community Dam because the government will soon take over the three-waters and it can then be responsible for water augmentation. This view is not supported because:
- 4.67.1 There is no certainty as to whether the 3 waters activities will be aggregated into a separate entity or the scale of any aggregation. If aggregation did occur then the aggregated entity would only be interested in water augmentation for the urban supply and not be interested in any other benefits. Alternative water augmentation options have already been identified as not being as cost-effective for urban water supplies as the Waimea Community Dam;
 - 4.67.2 The Council has a regional council responsibility to protect and enhance the environment. It would need to find another means to maintain and enhance the ecology of the rivers;
 - 4.67.3 The Council has a statutory responsibility to ensure the economic, social and environment wellbeing of its community. The economic multiplier of the Dam has been verified by the Northington report;
 - 4.67.4 The government has not signalled how it may help in financing or subsidising the three-waters. Even if it does subsidise in some form or other, users would still bare the greater share of the funding. Any subsidy is not likely to match the current funding that the government has allocated to the Waimea Community Dam.

- 4.67.5 Potentially the transfer of the water supplies to a separate entity, would also result in the transfer of the water supplies' debt and share of operating costs related to the Waimea Community Dam.
- 4.67.6 It is likely that there will be a new regulator and review of the current regulations related to the three waters activity.
- 4.67.7 Any investment from government would likely be prioritised to areas of high deprecation.

Balancing expert and staff advice against information provided by other parties.

- 4.68 Council is entitled to rely on the advice of staff and the evidence of specialists engaged to contribute in their area of expertise to this project. They are professionals who are recognised experts in their field. They have professional membership and indemnity cover.
- 4.69 Commentary from members of the public is generally in the nature of views and preferences (which the Council is obliged to consider). As to technical and financial matters, the Council may be expected to rely on expert professional advice. Wherever possible, matters raised by submitters have been subject to review and commentary from officers and specialist advisors.
- 4.70 A full list of the reports commissioned by Waimea Water Augmentation Committee or Council on the Dam is outlined in Attachment I.

5 Options

- 5.1 Council has the following options to consider:
 - 5.1.1 Option 1: Proceed with the Dam through to financial close and fund Council's share of the increased project cost; or
 - 5.1.2 Option 2: Decide not to proceed with the Dam and to commence work towards finding a combination of alternatives that are affordable and effective solutions, that will provide a secure urban water supply for the Waimea Plains and meet our regional council obligations.
- 5.2 **Option 1: Proceed with the Dam through to financial close and fund Council's share of the increased project cost** – the advantages of option one are that this option would have the least cost to Council and ratepayers. It would be the easiest option to achieve, given the Dam project is well scoped, consented and Council has a firm tender price for the Dam construction. The Dam project is consistent with proposals Council has previously consulted with the public on; and it would enable Council to provide a secure urban water supply to the Waimea Plains at the earliest time. This project also achieves wider benefits to the region, including to irrigators and public good outcomes such as improving the health of the Waimea River, recreational opportunities, employment opportunities, opportunities for growth, etc. There will also be an opportunity for Council to decide not to proceed with the Dam if all the agreements are not concluded successfully by financial close.
- 5.3 The main disadvantages of this option are the increased costs associated with the project. These are above what Council has provided for in its Long Term Plan 2018-2028. Other capital projects may need to be delayed in order for Council to keep within its debt and rates limits.

- 5.4 **Option 1** is the recommended option.
- 5.5 **Option 2: Decide not to proceed with the Dam and to commence work towards finding a combination of alternatives that are affordable and effective solutions, that will provide a secure urban water supply for the Waimea Plains and meet our regional council obligations**– the advantages of this option are it will defer the cost of the Dam project in the short term. The disadvantages of this option are outlined in paras 4.46–4.60 above. The discussion on significance and engagement in section 9 of this report is of particular relevance to this option and should be read in conjunction with it.

6 Strategy and Risks

- 6.1 Providing a safe and secure urban water supply is a key activity for Council. The Waimea Dam project is designed to enable Council to achieve a safe and secure water supply to the residents and businesses on the Waimea Plains, while also achieving a range of public good benefits, including economic, environmental, social, recreational and cultural benefits.
- 6.2 There are a range of risks associated with the project should it proceed, including construction risks, funding risks, reputational risks for Council, among others. A full discussion on risk is outlined in section 23.4-23.17 of the report.
- 6.3 There are also risks should the project not proceed in terms of economic risks to the Nelson-Tasman region, loss of employment opportunities, lost growth and development opportunities, constraints on growth, lost opportunities to improve the health of the Waimea River and reputation. Council has received information on these matters in various reports over recent years.

7 Policy / Legal Requirements / Plan

- 7.1 Over the years, there has been a great deal of consultation on the Waimea Community Dam project. It has been contained in Council's Long Term Plans since at least 2006. Council has also undertaken specific consultation on the project in both 2014 and 2017.
- 7.2 Through the adoption of its Long Term Plan 2018-2028 on the 28 June 2018, Council confirmed its investment of \$26.8m towards the capital cost of the Dam, and approximately \$715,000 per annum (inflation adjusted) for operational costs. Council is meeting the Dam costs through a mix of targeted rates, development contributions, and revenue and enterprise activity surpluses.
- 7.3 Our Revenue and Financing Policy allows Council to make provision for the allocation of costs associated with the Dam.
- 7.4 Please refer to section 9 of this report for a discussion on the complex issues relating to the significance and engagement, and meeting the Local Government Act 2002 requirements.
- 7.5 There are other factors that the Council must have regard to in complying with the decision making provisions in the Local Government Act. These include the principles in s.14 of the Act, Council's resources and the extent to which the nature of the decision, or the circumstances in which it is taken allow the Council the scope to consider options, or the views and preferences of persons.

- 7.6 Among the s14 principles that are relevant here are:
- 7.6.1 Openness;
 - 7.6.2 The views of all communities;
 - 7.6.3 Your (strategic) priorities and desired outcomes;
 - 7.6.4 Collaboration with other bodies;
 - 7.6.5 Prudent stewardship of resources; and
 - 7.6.6 Effective future management of assets.

8 Consideration of Financial or Budgetary Implications

- 8.1 The proposed Dam is among the larger single investments the Tasman community is proposing to make in its core infrastructure. As a water augmentation project it provides a range of benefits across the community – water supply benefits, public good benefits like economic, environmental, recreational, social and cultural benefits and irrigation benefits. This makes the division of Council's costs more complex than a pure irrigation or urban water supply scheme.
- 8.2 Section 101(3) of the Local Government Act 2002 sets out the matters that Council must consider when funding an activity. Council completed an analysis of those matters for the allocation of our funding contribution to the Dam project in October 2017. From that analysis, Council agreed on a preferred funding model to include in the 2017 Waimea Community Dam Consultation Document – Statement of Proposal for Governance and Funding arrangements. That funding model as subsequently adopted into our Long Term Plan 2018-2028.
- 8.3 In order to fund the proposed increase in our 51% share of the Dam costs of \$23m, we propose to retain the adopted funding model whereby the additional project costs are apportioned across direct and indirect beneficiaries on the same basis.
- 8.4 The extractive user contribution through the Urban Water Club would increase from \$9.58m to \$13.4m (including \$1.9m in development contributions).
- 8.5 The Community and Environmental benefits share of the costs would increase from \$4.29m to \$12.4m (without any Provincial Growth Fund funding). This would see the District wide rate increase from its maximum of approximately \$29/rateable rating unit/year to \$46 /rateable rating unit/year (based on the 2017/2018 number of rating units).

the Council can consult on any project delays through the Annual Plan consultation processes for those years, if needed.

- 9.4 The matter of a decision or indication not to proceed with the Dam is far more complicated in terms of its level of significance and the need for public consultation. Staff consider that a Council decision or indication not to proceed with the Dam project would be of a high level of significance. Such a decision would be inconsistent with Council's Long Term Plan 2018-2028 and Council would need to clearly identify the inconsistency; the reasons for the inconsistency; and any intention to amend the Plan to accommodate the decision (section 80 of the Local Government Act 2002). Staff consider, that a no Dam decision would trigger a Long Term Plan amendment under section 97 of the Local Government Act 2002. Section 97 states that Council can only make certain decisions if they are provided for in the Council's Long Term Plan. Such decisions are a decision to alter significantly the intended level of service provision for any significant activity undertaken by or on behalf of the Council, including a decision to commence or cease any such activity; or a decision to transfer the ownership or control of a strategic asset to or from the Council. In our view, a no dam Council decision would lead to a reduction in the level of service for water supply and security on the Waimea Plains and for environmental enhancement of the Waimea River. Therefore, prior to making a decision not to proceed with the Dam, Council should amend its Long Term Plan through a public consultation process.
- 9.5 The difficulty Council faces in this situation is that there is unlikely to be sufficient time to undertake a Long Term Plan amendment prior to the 30 November deadline for financial close and the 15 December 2018 date for the withdrawal of Crown funding. Also, any indication by Council that it may wish to make a no Dam decision following consultation on a Long Term Plan amendment is likely to mean our joint venture partners are no longer willing to invest time and funding in completing the workstreams needing to be undertaken prior to financial close. Either way, the effect would be that the Dam project would fail. Therefore, Council needs to carefully consider the decision it makes and the risks it could expose itself to if it does not follow correct process under the legislation.

Issue	Level of Significance if <u>proceeding with Dam</u>	Explanation of Assessment	Level of Significance if <u>no Dam decision</u>	Explanation of Assessment
Is there a high level of public interest, or is decision likely to be controversial?	High	The Dam project has attracted a lot of public interest and is controversial.	High	The Dam project has attracted a lot of public interest and is controversial.
Is there a significant impact arising from duration of the effects from the decision?	Low to Moderate	The decision to continue with the Dam project is considered of low to moderate significance due to the rating and debt impacts on ratepayers and that it is over a 30 year loan period.	High	A no Dam decision will be of high significance due to the loss of the \$55+ million of Government funding and the implications for the District of lost water security, economic productivity, environmental impacts, social impacts (e.g. employment), etc.
Does the decision relate to a strategic asset? (refer Significance and Engagement Policy for list of strategic assets)	N/A	If the Dam is built, the Council has determined that its investment in the Council Controlled Organisation will be listed as a strategic asset in the Significance and Engagement Policy. However, the Dam is not currently listed.	N/A	
Does the decision create a substantial change in the level of service provided by Council?	Low	The Council has already decided it is going to provide this level of service in the Long Term Plan (LTP).	High	A no Dam decision would affect the degree of water supply and security for urban water users and it would negatively affect the level of environmental protection to the Waimea River and connected aquifers. Therefore, it would change the levels of service provided for in the LTP.

Issue	Level of Significance if <u>proceeding with Dam</u>	Explanation of Assessment	Level of Significance if <u>no Dam decision</u>	Explanation of Assessment
Does the proposal, activity or decision substantially affect debt, rates or Council finances in any <u>one year</u> or more of the LTP?	Moderate	Most of the additional cost will fall on the community and environmental good component, which will <u>impact on all general ratepayers</u> in the District. It will also <u>impact more on the Zone of Benefit ratepayers</u> . There will be a relatively minor impact on the urban water users.	High	A no Dam situation will require Council to look for alternative options to supply the urban water users. These alternatives are likely to be significantly more costly than Council's share of the Dam. The District will lose the Government's \$55+ <u>million</u> of funding towards a water solution and the joint venture <u>parties</u> contributions will be lost.
Does the decision involve sale of a substantial proportion or controlling interest in CCO?	N/A	The CCO <u>has not yet been established</u> and is not being proposed to be sold through these decisions.	N/A	The CCO <u>has not yet been established</u> and is not being proposed to be sold through these decisions.
Does the decision involve entry into a private sector partnership or contract to carry out the deliver on any group of activities?	Low	Already within a JV partnership. This decision would not change that.	High	This decision would involve the exiting of a JV partnership.
Does the decision involve Council exiting from or entering into a group of activities?	N/A		Moderate	The Dam is an activity <u>proposed to be carried out by Council</u> in the LTP. A no Dam decision would mean Council would be existing from an activity but not the whole water supply group of activities.

10 Conclusion

- 10.1 The case for building the Waimea Community Dam remains compelling. A large-scale water augmentation scheme needs to be built if the Council is going to meet its obligation to provide households and businesses with a reliable water supply at least cost in the longer term. The project also enables Council to meet its freshwater management obligations and is critical to the future viability of local industry and rural land users. Without a dam, the water supplies in the area of the District supplied from the Waimea aquifers will fail to meet people's needs now and into the future.
- 10.2 As unpalatable as the choices may seem, one has to be made.
- 10.3 While the Waimea Dam project may seem large and complex, in reality Council's proposed capital contribution to the project is only about 10% of its Long Term Plan capital works budget over the next 10 years.
- 10.4 The project will not proceed unless the partners (primarily Waimea Irrigators Ltd, Council and Crown Irrigation Investments Ltd) are able to find a solution to closing their share of the funding gap. The case for all of the partners continuing to work together and collaborate on the project is strong. Since the increased costs became known the partners have committed to closing the funding gap.
- 10.5 Council cannot meet its urban water supply needs now and in the future, without water augmentation on the scale that the project provides. Demand control measures, even the most severe, will not reduce demand from households and businesses to the extent that the water allocation rules in the Tasman Resource Management Plan require, if there is no Dam.
- 10.6 The alternatives to the proposed Dam are either more costly; don't provide the same protection against droughts; don't provide for the increase in future demand; or don't meet Council's obligations under the National Policy Statement on Freshwater Management and the National Policy Statement on Urban Development Capacity. Some of the alternatives fail on all counts. The options for industrial and rural water users are also limited if Council decides not to proceed with the proposed dam in the Lee Valley.
- 10.7 Increasing Council's contribution to the project and continuing the collaboration on the Dam delivers the direct benefits needed for less cost than going it alone. As a bonus, the scheme delivers a suite of environmental, social, recreational, cultural and economic benefits that no other option does. To realise those benefits, all the partners, including Council, need to reconsider the limits they previously placed on their contributions to the project.
- 10.8 Even with an increased Council contribution, the project is still the most effective way of meeting the current and future water supply needs of the households and businesses in the area. All of the alternatives carry more risk than the Dam project; most are actually 'unrealistic' and none deliver the same level of water supply security now or in the future or the co-benefits that the project does.

11 Next Steps / Timeline

- 11.1 If Council agrees to proceed with the Dam project, staff will continue negotiations with our joint venture partners to close the funding gap.
- 11.2 Staff will also continue working on the workstreams needed to get the project to financial close.

Section 2

12 Statutory Responsibilities

Legal Decision Making obligations

- 12.1 Given the duration, cost and significance of the project, Councillors should have due regard to the legal framework within which their decision making must occur. In particular, consideration should be had to the principles set out in section 14 of the Local Government Act 2002 (LGA), the decision-making requirements of sections 76 to 82, and the prudential financial management requirements of section 101.
- 12.2 The first principle in section 14(1)(a) is to conduct the Council's business in an open, transparent and democratically accountable way and give effect to identified priorities and desired outcomes in an efficient and effective manner. Through successive consultations, the Council has set a course towards a water augmentation scheme to achieve certain objectives. Those objectives remain and the Council's response to the pricing development should be guided by efficient and effective delivery.
- 12.3 The fundamental decision-making obligations in section 76 to 82 are to identify and assess the reasonably practicable options for achieving the objective of a decision and to consider the views and preferences of interested and affected persons (in proportion to the significance). In the present case, the objective of the decision properly before the Council now is to determine how to respond to changed pricing information. In the context of the history of this matter, this has at least medium significance. It certainly does not lend itself to an opportunist, reactive decision that would be irreversible and costly to the overall attainment of the desired outcomes.
- 12.4 The Council's purpose in section 10 LGA includes meeting the current and future needs of communities for good quality local infrastructure in a way that is most cost effective for household and businesses. Good quality means effective, efficient and appropriate to present as well as future circumstances. Network infrastructure is a core service and includes water collection and management.
- 12.5 In a similar vein, section 101(1) requires the Council to manage its general financial dealings prudently and in a manner that promotes the current and future interests of the community.
- 12.6 But the Council has other matters that need to be considered, alongside those relating to financial prudence in its decision-making. If, for example, a Councillor were of a mind to not proceed with the Dam because of a concern about a disproportionate allocation of cost and risk to the Council, the Councillor would need to consider the extent to which such a decision would or would not:
- 12.6.1 meet the current and future needs of the community for a safe and secure future water supply or as the LGA puts it – the need for good quality cost effective local infrastructure, (good quality meaning effective, effective and appropriate to future circumstances);
 - 12.6.2 achieve Council's community outcomes;
 - 12.6.3 address the key issues for the community that were identified in Long Term Plan including water supply resilience;

- 12.6.4 enable the Council to actively cooperate with other councils and bodies to achieve its priorities and outcomes;
 - 12.6.5 deliver on Council's infrastructure strategy;
 - 12.6.6 maintain and enhance the natural environment;
 - 12.6.7 constitute a sustainable development approach especially taking into account the needs of future generations;
 - 12.6.8 enable Council's obligations under both the National Policy Statement (NPS) on Urban Development Capacity and the NPS for Freshwater Management (NPSFM) to be met; and
 - 12.6.9 be consistent with Council's strategic direction – leadership, service, decisions that enable.
- 12.7 This is not an exhaustive list but Councillors will immediately see the tension that exists between the role of the Council in decision making and what many people may say to Councillors that it should be. While Councillors must have regard to the views of their communities and take account of their diversity and interest, this issue cannot be resolved by a popular community vote.
- 12.8 Councillors have made a declaration to make decisions impartially and according to the best of their skill and judgment, in the best interests of the whole District. This requires the exercise of prudential judgment on the information before them, in a manner that promotes the current and future interests of the community.

Conflicts/Interests

- 12.9 The Councillors are reminded that they must be careful to maintain a clear separation between their personal interests and their duties as a member of the Council, so as to ensure decisions are made free from bias (whether real or perceived).
- 12.10 The Councillors should remain mindful of (and satisfied of their compliance with) the statutory and common law principles relating to conflicts (both pecuniary and non-pecuniary). A thorough summary of the general legal framework with respect to Conflicts of Interest has previously been articulated in detail to the Councillors in the presentation by Jonathan Salter and James Winchester of Simpson Grierson on 24 October 2017 and was reiterated by Jonathan Salter on 1 February 2018.
- 12.11 In the interest of openness and fairness, the Councillors are encouraged to take a cautious approach to conflicts of interest.
- 12.12 The Councillors are respectfully referred to Standing Order 19.7 (Financial Conflicts of Interest) and 19.8 (Non-financial Conflicts of Interest) for the relevant rules for the conduct of the meeting on 28 August 2018. For the avoidance of doubt, where a Councillor decides that they have a conflict of interest, they must:
- 12.12.1 Declare that they have a conflict of interest when the matter comes up at the meeting;
 - 12.12.2 Refrain from discussing or voting on the matter;
 - 12.12.3 Leave the table when the matter is considered (and note where there is a financial conflict, they may also need to leave the room); and
 - 12.12.4 Ensure that their declaration and abstention is recorded in the minutes.

Significance and Engagement

12.13 Council is of the view that:

12.13.1 A decision to proceed to financial completion would not be considered a decision 'to alter significantly the intended service level provision for any significant activity' as envisaged by s.97(1)(a) LGA. The practical consequence of this is that a mandatory amendment to the Long Term Plan would not be required.

12.13.2 A decision not to continue to financial completion would constitute a decision 'to alter significantly the intended service level provision for any significant activity' as envisaged by s 97(1)(a) LGA. This would require a Long Term Plan amendment, and that in itself, would need to be the subject of consultation. In this event, any consultation on this Long Term Plan amendment would be moot, since the consultation could not properly occur (and the results collated and considered) before the expiry of the 'drop dead date' for financial close.

The Council's Role as the Regulatory Authority

12.14 Regard must be had to Council's obligations under the Resource Management Act 1991 (RMA). The RMA covers, amongst other things, water management and water use (how it is taken, used, dammed or diverted). The RMA sets out requirements that Council must meet with regard to water management and use, processes it must follow, and things that it must consider when making decisions.

12.15 Central Government has a role in that it is responsible for making regulations that councils must implement. It also provides direction for water management through national policy statements, such as the NPSFM that councils must implement.

12.16 The NPSFM aims to safeguard healthy rivers and requires Council to avoid over-allocation of water quantity, and phase out existing over-allocation by reviewing permits and setting take limits as environmental flow regimes and allocation limits, using defensible approaches that include integrating surface and groundwater dynamics.

12.17 Under the NPSFM over-allocation means not meeting the management objectives set to sustain the values established for the water body. Under this meaning, the Waimea plains zones are substantially over-allocated despite the modest objectives and standards set in TRMP provisions.

12.18 The current government has signalled through the media that it intends to amend the NPSFM in the near future to strengthen the quantity allocation requirements among others; but at present there is no detail on this. Even without setting further national policy requirements, the development of freshwater limit-setting practice and associated case law around New Zealand is almost certain to drive an expectation that in the event of no dam or other substantially effective water augmentation, the response required to reduce over-allocation is still substantial by any measure.

12.19 The implications of not progressing with the Dam are:

12.19.1 The Council would be expected to withdraw the current plan change 67 which seeks to delay the implementation of the 'no dam' provisions of the TRMP by one year (1 November 2018 to 1 November 2019).

12.19.2 The Council would have to release the decisions on the 329 water permits on the Waimea Plains on the basis of the 'no dam' TRMP provisions and following the

results of the bona fide reviews. This will result in reductions in pre-plan change allocations as shown in the following table.

Percentage of permits affected (number of permits affected)	Percentage of reduction in current allocation
4% (14)	100%
13% (43)	50%-99%
34% (112)	20%-49%
27% (88)	1%-19%
22% (72)	No change

12.20 However, overall the bona fide review only managed to reduce over-allocation by 27.2% and the reduction target from the 2013 allocations required in the TRMP is 42%. If the Council were to manage the water system to achieve the 800 l/sec target minimum flow for about a 10 year security of supply with restriction, permits would have to be cut back by this amount.

12.20.1 To give effect to the National Policy Statement for Freshwater Management (NPSFM), the Council would be expected to move to resolve any inconsistency around minimum flow by way of a plan change. Given the 800 l/sec standard is only about 36% of the Mean Annual Low Flow (7-day MALF), the Council may come under pressure to change the TRMP to ensure compliance with the NPSFM. There may be other drivers for a plan change which will come with significant litigation risk either way.

12.20.2 Implementation of the new permit allocations, together with the new rationing restrictions which will come in earlier than in the past, will severely impact on water users in the event of a dry summer. Based on past trends, water users will be subject to 50% cuts for between five and 104 days each year (average 28 days/year). This would impact the smaller more vulnerable extractors.

12.20.3 The Council will likely have to allocate more resources to monitoring and enforcement as water abstractors seek to optimise use of scarce water over summer. There is an existing history of over-takes during restrictions, and this will only increase. The Council will have to take enforcement action to ensure compliance.

The Council's role as Community Water Supplier

12.21 The challenges of not having the Dam as a water augmentation solution is summarised as follows. They would apply until an alternative water augmentation solution is commissioned. They would affect over 20,000 residents in Brightwater, Richmond, Redwood Valley and Mapua (around 40% of the District's population), as well as many commercial enterprises, and our customers in Nelson South.

12.22 The Council, as community water supply authority, during rationing will have to achieve a 25% cut based on the previous eight years usage rates, at the same time other permit holders are under rationing of 50%. This is expected to occur nine out of every ten years.

- 12.23 The Council will have to impose restrictions on our customers in order for us to comply (Public Water Supply Bylaw currently undergoing consultation). The actual reductions required from our customers will need to be proportionally higher than the percentage reduction required by the Council. This is due to recent growth in water demand and because non-revenue water makes up a portion of the water in our system.
- 12.24 In the worst case scenario, when Stage 5 rationing is in force, our customers would only be allowed water for essential human and animal health and safety. In these circumstances, many businesses may not be able to continue operations. The impact of these restrictions on our community and its economic well-being would be widespread, and should not be underestimated. As noted in previous reports, Stage 5 rationing would have occurred in five out of the last 18 years, or 28% of years, had the "no dam" TRMP rules applied.
- 12.25 Urban development would be confined to the 2013 residential zoning envelope in Richmond, Brightwater and Mapua. Until the Council commissions a water augmentation solution it will not be able to plan for future growth. The Council will also need to consider whether it ceases development of land with a deferred zoning for water services (including the recently advertised land at Brightwater). This would be contrary to our obligations under the RMA and National Policy Statement on Urban Development Capacity to provide adequate land to meet housing and business needs. It will also undermine future expected development contributions and rates income from development currently embedded in the Long Term Plan.
- 12.26 The Council will not be able to connect any new industry that uses more than 15m³ of water per day.
- 12.27 The Council will likely have to allocate more resources to monitoring and enforcement of water use during periods of rationing. There is an existing history of over-takes during restrictions, and this will only increase. The Council will have to take enforcement action to ensure compliance.
- 12.28 The Council will have to find an alternative supply option to cope with the risk of restrictions as well as catering for increased urban demand. The Council will have to reconsider the supply of water to Nelson City (Nelson South and the industrial area) as provided for in the current supply agreement if it meant a denial of water to Tasman residents. This currently provides around \$1 million in revenue per year to the Council.

13 Waimea Community Dam – Overview of the Dam Deliverables

- 13.1 The proposed Dam will provide water to ensure the health of the Waimea River and provide long term water security for community, industrial, commercial and irrigation needs on the Waimea Plains. It is a "joined up" solution intended to meet a wide range of water needs and address over allocation of the water resource on the Plains (and the resulting impact on the environment) – at the least cost to our community.
- 13.2 The need for some kind of augmentation to address over-allocation on the Waimea Plains has been identified for some decades with early water storage studies going back to the 1970's. The Dam proposal is the culmination of decades of work, studies and research in various fields that have determined that this is the most effective and feasible solution available for our community. This work has also addressed the various technical and environmental challenges needed to construct and operate the Dam. The Dam is consented, designed, has a known construction price, and potential risks are well understood.

- 13.3 The Waimea Community Dam will provide a very high level of security of supply for abstractive users. While the Dam will hold around 13M m³ of water at any point in time, its effective storage is much higher at around 42M m³. The dam storage is dynamic - it will continually be “refilled” from the catchments above.
- 13.4 The storage in the dam will provide a “60 year” level of drought security for irrigation on the Waimea Plains and for the urban water supplies (Brightwater, Richmond, Redwood Valley, and Mapua) for the next 100+ years.
- 13.5 This means that water rationing would not be needed except in the case of the most severe droughts exceeding, for example, the 2000/2001 year - and this only once the Dam capacity is fully allocated. The level of water security provided by Dam is further improved by the provisions in the TRMP where, in the event of a severe drought the minimum flow in the Waimea River can reduce to 800 l/s. In further extreme droughts and when dam storage level drops below 2M m³, stage one restrictions can be imposed. This would also extend the security of dam supply to beyond the 60 years drought security.
- 13.6 The Dam and the water it provides will provide a number of significant benefits for our community. These are outlined below and present a compelling case for progressing and investing in the Dam on behalf our community.
- 13.7 If the Dam does not proceed, these benefits will be lost. Our community will face more frequent and more severe restrictions. The impact will be significant and felt throughout our community and economy.

Environmental

- 13.8 The proposed Dam enables the Council to increase minimum river flows (at a measuring point above Appleby Bridge) from 800 litres per second to at least 1,100 litres per second. This minimum river flow will provide improved benefits to the instream flora and fauna, recreational users and surrounding environment. Although still to be determined for the Waimea River, it may also be sufficient to meet the requirements set out under the National Policy Statement for Freshwater Management.
- 13.9 The Dam also provides sufficient flow in the River to maintain aquifer water levels and prevent seawater intrusion into aquifers.

Primary Production

- 13.10 The water needs of most our primary producers on the Plains will be secured well into the future. The basis of our economy is in primary production and the Dam helps retain the viability of these industries, and the flow on impacts to their employee, contractors, and the wider economy.

Urban water supply

- 13.11 The Dam would meet the needs of the urban water supply for at least 100 years. Rationing in all but the most severe droughts will be unnecessary. We will have sufficient water to accommodate commercial and economic development and service new residential land, as required by the Resource Management Act and National Policy Statement on Urban Development Capacity.

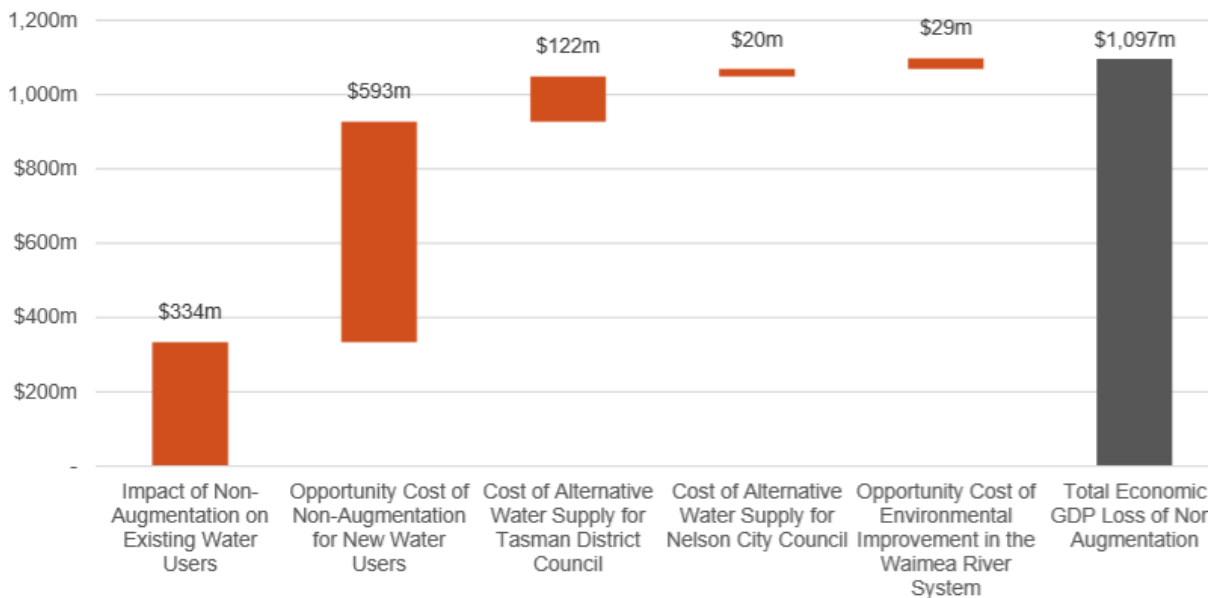
Economic

- 13.12 Water will be the key to the District’s future prosperity. The investment in water infrastructure is a priority for our District. It is needed to sustain current use, and it enables growth and provides a return on investment to the Council and others.
- 13.13 Northington and Partners has completed an economic analysis detailing the implications of the not having a Dam (Attachment G). This analysis was updated in August 2018. The report provides a summary of the potential financial and economic impacts on the District of the proposed Waimea Community Dam not going ahead. The estimated total impact of a decision not to proceed with the Dam is assessed as being in the order of \$1100 million.
- 13.14 The Northington report deals with five core impacts arising from a decision not to proceed with the Dam.

1. Impact of Non-Augmentation on Existing Water Users;
2. Opportunity Cost of Non-Augmentation for New Water Users;
3. Cost of Alternative Water Supply for Tasman District Council;
4. Cost of Alternative Water Supply for Nelson City Council; and
5. Opportunity Cost of Environmental Improvement in the Waimea River System.

13.15 Figure 13.15 below illustrates the components that make up the impact on existing and new water users. Between these groups, the cost is \$927m over 25 years or \$37m pa. The impact of the alternative Tasman District Council and Nelson City water supplies totals \$142m and the environmental improvements another \$29m over the period. The conclusion reached is that a decision to not build the Dam will result in a significant negative economic impact on the District.

Figure 13.15: Aggregate Cost of Non-Dam Alternative (Mid-Point)



13.16 There is also potential to gain greater economic gains through a potential hydro-power scheme at the Dam, and Council has indicated its intention to progress this option.

Partnership Benefits

13.17 The Dam provides a complete solution for our community. The funding model allows the Council to leverage an extensive central government (\$7m grant and \$10m interest free loan) and private sector (equity \$25-\$28m plus \$25m Crown Irrigation Investments Limited concessional loan and potential Provincial Growth Fund funding) capital investment in the project. This investment will not be forthcoming for any alternative augmented water supply solution, which will cost more. Council's share of the operational costs is estimated at \$862,000 per year, which is 45% of the nearest alternative water supply solution which would be circa \$1.9m per year. For any alternative, Council will also need to repay \$4-5m of costs for the Dam that would have been recoverable through the Joint Venture.

Least Cost Solution

13.18 The economies of scale that the Dam offers lowers the overall costs for our community. The Dam is a solution in the making for over two decades, and has been Council's preferred plan for addressing a range of issues since at least 2012. The Dam is still the most cost effective option (capital and operating costs) for meeting everyone's needs on the Waimea plains – including Council as an urban water supplier. We have investigated a range of alternative options, and in comparison to the Dam they are not cost efficient and do not deliver the range of benefits (i.e. environmental, urban water supply, and irrigation) that the Dam does. The alternatives would provide only an urban water supply solution with capital costs estimated from \$25 million to partially meet present urban water needs, to over \$100 million for our 100 year future required urban capacity.

14 Tasman Resource Management Plan (TRMP)

Current situation

- 14.1 At present we are still operating under existing conditions with the historical trigger for step 1 rationing applying to permits being 2500 l/s flow at the Wairoa gorge. This rule came with no minimum flow for the Waimea River. Flow management is achieved by the Dry Weather Task Force issuing weekly directions for flow management during dry periods. These consents were issued prior to the Waimea zones TRMP changes (Changes 47, 55, 63 and 67) where by renewed consents, presently on hold, have updated conditions to replace this flow management regime.
- 14.2 The current TRMP situation sees water allocation restrictions for three dam-related scenarios in place now as sleeper rules (they do not apply yet). These provisions were intended to reduce the historical over-allocation in the Waimea Plains and are also to enhance the environmental flow regime. The rules rely on augmentation being provided by the Waimea Community Dam and are the outcome of public planning processes and operative TRMP changes.
- 14.3 These new rules: no-Dam, with-Dam affiliated (buy into the Dam), and with-Dam non-affiliated (don't buy in) are not yet active. They will be first triggered by either a Council No-Dam decision, or by a trigger where the default outcome is that there is no Dam (1 November 2019). The new rules come with new rationing stages which start when the river at the Wairoa gorge gets to 2750 l/s and are designed for a target minimum river flow of 800 l/s at Appleby, below which cease takes will start to apply using set policy criteria in the TRMP.

- 14.4 As part of renewing consents within the Waimea water management zones these new rules have been applied. A primary driver is the need to reduce the over-allocation of the water resource. Bona fide reviews have been done which addresses some of the over-allocation but at present all permit renewals are on hold, waiting for a Dam decision. Once a Dam decision is made, either yes or no, then the applicable set of allocation restrictions will apply through the consent conditions set in the replacement permits i.e. all present water permit restrictions will change.
- 14.5 For the reticulated community water supplies, Richmond, Brightwater, Mapua-Ruby Bay, rural extensions to these and the Redwood Valley rural supply, a no-Dam will trigger a limitation on the Council to only service those connections already in place and those areas zoned urban or deferred urban as at 27 April 2013. So Council's permits would not be able to accommodate extensions to urban areas.
- 14.6 The recent bona fide review of water permits only managed to reduce over-allocation by 27.2% and the reduction target from the 2013 allocations required in the TRMP is 42%. So without a dam there will be pressure to 'fix' this continuing over-allocation.

Is a change to the TRMP an option?

- 14.7 The short answer is no. The current TRMP regime seeks to balance a more sustainably managed water resource alongside enhanced economic production while allowing for urban growth. These benefits are set against the costs of a long term investment in water augmentation of sufficient scale for enhanced security and future demand.
- 14.8 However the Waimea resource remains significantly over-allocated despite the consent renewal process reducing allocations, while the case for higher minimum flows remains strong. A most likely no-Dam TRMP change would be to seek to reduce the stringency of allocation restrictions or remove reliance on the Dam as the only augmentation solution. Regardless of the purpose or scope for any TRMP change, national policy directives and the RMA planning process would see significant challenge to the current or proposed allocation regime. Staff consider that any change attempt would result in much more stringent limits with substantially less security of access than at present under the existing "no Dam" scenario. Including for community water supplies.
- 14.9 The present rules are essentially an agreed compromise that enabled the many competing interests to all achieve progress. It is important that Council recognises that any TRMP change, from major changes right down to minor tweaks, would be a fully public Schedule 1 process. The process would be out of Council control once it was notified and the outcome would be determined not by Council but by independent commissioners, and following this very likely the Environment Court. Council is conflicted both as a water supplier and as a regulator, so the outcome would be uncertain, long and expensive.
- 14.10 If a TRMP change were proposed to the present TRMP under a no Dam decision, there are some certainties we could expect as part of process:
- 14.11 Greater emphasis would be placed on the requirements of the National Policy Statement for Freshwater Management 2014 (amended in 2017) for sustainable allocation of fresh water resources, requiring reduction of present over-allocation, integrated management, and recognition of Te Mana o te Wai. This includes possible further amendments indicated by the Government to strengthen water quantity management requirements of the NPSFM 2014/2017.

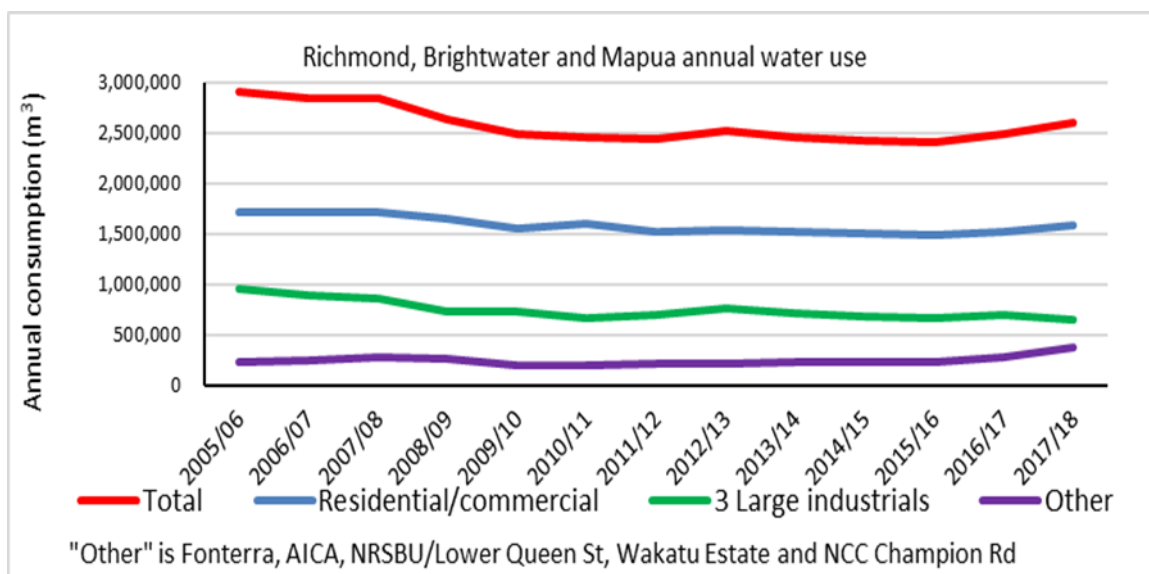
- 14.12 A re-examination of the evidence of the Waimea River's instream ecosystem values and associated amenity, recreational and tikanga Maori values, their minimum flow requirements, and the risks to these values from low flows, with a likely much higher minimum flow being imposed.
- 14.13 Positions will be taken and may be vigorously pursued through the courts by submitters including the Crown, Department of Conservation, other statutory entities, Maori iwi, WIL or other irrigator collectives, industry groups, businesses, environmental Non-Government Organisations and potentially even ratepayer groups be they water user or environmental guardian.
- 14.14 The process requirements under the RMA (s 32, Schedule 1) to advance any TRMP change would bring into play any or all of the above influences through due process.
- 14.15 Regardless of the purpose for any potential TRMP change, under these external influences the outcome for a change is certain to gravitate in one direction: a substantially more stringent set of water allocation limits for the Waimea Plains zones. The outcome is most likely to be an environmental flow regime with a much higher minimum flow than the current no dam regime (a "minimum flow" of 800l/s but practically with lower flows possible), and more likely be 1300 l/s or higher. With a total allocation limit more likely to be towards 660 l/s than the present 2200 l/s presently consented following the bona fide reviews. Cease takes would be more stringent and the differential providing greater security of access for community water supplies, over other water users, would likely to be reduced.

What if an irrigation consent became available for use by Council?

- 14.16 While reallocating present irrigation consents might provide some additional water for community supplies, if Council were able to negotiate access to them (we have no right to demand access), this would not be a panacea to the problem although it might if successfully granted, assist.
- 14.17 Irrigation use is different from community water supply use as it only applies during summer. These consents have all had a bona fide review so their allocation will have been reassessed and likely reduced and this could not be reconsidered under any previous approach exempting Community Water Supplies.
- 14.18 This reallocation for community supply would require a change in use consent to allow it to change from a seasonal irrigation use to a domestic supply which would be assessed based on 365 days maximum use. A localised impact assessment would be required in order to allow for the changed use. It is highly unlikely that any greater annual take would be granted. The allocation would need to be able to sustain increased drawdown on the surrounding users and still allow for present expected recharge capability to protect the existing security of supply expectation of the other users in the locality. Continuous demand does not allow the same capability to recharge as seasonal use does. Any such additional water would still be subject to the same rationing as Council's current permits.
- 14.19 Additionally if the new source was from those aquifers close to the coast, like the Lower Confined Aquifer, there would be added scrutiny due to the risk of continuous pumping over a longer term leading to sustained drawdown below sea level. Potentially exposing the aquifer to increased salt intrusion risk.

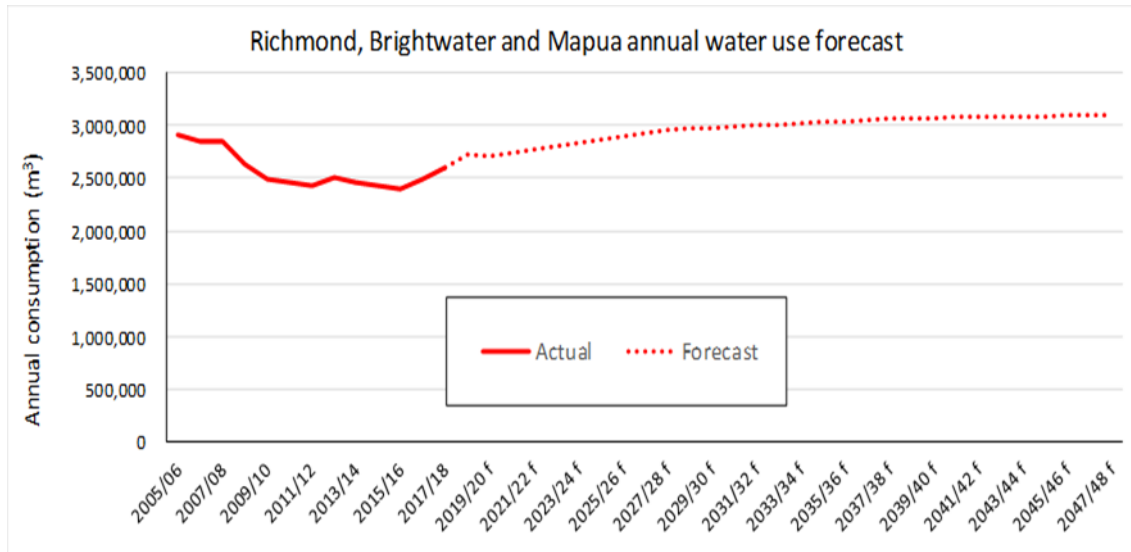
15 Urban Water Supplies

- 15.1 In the Waimea Basin Council provides urban water to 20,000+ people (40% of the District) in Brightwater, Richmond, Redwood Valley, and Mapua. 50% of water used by customers connected to these water supplies is for residential purposes, and 50% for commercial and industrial purposes.
- 15.2 Demand for urban water in these communities dropped away in the late 2000s and was steady for several years. Water use per property had been dropping until recently, which had outweighed the growth in number of connections, so overall water demand fell. Water use per property stabilised a few years ago, so the impacts of growth and development are starting to be felt more with overall water demand growing again.
- 15.3 Figure 15.3 Annual water use by sector since 2005:



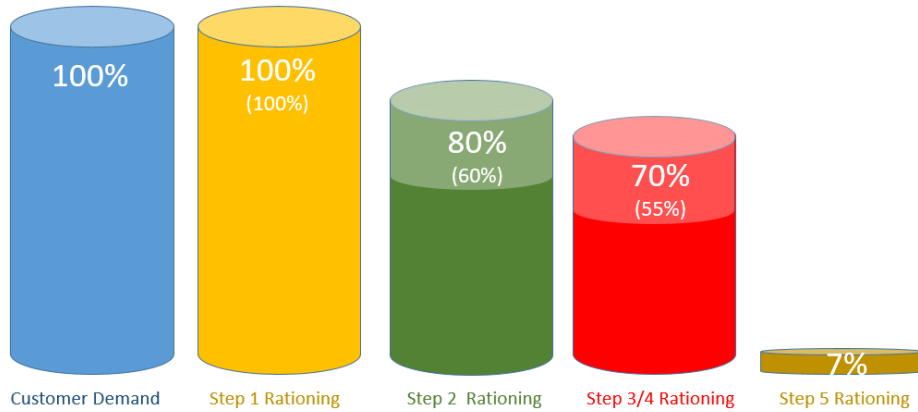
- 15.4 Longer term, water demand is expected to grow even with water efficiency and conservation measures in place. Both staff forecasts and an independent 2017 MWH Waimea water demand model forecast steady and sustained growth into the future. In summary, they forecast:
- 15.4.1 Increases of 10-12% in usage for the next 10 years under high growth.
- 15.4.2 Increases of 17-19% in usage for the next 30 years under medium growth.
- 15.4.3 Increases of 32 -118% in peak water demand by 2117 (MWH model only) depending on whether we experience medium or high growth (along with a range of other factors).
- 15.5 Council's subscription in the Dam is for 60,000 m³ per day. This forecast indicates this is adequate for at least the next 100 years.

15.6 Graph showing 30 year annual demand forecast – all sectors:



- 15.7 Without the Dam, Council's urban water supplies in Brightwater, Redwood Valley, Richmond, and Mapua are subject to a range of constraints under the TRMP, including rationing almost every summer. The "reduction rules" in the TRMP will generally prevail for rationing stages 1-3 for the urban water consents. These require reductions in abstraction compared to the average level of abstraction of the last eight years for that same week. Stage 1 requires a reduction of 10%, Stage 2 requires a reduction of 17.5% and Stage 3 requires a reduction of 25%.
- 15.8 The impact of these will differ from year to year, but based on drought information since 2000, Council will be subject to Stage 3 rationing nine out of every 10 years. Stage 5 rationing would have occurred in four out of the last 18 years, or around one year in five.
- 15.9 The reductions required by Council translate to a much greater reduction required by our customers, particularly for stages 2-3. This is due to recent growth in water demand and because an element of water use (unaccounted for water) is consumed within the network.
- 15.10 For example, using 2017/2018 summer water demand as a base, the 25% reduction required at Stage 3 by Council translates to an average reduction required by customers of 30-35%. Peak week reductions required by customers can approach 50%. These impacts can be seen for Richmond and Mapua in figure 15.13.
- 15.11 Stage 5 rationing permits Council to extract 125 litres per day per person. This limits Council abstraction to around 2,500 m³ per day for all of our schemes for all uses (commercial and residential). This is less than 20% of average daily demand in summer. The amount of water that can actually be delivered to the customer is even less, due to unaccounted for water.
- 15.12 This presents a major challenge for the urban water supplies and to our customers. Water use will be restricted to essential human and animal health, safety, and sanitation. Many households will struggle with these restrictions and many businesses will not be able to operate. This situation would prevail until the Council provides an alternative water augmentation scheme.

15.13 Fig 15.13 Translating rationing into 2017/2018 customer restrictions in Richmond and Mapua:

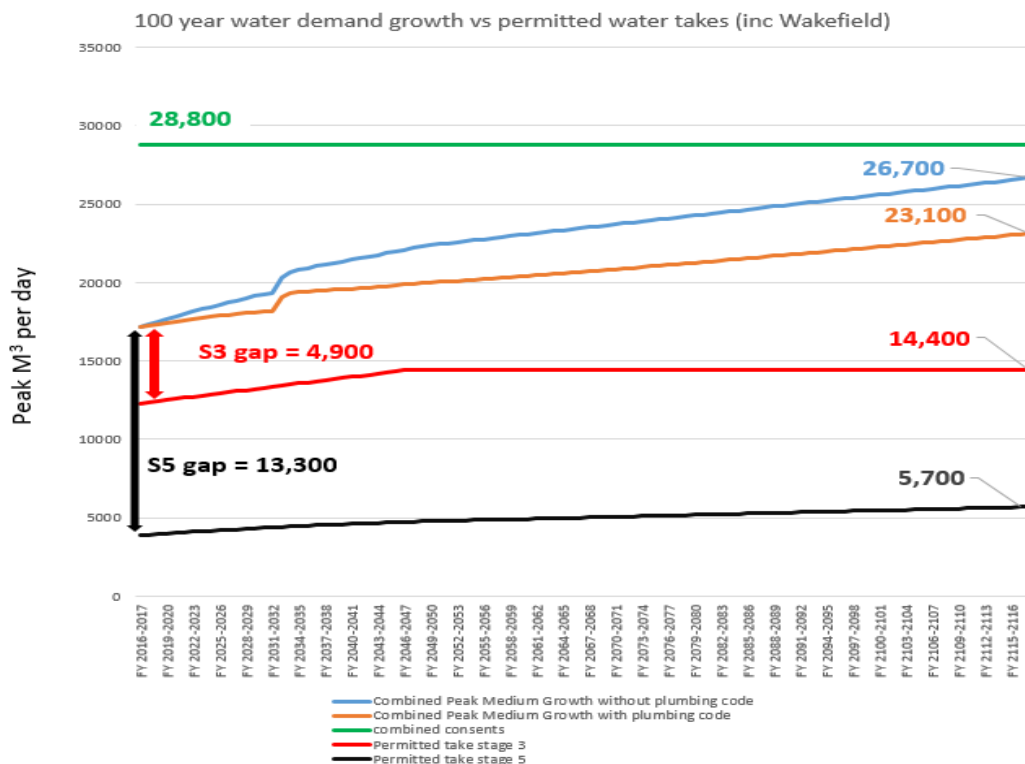


15.14 Rationing under stages 1-3 will get progressively more severe as time passes, requiring greater and greater cuts from the Council and our customers.

15.15 The 2017 MWH model forecast the peak week average daily water gap under the “no dam” TRMP rules for 100 years. The range of estimates are shown in Figure 15.17 for a medium growth future with and without water conservation and efficiency measures for our customers. In this case, Wakefield is included. (Wakefield will need water from the Waimea Community Dam for growth beyond 30 years).

15.16 This clearly shows that the rationing challenge will grow over time.

15.17 Figure 15.17 100 year MWH medium growth water demand forecast vs no dam rationing rules:



Non-revenue water

- 15.18 Non-revenue water represents the difference between the volume of water delivered into a network and billed authorised consumption. The main components of non-revenue water include pipe breaks and leaks, storage overflows, house connection leaks, metering errors, operational flushing, water theft, billing anomalies and firefighting. There are several factors that contribute to water loss including infrastructure age, network size/distribution, pipe condition, network pressure, installation techniques and standards, and third party influences.
- 15.19 Council continually monitors network water use in various zones, typically overnight usage. Council reports annually on water loss and has two performance measures that assess it. The first performance measure assesses volume and percentage of real water loss for all urban networks. The second performance measure ensures water loss does not exceed 4 as measured by the Infrastructure Leakage Index (ILI). The ranges for ILI are 0-2 (considered low), 2-4 (moderate) and 4+ (high). ILI is considered the industry standard and best practice for reporting water loss.
- 15.20 Council is raising its level of service by continuing to lower the target on water loss. The 2016/17 annual report cites a weighted District average of 21% which is 2.9 ILI. This figure is down from 26% for the previous year (3.7ILI).
- 15.21 Council monitors the weekly system input and compares this to the previous year's usage and actively assesses any changes. We use Scada/telemetry to monitor zone flows which allows us to examine trends and look at night flow rates between 1- 5am providing a clear assessment of the low usage period. Council also optimises pressure zones to reduce the volumes of loss when a leak does occur. Council has an ongoing reactive maintenance budget of \$530,000 per annum for Urban Water Club reticulation.
- 15.22 Council has a \$150,000 annual leak detection programme, which involves using monitoring equipment to locate leaks and assess leakage rates. The amount of leak detection work being carried out has increased in the last few years and will be maintained into the future. Council repairs all leaks that we are advised of through the leak detection programme. In some locations, bulk meters have been installed to allow improved leakage identification to be isolated to a particular zone.
- 15.23 Council has an ongoing capital expenditure budget for pipe and meter replacements. This maintains the integrity of the network. The Urban Water Club Reticulation Renewal budget is \$200,000 over the next 5 years, and increases to \$750,000 in 2023/24 and to \$945,000 in 2028/29 (excluding major separately programmed renewals). The meter replacement programme has \$420,000 budgeted in 2020/21 to replace meters in Brightwater, Mapua and Richmond.
- 15.24 Council could elect to invest additional resources into improving systems maintenance by increasing leak detection and reactive maintenance budgets however, this would add significant operations and maintenance cost and there is a cut off based on benefits. Spot repairs of leaks typically cost in the region of \$2,000-\$10,000 for each instance. Council could also increase capital expenditure on the pipe and meter renewals programme.
- 15.25 It is impossible and unrealistic to eliminate all water loss from a network. A certain level of water loss cannot be avoided from a technical point of view. An aggressive renewals programme could proactively reduce leakage, but the network in Brightwater, Richmond, Mapua, and Redwood Valley is valued at a minimum \$80m. Moreover, even newly

constructed networks leak, and the scale of leakage grows over time as the network ages. Consequently, some losses are unavoidable and some leakage is too small or uneconomic to repair. Council must carefully balance the investment costs of reducing water loss, with the amount of water that can be realistically saved. There are diminishing returns and escalating costs.

- 15.26 Critics have argued that Council could solve its water shortage problem by addressing excessive water loss – or even by eliminating it somehow.
- 15.27 To put this into perspective, Richmond currently has 15% water loss which is good by national standards. Brightwater and Mapua have 27% and 26% water loss which is above our targets. If Council were to reduce water loss in Mapua and Brightwater to 15%, it would save 300 m³ of water per day. This is less than 10% of the water average daily water shortage at Stage 3 rationing, and an insignificant amount of water compared to our water shortage at Stage 5.
- 15.28 Even if the Council were able to reduce unaccounted water to zero somehow, it will not address the water shortage, especially at stage 5 rationing. Reducing water loss to zero for Brightwater, Mapua and Richmond would yield a total saving of 1,822 m³/day. This will not address today's needs, or the longer-term water gap challenge presented by growth and development, as seen in Figure 15.17.
- 15.29 Finally, we need to be aware that benefit of any water loss reduction toward addressing our water shortage (however small that contribution may be) will be also be short lived. Water loss reductions will eventually factor into water abstraction records, and therefore lower Council's entitlement to water under rationing in the future.
- 15.30 In short, addressing water leaks responsibly is an important aspect of our network and environment stewardship, but it is not the panacea to our water shortage problems.

16 Urban Water Augmentation Alternatives

Levels of Service

- 16.1 The Council's subscription in the Dam provides up to 60,000 m³ per day (8.4 million m³) of effective storage and is intended to provide a 60 year level of drought security for the next 100+ years for the urban water supply in Brightwater, Richmond, Redwood Valley and Mapua. It also effectively provides 100+ year growth and drought protection for Wakefield, as the Wai-Iti dam only provides a nine out of ten year level of drought protection, and only for the next 30 years or so.
- 16.2 This means the Council supply will not be rationed in all but the most extreme droughts (circa 1/60 years). As noted earlier, in these instances, we are likely to be limited only to stage 1 rationing. None of the alternatives for the urban water supply approach this level of water security.
- 16.3 The two key parameters for any drought level of service for alternatives to the Dam are to what extent and for how long they protect against the 'no dam' rules for:
- 16.3.1 Stage 3 rationing, which is expected most years; and
 - 16.3.2 Stage 5 rationing, which is expected less frequently, perhaps once in every years. However, the impact of Stage 5 rationing is extreme.

- 16.4 Several of the options potentially available to Council can help ease the pain of rationing on our community during rationing Stages 1-3, but most are not reliable and will not avoid the need for significant restrictions on our customers nine out of every ten years. The water gap at stage 3 rationing is generally around around 4,900 m³ per day on average, with a peak of around 5,000 m³ per day. As noted earlier in this report, this is forecast to grow.
- 16.5 Most of the alternatives to the Dam considered by Council are completely inadequate to deal with stage 5 rationing. At stage 5 rationing, the vast majority of our water supply needs for Brightwater, Richmond, Redwood Valley, Nelson South and Mapua needs to come from an alternative source. The amount of water needed to supplement our existing sources at stage 5 rationing is in the order of 11,000 m³ on average per day, with a peak of around 13,300 m³ per day.
- 16.6 Only a large scale water augmentation scheme can provide a level of water security against stage 5 rationing for today's customers, or for the future. A scheme that can provide for stage 5 rationing will generally provide some level of water security for earlier stages of rationing.
- 16.7 The two schemes previously considered that could provide some level of security against Stage 5 rationing have been the small dam and the ponds/lake storage. The level of service these provide actually depends on the intensity and duration of the drought – how many days do you spend at different stages of rationing. Moreover, the level of security will also erode as growth occurs. Nevertheless, the examples below give an indication of the levels of service these schemes could provide.
- 16.8 A riverside pond comprising 500,000 m³ storage (400,000 m³ of effective storage) and able to supply 4,000 m³/day would cover Stage 3 restrictions in most drought years at current demand levels – up to 100 days. This is similar to the number of days we would have been in stage 3/4 rationing in 2000/2001 had the 'no dam' rule been in place. Some weeks of peak demand may still require restrictions in the order of 10%. However, this capacity would have been exhausted had the Council then moved to Stage 5 rationing.
- 16.9 A riverside pond comprising 800,000 m³ storage (700,000 m³ of effective storage) and able to supply peak demand of 13,000 m³/day could cover 60 days at stage 3, and a further 40 days at stage 5 rationing without restrictions on our customers. This would have met all our needs in the most severe recent drought (2000/2001) at current demand levels, and could even accommodate some growth.
- 16.10 In reality, the Council will be able to extract more security out of the ponds by imposing some restrictions on our customers to preserve more of the storage capacity for longer.

Early Assessment of Alternatives

- 16.11 Since 1991 Council has been identifying and assessing options for water augmentation for the Waimea Plains. The following is a chronology of investigations undertaken to date;
- 16.11.1 1991 Agriculture New Zealand (MAF) Report – Water Augmentation Options Waimea Basin
 - 16.11.2 2003 Tasman Regional Water Study
 - 16.11.3 Waimea Water Augmentation Committee (WWAC)
 - i. 2004 to 2007 - Phase 1 Feasibility Study – this identified 18 sites; Lee Valley Dam identified as preferred option
 - ii. 2007 to 2010 - Phase 2 Detailed Investigation – Lee Valley Dam (Site 11)
 - iii. 2011 to 2014 – Phase 3 Preliminary Design – Lee Valley Dam (Site 11)

iv. March 2015 – Resource Consent Granted – Lee Valley Dam (Site 11)

- 16.12 The investigations into the options began in 2004 with the formation of the Waimea Water Augmentation Committee.
- 16.13 More recently (2014/2015), the Council commissioned a high-level assessment of short listed alternatives was undertaken by MWH. This assessment was intended to help better understand our next best alternatives to the Waimea Community Dam for the urban water supply and identify what the most feasible alternatives were for further development. This assessment focused only on providing the urban water supply and ignores the need of the Waimea River.
- 16.14 The summary of the analysis is attached in Attachment A. Key themes that appear through the analysis:
- 16.14.1 Most options provide insufficient security or reliability. When our normal supply is rationed, there will be constraints on the alternatives.
 - 16.14.2 Most options do not provide adequate flow, even when available. Restrictions still apply most years. At best, they provide stop-gap measures.
 - 16.14.3 Only two options could provide any enduring reliability, security against a major drought, and provide for growth.
- 16.15 The best long term options identified in the report were water storage ponds or a small dam. These have the potential to provide adequate equivalent daily flow to deal with rationing most years as well as a major drought when Stage 5 rationing is in force if they are large enough. An assessment of the pond options is below.

The Level of Demand Required

- 16.16 The potential urban demands were assessed to determine the quantities of water required now and into the future. The urban water areas being considered are Richmond, Mapua, Ruby Bay and Brightwater. The following table outlines the urban water demand under a medium growth scenario and shows the rationing gaps for Stages 3 and 5 of abstraction restrictions in the Tasman Resource Management Plan;

Table showing Urban Water Demand (medium growth scenario) and Rationing Gaps

	Daily 2017 (excl. Wakefield) (m3/day)	Daily 2047 (excl. Wakefield) (m3/day)	Daily 2117 (incl. Wakefield) (m3/day)
Peak Week Daily Demand	15,900	22,000	26,700
Stage 3 permitted take	11,000	12,200	14,400
Stage 5 permitted take	2,600	3,500	5,700
Rationing stage water gaps	2017	2047	2117
Stage 3	-4,900	-9,800	-12,300
Stage 5	-13,300	-18,500	-21,000

Note – the Rationing scenario based on 2000/201 drought

- 60 days at Stage 3 rationing
- 40 days at Stage 5 rationing

- 16.17 This table outlines that the current gap during Stage 3 restrictions is around 4,900 m3/day and for Stage 5 restrictions it is 13,300 m3/day. In the next 29-30 years the gap between demand and supply is likely to increase to 11,800m3/day for Stage 3 restrictions and 20,500m3/day for Stage 5 restrictions. This is based on the current abstraction infrastructure (bores and treatment plant) and resource consents conditions.
- 16.18 Wakefield is considered to have sufficient headroom in water supply capacity to last the next 30 years. This is primarily due to the benefits of the Wai-iti Dam and its ability to increase flows in the Wai-iti River. After 30 years it is expected that Wakefield will also need additional water and it is therefore included in the demands predicted from 2047 onwards.
- 16.19 In considering alternatives to the augmenting the urban supply, it is necessary that we convert the water gap into storage. The following table outlines the storage requirements based on the water gaps outlined in the table above.

Table showing Present and Future Water Storage Requirements for each Stage of Restrictions

	2017 Storage (m3)	2047 Storage (m3)	2117 Storage (m3)
Rationing Stage 3 (60 days)	249,000	601,000	1,153,000
Rationing Stage 5 (40 days)	452,000	697,000	1,064,000
Total (100 days)	701,000	1,298,000	2,217,000
Allowance for Losses	100,000	100,000	100,000
Design Storage	800,000	1,400,000	2,300,000

16.20 The design storage was utilised to determine what any alternatives needed to deliver to meet the urban demands.

Alternatives Assessment

16.21 Over the years since 2004, several of the 18 alternatives originally identified by WWAC have been re-assessed and presented to Council in various forms. The demand requirements, scope and outcomes of these alternatives varied significantly. In June/July 2017 staff reviewed all the reports continuing these alternatives or variances of them. Staff have recast scope and deliverables of each of the alternatives utilizing the urban demand gaps outlined in the tables above. These revised alternatives were presented to Council at its meeting 27 July 2017. Essentially they fall into four categories:

- 16.21.1 Riverside Ponds storage (on banks of Waimea River)
- 16.21.2 Motueka aquifer (piping from Motueka to Mapua/Richmond)
- 16.21.3 Roding River storage (impoundment of Roding River)
- 16.21.4 Teapot Valley storage (impoundment in Teapot Valley)
- 16.21.5 Nelson City Council

16.22 The following table summarises the outcomes of this July 2017 review.

Table Outlining the Alternative Options, Capital and Operating Costs, Daily Flow and ability to meet water gap for Stages 3 and 5 Water Restrictions

Water Augmentation Options	Storage	Capital Cost	Opex	Daily Flow	Rationing Stage	Daily Water Gap	Daily Water Gap	Daily Water Gap
	(m3)	(\$'000)	(\$'000 p.a.)	(m3)		2017	2047	2117
Riverside Storage	500,000	\$24,600	\$788	4,000	3	4,900	11,800	22,600
					5	13,300	20,500	31,300
	800,000	\$54,000	\$2,297	13,000	3	4,900	11,800	22,600
					5	13,300	20,500	31,300
	1,400,000	\$84,000	\$3,498	20,000	3	4,900	11,800	22,600
					5	13,300	20,500	31,300
	2,300,000	\$108,000	\$5,024	31,000	3	4,900	11,800	22,600
					5	13,300	20,500	31,300
Motueka Aquifer	N/A	\$35-\$40,000	\$750	5,900	3	4,900	11,800	22,600
					5	13,300	20,500	31,300
		\$100 - \$120,000	\$1,600	13,000	3	4,900	11,800	22,600
					5	13,300	20,500	31,300
		\$160 - \$200,000	\$2,800	31,000	3	4,900	11,800	22,600
					5	13,300	20,500	31,300
Roding River Storage	4,000,000	\$110,000	\$3,600	30,000	3	4,900	11,800	22,600
					5	13,300	20,500	31,300
Teapot Valley Dam	500,000	\$46,150	\$1,111	4,000	3	4,900	11,800	22,600
					5	13,300	20,500	31,300
Nelson City Council	N/A	\$12-\$14,000	NCC water charges	5,000	3	4,900	11,800	22,600

16.23 Council requested an independent review of three of these alternatives and for the option of utilizing potential surplus from Nelson City Council;

16.23.1 Riverside Pond with Storage 500,000m³ and delivery of 4,000m³/day;

16.23.2 Riverside Pond with storage of 800,000m³ and delivery of 13,000m³/day;

16.23.3 Motueka Aquifer to Mapua delivering 5,900m³/day.

16.23.4 Nelson City Council delivering up to 5,000m³/day.

Review of Alternative Option Estimates

16.24 The scope and quantities of the alternative options have been reviewed. The review incorporated the following assumptions and do differ from what was included in the July 2017 estimates;

16.24.1 Utilised independent specialists on key components of the options, such as riverside pond construction and treatment plant sizing and construction;

16.24.2 The scheduled rates have been on current construction rates;

16.24.3 Preliminary & General plus margins have been calculated at 25% of the construction costs and are reflective of the current construction market;

16.24.4 Construction contingency of 10% is applied to the construction estimate;

16.24.5 Scope risk of 25% has been applied to reflect the fact that they are based on concepts with limited design and reflect the uncertainties at this stage of assessment;

16.24.6 The estimates are still reasonably high level and detailed schedule items can only be identified in the design stages;

16.24.7 Land values are based on current rating valuations, but we have been advised that these are the lower end of likely land values given the current buoyant market. The land values used are \$120,000/ha.

Riverside Pond Alternatives

Pond Construction

- 16.25 The review of the pond component of the Riverside Pond alternatives was undertaken by Damwatch – a company that specializes in the construction of dams and has been involved in the construction of irrigation schemes and riverside ponds in the Canterbury region.
- 16.26 Damwatch have assumed that the ponds would be located on the right bank of Waimea River upstream of Appleby Bridge. They have noted that these ponds are indicatively located on the riverside of the stop bank. The ponds would therefore act as an impediment to flood flows and as a result cause backing up of flows in the river. This aspect would need to be considered in the final siting of the ponds.
- 16.27 The scope of work for the ponds assume 5m water depth, 1.0m excavation and 5.0m high embankment heights. Within the ponds this provides for a 5m depth of water and 1m freeboard between top water level and embankment crest. No allowance for dead storage at the bottom of the pond has been made at this stage. The width of the embankment crest and slopes is assumed to be 5m crest width, 1V:3H inside slope and 1V:2.5H outside slope. The ponds to be fully lined with an HDPE liner.
- 16.28 The available area of pond is limited by the present river bank and stop bank. This is an area of approximately 170,000m² although the useable area may be less than this. This area restricts the size of pond that can be built and it may not be possible to build the larger 800,000m³ storage pond. The restraint on the depth of excavation due to groundwater may make a cut and fill balance of the materials for the embankments difficult with potentially insufficient material to form embankments of 5m in height. However, there may be alternative sources of material close by that could be used.
- 16.29 The cost estimates have been made based on costs from other larger ponds of the same design. These costs are compared with the combined cost of the reservoir construction earthworks and reservoir structures for both options. It is assumed that;
- All material can be won from within the pond area (this may mean that the depth of excavation needs to be deeper than 1m).
 - No costs have been included for river erosion protection, which may be needed.
 - Preliminary and General, margins and contingency not included.
 - The following table summarises the costs of the reservoir construction earthworks and reservoir structures that Damwatch prepared for Council.

Table Outlining the variation in Costs Estimates for Riverside Pond construction compared to July 2017 Estimates

Storage	July 2017 Estimate	August 2018 Estimate	% Difference
500,000m3	\$4.42M	\$3.48M	79%
800,000m3	\$7.07M	\$5.57M	79%
Cost/m3 storage	\$8.84/m3	\$6.96/m3	

- 16.30 There is a difference in costs of about \$1.0 million for the smaller pond and \$1.5 million for the larger pond. The July 2017 estimates may have allowed river protection works and these could easily be of this order of cost.
- 16.31 The above costs without the river protection works equate to a storage cost rate of about \$7/m3 compared with \$9/m3 in the July 2017 estimates.
- 16.32 Damwatch has indicated that the values derived from its experience on the construction of other ponds is that the rate is of the order of \$5.00–\$5.50/m3 of storage for unlined ponds. However a more detailed design and refined estimate of quantities and costs could reduce the overall cost to below the estimated of \$7/m3.

Reticulation and Treatment Plant

- 16.33 Council is currently undertaking reticulation construction and treatment plant upgrades as part of its normal project delivery programme. Stantec were requested to review the estimates for the treatment plant component and Council staff undertook a review of both the reticulation and treatment plant components of the estimates.
- 16.34 Stantec has confirmed that for small to mid size water treatment plants the direct capital cost is around \$1.0 million per 1000m3/day with additional cost for treatment of algae. The allowance for algae treatment is relatively small part of the overall treatment cost. Approximately \$375,000 is considered appropriate to treat algae for a 4000m3/day plant and \$3.0 million for a 13,000m3/day plant. Stantec comments that the allowance for the treatment of algae for the 4000m3/day plant could be under-estimated so an increase maybe prudent. At this stage we have left it at \$3.0 million.
- 16.35 It is probable with this scheme that the water will be retained in the reservoirs for long periods during warm weather so algae is likely to be a problem. More so where the storage is relatively shallow and when raw water has nutrients in it that will promote growth.
- 16.36 The aim in the first instance is to minimise algae growth through raw water quality management and reservoir mixing. Chemical dosing for algal blooms is generally not preferred and is an action of last resort. The aim is not the break up the algae cells as this is leads to odour and taste problems in the water supply.
- 16.37 Removal of algae intact through treatment processes such as pre-screening and dissolved air flotation followed by sand or membrane filtration would then be the usual choice for treatment. Having ancillary processes to manage taste and odours such as advanced oxidation and activated carbon would need to be considered depending on the likely frequency, type and extent of algal blooms.
- 16.38 Ultrasonic control maybe another option to manage algal blooms but we are unsure of its effectiveness in shallow reservoirs. It is reported to provide some suppression of algal growth. This option could be considered in more detail but at this stage Stantec does not

believe there will be any significant savings on algae treatment as the risk of algal blooms and associated taste and odour will still apply.

16.39 The estimates for the alternatives are summarised as follows;

16.39.1 Riverside Pond with 500,000m³ Storage and delivery of 4,000m³/day

	Aug 2018	July 2017
• Reservoir Construction	\$ 3,480,000	\$ 4,420,000
• Riverside Bores & Pipework	\$ 526,000	\$ 400,000
• Pump & Watermain to WTP	\$ 2,607,000	\$ 3,172,000
• Power Supply/Scada to Reservoir site	\$ 80,000	\$ 80,000
• Water Treatment Plant (4,000m ³ /day)	\$ 4,375,000	\$ 4,375,000
• P&G & Profit Margin (25%)	\$ 2,767,000	\$ 1,245,000
• Contingency (10%)	<u>\$ 1,384,000</u>	<u>\$ 1,369,000</u>
Construction Total	\$15,219,000	\$15,061,000
• Land Purchase and Survey (16 ha)	\$ 2,020,000	\$2,150,000
• Professional Fees	\$ 1,991,000	\$1,930,000
• Consents	\$ 140,000	\$ 140,000
• Project Management and Delivery	\$ 395,000	\$ 386,000
• Scope Risk (25%)	<u>\$ 4,941,000</u>	<u>\$ 4,917,000</u>
Total Estimate	\$ 24,706,000	\$24,584,000

16.39.2 Riverside Pond with 800,000m³ Storage and delivery of 13,000m³/day

	Aug 2018	July 2017
• Reservoir Construction	\$ 5,570,000	\$ 7,072,000
• Riverside Bores & Pipework	\$ 927,000	\$ 680,000
• Pump & Watermain to WTP	\$ 4,830,000	\$ 5,220,000
• Power Supply/Scada to Reservoir site	\$ 128,000	\$ 80,000
• Water Treatment Plant (13,000m ³ /day)	\$16,000,000	\$16,000,000
• P&G	\$ 6,864,000	\$ 2,905,000
• Contingency (10%)	<u>\$ 3,432,000</u>	<u>\$ 3,196,000</u>
Construction Total	\$ 37,751,000	\$35,153,000
• Land Purchase and Survey (32 ha)	\$ 3,940,000	\$ 3,330,000
• Professional Fees	\$ 5,036,000	\$ 3,815,000
• Consents	\$ 160,000	\$ 160,000
• Project Management and Delivery	\$ 993,000	\$ 849,000
• Scope Risk (25%)	<u>\$ 11,970,000</u>	<u>\$10,827,000</u>
Total Estimate	\$ 59,850,000	\$54,134,000

Motueka Aquifer to Mapua Option (5,900m³/day)***Reticulation and Treatment Plant***

- 16.40 Council is currently undertaking reticulation construction and treatment plant upgrades as part of its normal project delivery programme. Stantec were requested to review the estimates for the treatment plant component and Council staff undertook a review of both the reticulation and treatment plant components of the estimates.
- 16.41 Stantec has confirmed that for small to mid size water treatment plants the direct capital cost is around \$1.0 million per 1000m³/day.
- 16.42 This option comprises
- Motueka Aquifer to Mapua with delivery of 5,900m³/day

	Aug 2018	July 2017
• Bores for extraction	\$ 270,000	\$ 270,000
• Treatment Plant (5,900m ³ /day)	\$ 5,900,000	\$ 6,500,000
• Storage tanks (2 x 10,000m ³)	\$ 8,600,000	\$ 2,000,00
• Pumps and Pump Building	\$ 1,106,000	\$ 913,000
• Water main (18km of 350mm dia)	\$12,600,000	\$11,900,000
• P&G	\$ 7,119,000	\$ 2,158,000
• Contingency (10%)	<u>\$ 3,560,000</u>	<u>\$ 2,374,000</u>
Construction Total	\$ 39,155,000	\$26,115,000
• Land Purchase and Survey (1,000m ²)	\$ 130,000	\$ 130,000
• Professional Fees	\$ 4,627,000	\$ 3,086,000
• Consents	\$ 150,000	\$ 850,000
• Project Management and Delivery	\$ 881,000	\$ 604,000
• Scope Risk (25%)	<u>\$ 11,236,000</u>	<u>\$ 7,696,000</u>
Total Estimate	\$ 56,179,000	\$38,481,000

Operating Costs

- 16.43 The operating costs for each of these options have also been reviewed. It has been assumed that the alternative options would only be fully operational during the 100 days of drought (60 days at Stage 3 rationing and 40 days at Stage 5 rationing). There is also an allowance for ramping up the treatment plant in readiness for full production and then ramping it down again at the end of the drought.
- 16.44 The Riverside Pond 500,000m³ option only delivers 4,000m³/day so it is assumed that it would operate at this level for the full 100 days. Should Step 5 rationing be implemented then even with this is operating there will still need to be some restrictions as the 4,000m³/day will not fill the gap in demand.
- 16.45 The Riverside Pond 800,000m³ option delivers 13,000m³/day so it is assumed that it would partially operate over the 60 days of stage 3 rationing but operate at full capacity for the 40 days of stage 5 rationing. Some restrictions may still need to applied in the event that the demand exceeds the delivery capacity of 13,000m³/day.
- 16.46 The Motueka Aquifer Option delivers 5,900m³/day to Mapua. It is assumed that this would operate at full capacity for 100 days of the year and may operate at lesser capacity at other times.

16.47 The operational costs are outlined as follows:

	Riverside Pond (500,000m3)	Riverside Pond (800,000m3)	Motueka Aquifer (5,900 m3/day)
Treatment Plant	\$ 269,600	\$698,100	\$157,600
Pumping	\$ 6,180	\$ 16,481	\$255,300
Riverside Bore Pumping	\$ 28,000	\$56,000	N/A
Maintenance	\$150,000	\$250,000	\$195,000
Depreciation, Rates, Insurance, Administration	\$280,000	\$900,000	\$300,700
Totals (\$/yr)	\$733,780	\$1,920,581	908,600

Nelson City Council Alternative

16.48 The Nelson City Council has confirmed that it could only provide Tasman District Council up to 5,000m3/day. Previously it indicated 5-10,000m3 per day could be available, however until the primary clarifier is installed in 2029/30 more than 5,000m3/day is not possible.

16.49 The details of this option are outlined in Attachment D.

16.50 If the Tasman District Council wanted to utilise up to 5,000m3/day that could be available from the Nelson City Council it would probably need to consider providing some investment to implement specific upgrades sooner. The likely investment required would be;

Maitai duplicate pipeline pump station upgrade	\$2.0 million
Second clear water reservoir at Tantragee Water Treatment Plant	\$1.0 million
Tantragee WTP pumps/pH correction/general plant upgrades	\$1.0 million
Install new reticulation Suffolk Road, Stoke Main Road Stoke	\$3.0 million
Install new reticulation Main Road, Stoke	<u>\$6.0 million</u>
Total	\$13.0 million

16.51 The Nelson City Council has indicated that it cannot make more than 5,000m3/day available at this stage. If the Tasman District Council needed up to 10,000m3/day then it would need to convince the Nelson City Council with a value proposition. Council would probably need to not only invest \$13.0 million in the infrastructure outlined above, but also offer some sort of investment in the other major upgrades identified and not yet funded by the Nelson City Council. These are outlined and are summarised as follows;

Primary Clarifier at the Tantragee WTP	\$18.0 million
Upsizing the Suffolk Road Hill Street North Link	<u>\$ 1.0 million</u>
Total	\$19.0 million

Comment

16.52 The Nelson City Council has invested in its water supply including investing in the Maitai Dam. It is well within its rights to not allow permanent access to additional water as it needs to protect its future. From a regional and resilience perspective placing reliance on Nelson City Council to augment the water supply to Richmond and beyond is not sustainable. Additional augmentation will be required at some time in the short to medium term

Comparison with July 2017 Estimates

16.53 The following table compares the current estimates with the July 2017 Estimates.

Table comparing current estimates to July 2017 Estimates

	July 2017 Estimate	Aug 2018 Estimate	Operating Estimates
Riverside Pond (500,000m3)	\$24,600,000	\$24,706,000	\$733,780 per year
Riverside Pond (800,000m3)	\$54,000,00	\$59,850,000	\$1,920,581 per year
Motueka to Mapua (5,900m3/day)	\$38,500,000	\$59,850,000	\$893,700 per year

Comparison with Waimea Community Dam

- 16.54 The Waimea Community Dam is currently costed at \$102.171 million.
- 16.55 As outlined in the financial sections of this report, the portion of this cost that is allocated to Council totals \$38.6 million. Approximately \$16.30 million is allocated to the urban water account and \$22.300 allocated to public good and essentially covers the environmental component of the project.
- 16.56 The following table summarises the capital and operating costs of the urban water alternatives. It also outlines the daily flow each of the alternatives deliver to the urban supply and whether they meet the water gap requirements already derived.

Table Comparing the Capex, Opex and Daily delivery outputs for each of the Urban Water Alternatives

Water Augmentation Options	Storage	Capital Cost	Opex	Daily Flow	Capital Cost/Daily Flow	Rationing Stage	Daily Water Gap	Daily Water Gap	Daily Water Gap
	(m3)	(\$'000)	(\$'000 p.a.)	(m3)	(\$'000/m3/day)		2017	2047	2117
Riverside Storage	500,000	\$24,700	\$734	4,000	6.17	3	4,900	9,800	12,300
						5	13,300	18,500	21,000
	800,000	\$59,900	\$1,921	13,000	4.61	3	4,900	9,800	12,300
						5	13,300	18,500	21,000
	1,400,000	\$84,000	\$3,498	20,000	4.2	3	4,900	9,800	12,300
						5	13,300	18,500	21,000
	2,300,000	\$108,000	\$5,024	31,000	3.48	3	4,900	9,800	12,300
						5	13,300	18,500	21,000
Motueka Aquifer	N/A	\$54,200	\$894	5,900	9.19	3	4,900	9,800	12,300
						5	13,300	18,500	21,000
		\$100 - \$120,000	\$1,600	13,000	8.46	3	4,900	9,800	12,300
						5	13,300	18,500	21,000
		\$160 - \$200,000	\$2,800	31,000	5.81	3	4,900	9,800	12,300
						5	13,300	18,500	21,000
Roding River Storage	4,000,000	\$110,000	\$3,600	30,000	3.67	3	4,900	9,800	12,300
						5	13,300	18,500	21,000
Teapot Valley Dam	500,000	\$46,150	\$1,111	4,000	11.54	3	4,900	9,800	12,300
						5	13,300	18,500	21,000
Nelson City Council	N/A	\$13,000	NCC water charges	5,000	2.6	3	4,900	11,800	22,600
Waimea Community Dam	Urban	\$16,300	\$714	21,000	0.78	3	4,900	11,800	22,600
	Environmental	\$22,300				5	13,300	18,500	21,000
	Combined	\$38,600				1.84			
			2018 Revised Estimate						

- 16.57 The table also includes a column which calculates the investment for every 1.0 m3 of urban water delivered per day for the life of the option. The most expensive option is the Teapot Valley dam option which costs \$11,540 per m3/day. The Nelson City Council option requires an investment of \$2,600 per m3/day to obtain the up to 5,000m3/day
- 16.58 The first two Riverside Storage options (500,000m3 and 800,000m3) have investments of \$6,170 and \$4,610 per m3/day respectively.
- 16.59 The Waimea Community Dam can allow up to 60,000 m3/day to be abstracted to meet the urban water supply demand. For this exercise we have used 21,000m3/day as it is the expected water gap in 2117 for medium growth. Using the 21,000m3/day figure means that the Waimea Dam has an investment of \$780 per m3/day for the urban delivery of up to 21,000m3/day.
- 16.60 If the environmental is combined with the urban water then the investment for both is \$1,840 per m3/day. This investment is still more cost-effective than all the other alternatives and it also provides the environmental benefits as well. The other alternatives do not provide this benefit other than providing abstraction relief.
- 16.61 If the urban water 60,000m3/day allocation was utilised in the calculation the investment would drop to \$643 per m3/day for both urban water and the environmental benefits.
- 16.62 The Riverside Pond Option A (500,000m3 Storage) could be discounted as not being the most cost-effective option for delivering 4,000m3/day for an investment of \$24.7 million. The Nelson City Council option provides up to 5,000m3/day which is a similar level of service for an investment of up to \$13.0 million. Both of these options only meet Stage 3 restrictions now and do not provide security for Stage 5 restrictions. The Riverside Pond

Option B (800,000m³ Storage) provides better security in the short to medium term and therefore it is considered as being the preferred of all the alternative options.

- 16.63 The smaller storage of 500,000m³ and delivery of 4,000m³/day is not likely to sufficiently mitigate rationing for urban and industrial users. Although it could meet the current demand gap during Stage 3 restrictions, it is likely that some form of rationing will occur concurrently. This option is therefore not considered viable for the associated investment of \$25 million. The Northington Report August 2018 reaches a similar conclusion.
- 16.64 This analysis indicates that even with the environmental benefits included, the Waimea Community Dam has an investment profile of between \$643 per m³/day and \$1,840 per m³/day. This is compared to the Riverside Pond 800,000m³ storage option of \$4,610 per m³/day. Therefore, an investment of \$38.600 million delivers far more benefits over a much longer period than \$59,900 million for the Riverside Pond Option with 800,000m³ storage and only delivering up to 13,000m³/day.

Water Tanks

- 16.65 Attachment 3 provides an analysis comparing the value proposition of individual water tanks compared to the WCD. The conclusion of this analysis that water secured from the Waimea Community Dam is a much lower cost option for our customers when compared to tanks – and will provide a level of security many times greater.
- 16.66 The average cost of providing a basic tank system per customer connected to Council's water supply is estimated conservatively at \$5,000. This compares to around \$1,350 for the WCD if the urban water club's proposed contribution of \$11.5m (net) to the WCD is shared among those same customers. For a lower cost, the amount of water stored and available for use by the WCD will be 20 to 60 times the amount of water available by the tank scheme.
- 16.67 The tank systems used in this analysis will not address our water shortage. Tank systems can be developed to provide a greater level of security or use, and/or can fit the constraints of existing sites and smaller sites, but are significantly more expensive than that used in the analysis.
- 16.68 Requiring new developments to install tanks will address only a portion of new demand and will not offset existing demand. In practice, a wide scale urban tank scheme for all customers is going to be difficult to implement, and it may take decades to approach the level of impact contemplated in the analysis above.
- 16.69 At Stage 5 rationing, no urban tank system will provide a meaningful benefit to businesses, households, or the water supply network or stave off restrictions limiting urban water supply to essential human health only.
- 16.70 The cost of the Waimea Community Dam to our customers is lower than tanks in any configuration, even if we significantly increase our contribution to the Waimea Community Dam or use larger tanks. The Waimea Community Dam provides security for all business and household water uses including potable supply, provides for growth, protects against extreme drought, and protects our environment. In short, the Waimea Community Dam provides large-scale storage and economies of scale that tanks cannot match. Our community will get less and pay more with any tank scheme.

17 Risk Identification, Assessment and Treatment

Project Estimate and Fixed Price Component

- 17.1 The Total Project Cost is currently estimated at \$102.171 million. The following table outlines all the work streams within the project and the estimated cost of each work stream.
- 17.2 The right hand column of the table contains the remaining value of work within each work stream that contains either measure and value items, or items that have not been fixed or committed. The total of these values make-up \$22.084m.
- 17.3 Table showing the value of work that has not been committed or fixed price:

	Estimated Final Cost (\$m)	Value not committed and not fixed price (\$m)
1. Procurement, ECI Phase, Design, Project Office	\$6.092	\$2.104
2. Land	\$3.216	\$0.424
3. Governance & Company	\$1.603	\$1.470
4. Dam Construction	\$68.114	\$9.067
5. Site Access, Clearing, Roding	\$4.183	\$0.0
6. Escalation/Inflation Allowance	\$3.266	\$3.266
7. Waimea Water Risk Allowance	\$6.546	
8. Waimea Water Contingency Allowance	\$2.000	
9. Construction Related Professional Services	\$4.709	\$4.644
10. Consent Compliance	\$1.122	\$1.109m
11. Sunk Costs	\$1,320	\$0.0
Totals	\$102.171	\$22.084

Note – The estimate of \$102.171 assumes we will achieve financial close by 15 December 2018, with construction mobilisation following immediately for works to commence in January 2019.

Risk and Contingency

- 17.4 The Early Contractor Involvement (ECI) process has delivered significant certainty in the construction component of the project. The current project estimate of \$68.114 million has \$59.084 million of fixed prices. Prices that the contractor is to be paid and not subject to further increase.
- 17.5 The Waimea Water Risk Allowance (\$6.546m) and Waimea Water Contingency Allowance (\$2.000m) components have been assessed in detail. The background, detail and outcomes of the assessments are outlined in the following sections.

Risk

- 17.6 A Risk Register was developed early in the ECI process. Most of the risks identified were treated during the development of the construction methodology.
- 17.7 Each risk was allocated to the entity that could manage it most appropriately. Consequently there are risks allocated to Waimea Water and risks allocated to the contractor (FHTJV). The FHTJV risks are primarily risks related to construction and are included in the construction price.
- 17.8 The risks and associated allowance that have been allocated to Waimea Water are:
- **Flood Risk** – a flood risk model was developed during the ECI process to estimate the likelihoods and related costs of flooding during construction. Flood insurance has been included to cover large flood events. The insurance has a deductible (excess) of \$200,000 per event. The allowance of \$1.670m covers the costs of repairing flood damage for events less than \$200,000. It also covers the cost of the deductible on larger events.
 - **Shared Risks** – These are risks that have been identified as not being under the control of either entity but require both Waimea Water and FHTJV to cooperate in order to mitigate and manage them. An allowance of \$0.438m has been calculated to cover costs associated with the mitigation of these risks.
 - **Measurable items** – These are items in the schedule in which the volume of work and associated quantities cannot be predicted with certainty. These are specifically beyond the control of the contractor. They primarily relate to geological features beside and under the dam site within the river bed.
- 17.9 The quantities allowed for under the measure and value items in the priced contract amount to \$3.476m. The quantities and associated rates were derived from the site investigation knowledge acquired and the construction methodology adopted. The likelihood of the quantities being higher or lower than expected have been statistically analysed and a risk allowance of \$456,000 has been calculated. This equates to around 13.1% of the value of the measurable items.
- 17.10 It should be noted that the quantities in the schedule may be conservative and the actual required quantities may be less than estimated. The contractor will only be paid for work done under the measurable items.

Waimea Water Risks

- 17.11 These are risks that have been identified as beyond the control of the contractor and therefore need to be allocated to Waimea Water. An allowance of \$3.892m has been calculated to cover costs associated with these risks.

17.12 The allowance has been derived from the risk register and an assessment of the likelihood and potential cost implication of each risk. In summary, the risk allocation breakdown of \$6.546m is as follows;

- Flood Risk \$1.670m
 - Shared Risks \$0.438m
 - Measurable Items \$0.456m
 - Waimea Water Risks \$3.982m
- Total \$6.546m**

17.13 The risks and associated allowances that have been allocated to FHTJV total \$1.500 million. These have been included in the construction price of \$68.117 million.

17.14 This risk allowance of \$6.546 million is for the 'known unknowns'.

Contingency

17.15 Determining an appropriate contingency has involved an assessment of each of the critical aspects of the project. The following points outline the context in determining a contingency amount:

17.15.1 The construction price has been developed on a substantially completed detailed design.

17.15.2 The construction methodology determined during the ECI process has been carefully planned to a high level of detail by an appropriately experienced team. The construction methodology has been robustly costed.

17.15.3 The risks to construction have been determined, mitigated, costed and statistically analysed.

17.15.4 The \$68.114m construction price includes \$59.038m of fixed price items. The remaining \$9.076 comprises a Prime Cost sum of \$5.6m for Mechanical and Electrical (M&E) and \$3.476m for measure and value items. The PC sum for the M&E component will become fixed once the detailed design is complete and this will be finalised prior to financial close. The details around the \$3.476m of measurable items are outlined above.

17.15.5 Costs associated with land acquisition work stream is largely complete. Costs have either been incurred or have already been determined.

17.15.6 The design and ECI work stream is nearing completion. Costs have mostly been incurred.

17.15.7 As outlined in the table above an estimated \$22.084 million of the \$102.172m project estimate is still to be committed and is not a fixed price.

17.15.8 Of the \$22.084 million, \$3.476 million for measured items has a risk of \$0.456 million linked to it so we do not need to consider additional contingency for this item. This leaves \$18.608 million that needs to be assessed for a contingency.

17.16 Given that detailed considerations and associated certainty ascribed to this project, a contingency of between 10% and 15% would be considered appropriate within the \$18.608 million.

- 17.17 Waimea Water has included contingencies totalling \$355,750 in five work streams; Project Office, Land, Governance & Company, Professional Fees and Consent Compliance. Combine this with the Waimea Water Contingency Allowance of \$2.0 million gives a total contingency of \$2,355,750. This is around 14.5 % of the \$18.608 million.
- 17.18 The contingency allowance of \$2,355,750 is for the ‘unknown unknowns’, or things that can’t reasonably be foreseen.

Project Management and Delivery

- 17.19 The project is currently being managed by Waimea Water. Waimea Water comprises a Project Governance Board made up of the following members;
- John Palmer, Waimea Irrigators Ltd (Chair)
 - Janine Dowding, Tasman District Council
 - Natasha Berkett, Waimea Irrigators Ltd
 - Richard Kirby, Tasman District Council
- 17.20 The Project Governance Board has also had observers from Crown Irrigation Investments Ltd, Nelson City Council and staff from Tasman District Council. The staff have specifically been the Environmental & Planning Manager (Dennis Bush-King) and the Corporate Services Manager (Mike Drummond).
- 17.21 The Waimea Water Project Office has been resourced with a team of appropriately skilled personnel who have managed the day to day aspects of the project. These are;
- Alex Adams, Risk Manager
 - Andy Nelson, Project Director
 - Rhonda Marshall, Document Controller
 - Rachel Fraser, Financial Support
- 17.22 There have also been legal advisers (Anderson Lloyd), Professional Designers (Tonkin and Taylor), Independent Estimator (Bond CM), Engineer to the Contract (Stantec) and Probity Auditor (Brian Smith Advisory Services Ltd).
- 17.23 It is intended that the Project Governance Board and the Project Office will manage the project through until financial close. In the meantime it is intended to establish the Council Controlled Organisation by completing the necessary formation documents and legal agreements. It is also intended to advertise and appoint four Tasman District Council Directors to the CCO. Waimea Irrigators Limited have already selected its two Directors.
- 17.24 The 7 Directors on the Board comprise the following appointments;
- Directors appointed by the Tasman District Council;
 - Director appointed jointly by Tasman District and Nelson City Councils;
 - Directors appointed by Waimea Irrigators Ltd;
 - Director appointed by iwi

- 17.25 The Directors will have the appropriate experience as professional directors and have a combination of commercial, technical and governance experience to oversee the construction phase of the project. It is intended that the Board of Directors be established to take over the project prior to the construction phase commencing.
- 17.26 There will be a Project Director that will report directly to the Board of Directors. The project Office will comprise the following expertise and skills. Note that these skills will have input into the project thought some will not be involved fulltime on the project.
- Project Director
 - Document Controller
 - Administration Officer
 - Financial Officer
 - Engineer to the Contract (Stantec)
 - Engineer's Representative (Stantec)
 - Structural Engineer (Tonkin and Taylor)
 - Geotechnical Engineer (Tonkin and Taylor)
 - Construction Manager (Fulton Hogan Taylor Joint Venture)
 - Design Manager (Fulton Hogan Taylor Joint Venture)
 - Safety Manager (Fulton Hogan Taylor Joint Venture)
- 17.27 The Fulton Hogan Taylor Joint Venture will also have other skilled staff on site undertaking the physical works.
- 17.28 The Governance and Management Structure that is intended to be established will manage the risks and the delivery of the project. There is sufficient experience in the team to ensure that the project is delivered to meet its intended objectives and to manage the risks associated with that delivery.

Oxford University Paper - *'Should we build more large dams? The actual costs of hydropower mega-project development'*

- 17.29 Understanding the purpose of this research paper is critical to understanding its relevance to the Community dam.
- 17.30 The research paper's clearly stated purpose was to examine "whether the benefits of new dams will outweigh the costs" when providing electricity supplies - particularly in developing countries. This was because the de facto response to electricity needs is still often 'big solutions' at a time when it's becoming clear that alternative electricity sources (such as solar and wind) and much smaller dams can be provided much more quickly, with greatly reduced environmental impacts and scope for community ownership.
- 17.31 A key point is that the paper examines a sample of 245 dams (mostly hydro) out of over 50,000 globally and focused on very large ones (80% of the sample had a wall height of over 30 meters and 30% over 100 meters). In addition 75% of the dams were in developing countries and the average cost was US\$1.44 billion in 2010 dollars.
- 17.32 All the focus of study elements outlined above indicate that the conclusions from 'Should we build more large dams? The actual costs of hydropower mega-project development' are

not directly applicable to the Waimea Community Dam. The purpose of the study and scale and circumstance of projects examined are very different from those we face in NZ today and the Waimea Community Dam project in particular. However some more specific comment is valid.

- 17.33 The Study states that there was overwhelming evidence that costs were systematically biased towards underestimation. It implies that this bias was to enhance the business case to ensure the project was initiated. The natural consequence of this is would increase the overrun percentage. The ECI process has minimised the risk of any underestimation in the construction component of the project.
- 17.34 The costs attributed to the sample of 245 dams appear to be a misrepresentation. In a subsequent study by the International Commission on Large Dams (ICOLD) questions are raised about the voracity of the 99% overrun in costs as it cannot be explained by the six references quoted in the study. Another important aspect that is not clear in the study is - which estimate is used to calculate the cost overruns. Is it when the business case is developed to determine viability? Or is it after preliminary design and before procurement? Or is it when procurement has been completed and the construction contract signed?
- 17.35 The study has endeavoured to account for the variables and characteristics of each of the 245 dams in regard to scope, estimates, detailed design, procurement and project management. However it is not clear whether these inputs into the model were specific enough to give robust outputs - but given its focus on mega hydro projects that is, to some extent, an unknown.
- 17.36 As highlighted above the focus of the study was on hydropower mega-project development. The Waimea dam does not fall into this category given its modest size and a 2018 projected budget of US\$68.184 million compared with the studies average of US\$1.44 billion in 2010 dollars. It is primarily for maintaining river flows, augmenting the aquifers under the Waimea Plains to facilitate abstraction for urban water supplies and for horticulture and agriculture - thus it has multiple benefits.
- 17.37 The study does observe that the proponents of large dams envisage multiple benefits but given the primary justification was mostly hydro electricity production the cost-effective delivery of wider benefits was seldom achieved. The study suggests the use of an 'outside view' or independent advisors is preferable to minimise the risk of this occurring. That has been our approach and in particular the extensive involvement of the community in the earlier stages of developing means of water augmentation has been a very important part of the planning process.

Government Review of Three-Water Activities

General Overview

- 17.38 The Government is reviewing the management and delivery of the three-water activities as a result of the Havelock North Inquiry. It has signaled that this broad-ranging review will be undertaken this year. The Government recognises that the local government sector is facing variable service delivery challenges and significant cost pressures related to the management and delivery of the three-water services.
- 17.39 The Government intends to deal more effectively with the pressing issues confronting the three-water activities with a strategic approach in mind. It is committed to confronting the scope of this challenge whilst seeking to protect the health of people and the environment whilst also supporting a strong economy. This is in the context of climate change,

declining populations in rural areas and increasing funding and financing pressures on small communities.

- 17.40 The Government is undertaking the review with a strategic review of;
- Capability and Capacity – holistic asset management and governance;
 - Affordability – reviewing the main funding pressures
 - Regulation – compliance, monitoring and enforcement
- 17.41 The cross government agency review will be led by the Department of Internal Affairs who will work with councils, industry, sector groups and others to assess and scope options to deal with the key issues, including costs relating to better management and delivery of water services. Government Officials have been tasked to develop options and recommendations to create a strong sustainable three waters system. They have been tasked report back to the Minister in October 2018.
- 17.42 Although the Government has signaled that it will take the lead, it is expecting strong cooperation from councils, iwi and business to work with it to ensure risk, opportunities and costs are identified and managed.
- 17.43 The review will also include looking at the structures and entities that are best suited for the provision of the three-waters. The Government has signaled that the core principles of public ownership will underpin any considerations that will result from the review.
- 17.44 The review will also look at whether the existing regulatory framework for the three-waters is appropriate and fit-for-purpose.
- 17.45 The Review has four inter-related workstreams;
- Effective oversight, regulatory settings and institutional arrangements;
 - Funding and Financing mechanisms;
 - Capacity and capability of decision makers and suppliers
 - Information for transparency, accountability and decision making

Implications for Council

- 17.46 It is very difficult to predict the outcomes of the review and what course the government will take. It is highly likely that the following will occur;
- A specific regulator be established to regulate the 3 waters activities;
 - There will be some form of change in both the governance and management of the 3 water activities;
 - The funding and financing will be focused around users of the 3 water services.
- 17.47 The current Waimea Community Dam project has three main beneficiaries;
- The ecology and environmental outcomes of the Wairoa and Waimea Rivers;
 - The urban water supplies (Richmond, Hope, Brightwater, Mapua and Nelson);
 - The horticultural and agricultural activities on the Waimea Plains.

- 17.48 The current proposal for the Waimea Community Dam is funded by the three beneficiaries in some form or other. There is also funding coming from the government through the Fresh Water Improvement Fund (\$7.0 million grant) and Crown Irrigation Investments Limited (\$32 million in loans).
- 17.49 The 3 Waters Review is primarily focused on the water, wastewater and stormwater activities. Most of these in the Tasman district are managed by Council in one form or the other. They are also funded by the general ratepayer and by specific users. Of the three beneficiaries of the Waimea Community Dam only the urban water supply will be affected by the 3 waters review.
- 17.50 Although the governance and management of the three waters may be taken out of Council's direct control, the ecological and environmental responsibilities associated with the Wairoa and Waimea Rivers will still remain the responsibility of Council. It is clear from public opinion and recent government announcements that the environment will be given greater protection in future. Consequently, It is very likely that minimum trigger river flows in the Waimea and Wairoa rivers are likely to increase, thus putting more stress on abstractors whether urban or rural.
- 17.51 The horticultural and agricultural sector has a reliance on water. And although this is not a direct responsibility of Council, Council does have a responsibility for the economic wellbeing of its community. The ongoing wellbeing and sustainability of the horticultural and agricultural sector is of mutual benefit to the urban communities and is an economic driver. The Northington Report has confirmed the extent of this. Council cannot ignore its statutory responsibility in this respect.
- 17.52 Council's responsibility is more than just urban water supplies.
- 17.53 There has been some commentary that with the pending 3 waters review, Council should not invest in the Waimea Community Dam because the government will soon take over the 3 waters and it can then be responsible for water augmentation. This view is not supported for the following reasons:
1. There is no certainty as to whether the 3 waters activities will be aggregated into a separate entity or the scale of any aggregation. If aggregation did occur then the aggregated entity would only be interested in water augmentation for the urban supply and not be interested in any other benefits. Alternative water augmentation options have already been identified as not being as cost-effective for urban water supplies as the Waimea Community Dam;
 2. Council has a regional council responsibility of protecting and enhancing the environment. It would need to find another means to maintain and enhance the ecology of the rivers;
 3. Council has a statutory responsibility of ensuring the economic, social and environment wellbeing of its community. The economic multiplier of the dam has been verified by the Northington Report;
 4. The government has not signaled how it may help in financing or subsidising the 3 waters. Even if it does subsidise in some form or other, users will still bear the greater share of the funding. Any subsidy is not likely to match the current funding that the government has allocated to the Waimea Community Dam.

5. Potentially the transfer of the water supplies to a separate entity, would also result in the transfer of the water supplies' debt and share of operating costs related to Waimea Community Dam.
6. It is likely that there will be a new regulator and review of the current regulations related to the three waters activities.

18 Funding and Financial Considerations

Funding and Finance - General

- 18.1 There is a clear trade-off between operational costs and capital costs and over the longer term the cost of loan repayments in real terms reduces and the cost of operational expenses increases. Given current borrowing costs on a 30 year table loan each \$1m in opex is the equivalent of \$16m in additional borrowing in year one. When comparing between water augmentation alternatives this differential needs to be taken into account.
- 18.2 Any contribution to water augmentation solution capital costs needs to be accommodated within the net debt limit (\$200m) in the Council's Financial Strategy. The cost of servicing the additional loans needs to be accommodated within the rates increase limit of 3% (excluding growth). Both of these may require re-prioritisation of capital and operational projects.
- 18.3 The opening net debt as at 30 June 2018 was \$141m. The opening position in the Long Term Plan 2018-2028 was \$159m creating \$18m headroom. In addition, the Council does not usually complete its planned capital works programme each year. Carried over capital works from 2017/2018 to 2018/2019 will be in the order of \$17m - \$20m. This creates some ongoing headroom which combined with some reprioritisation should accommodate any increase in capital commitment for a water augmentation solution. The Chief Executive and the Senior Management Team could undertake to manage Council expenditure and the overall capital works programme to remain under the debt cap, which can be managed through Annual Plan processes.
- 18.4 A decision to not proceed with the Waimea Community Dam will mean that \$4-5m of Joint Venture refundable work in progress project costs currently loan funded by the Council will need to be met from future rates income over (say) a five year period leading up to the construction of an alternative solution. This figure is in addition to the costs of developing and implementing an alternative solution.
- 18.5 In addition to these recoverable costs (from the Joint Venture) the Council will have incurred circa \$2.5m in unrecoverable costs that need to be met from rates or other funding sources.
- 18.6 The decision on the form and timing of a water augmentation scheme will likely impact on the Council's credit rating. In its assessment Standard and Poors evaluates the Council's current and future financial performance, along with the management and governance of the organisation. In addition they consider the performance of the local economy and in particular the risks and diversity within that economy. A decision that would likely have significant negative impacts on the local economy will give cause for concern and will be taken into account in the Council's annual rating review. A down-grading in our credit rating will impact on our overall borrowing costs.
- Prudent Decision Making***
- 18.7 Section 101(1) of the Local Government Act 2002 requires the Council to manage its general financial dealings prudently and in a manner that promotes both the current and

future interests of the community. Financial prudence means making a decision with deliberation, due care and forethought; it applies equally to both making a decision to do something as to making a decision not to take a course of action. It also requires the Council to identify and manage the risks associated with the decision. For this project it would include the financial risks of both proceeding, not proceeding, or delaying the project.

Financial Impact of drought and income from Nelson City

- 18.8 During a drought like that in 2000/01, if the Council were able to comply with the TRMP rules, the total revenue lost through lower water sales would be approximately \$1.6m (incl GST). This would need to be recovered the following year through higher water charges. Over 90% of the water supply costs are fixed and are not impacted by the volume of water consumed.
- 18.9 In 2017/18 we received \$1m (incl GST) from water sales to customers in Nelson City. While we could curtail supplies to these customers in order to provide water to customers in Tasman District, this would only have a short term benefit due to the way the TRMP rules work. Any large reduction in supply to Nelson City would need to be used by Tasman District otherwise the reduction would be factored into the eight year average usage and lost over time through the operation of the TRMP provisions.

Funding and Finance – Waimea Community Dam

The Nature of Public Investments

- 18.10 Concerns have been raised in the past about the Council's investment in the proposed Waimea Dam being a subsidy to irrigators. What is proposed is not that but is an increased Council contribution to get a project over the line. The Council should be motivated to do that (within limits) because the do nothing and alternative augmentation options cost the community more and/or deliver less value.
- 18.11 Public capital investment in government-owned assets creates the opportunity for private investment and productivity – that is why councils and central governments do it. The effect of public capital investment on economic growth is hotly debated. While analysts debate the magnitude, the evidence is that there is a statistically significant positive relationship between infrastructure investment and economic performance.
- 18.12 In the case of this project the investment opportunities are for the irrigators and others to take. Some may argue that there is an element of exclusivity here in that 'affiliation' and a water supply agreement is required to gain access to the benefits. In other words, access is available for a fee.
- 18.13 Other public investments in assets such as roads, airports, ports, transit systems, and even community facilities create investment opportunities for and 'subsidise' someone. Our consenting and regulatory work enables developers and others to profit also. While some may be genuine public good and access is 'free' there are many other examples where a fee is needed to particulate.
- 18.14 There are various reports about the nature and extent of the economic benefits that will accrue from the proposed Waimea Community Dam and who will derive them. The cost of not proceeding with the proposed Waimea Community Dam on the economy and sectors of the economy has also been quantified. New Zealand Institute of Economic Research, Northington and Partners and John Cook and Associates have all written reports.

- 18.15 As noted earlier, academics and practitioners will debate and attempt to quantify these costs and benefits so long as someone commissions them. However, there should be no debate about the principles.
- 18.16 Trying to quantify the costs and benefits beyond the established principles is unproductive. There is so much we don't know about production methods, crops of the future, markets, the climate, the choices entrepreneurs will make, capital and labour availability and so on to be certain.
- 18.17 What we do know is that without a dam (or an alternative) there will be a negative impact, the urban footprint in the Waimea Basin area will be locked into its 2013 configuration, there will be no wet industries and so on.

Finance and Funding

- 18.18 This project now has an overall project cost estimated at \$102m excluding unrecoverable costs to date. Several funding proposals have been advanced over the years but none have been successful. The underlying challenge is that this is a large infrastructure project based on estimated water demand circa 100 years out and the project cannot be staged.
- 18.19 Reducing the size of the proposed Dam does not reduce the costs proportionally. This is because most of the cost is in the lower parts of the Dam and most of the storage capacity is in the higher areas. The design capacity of the Dam (hectare equivalents (hae)) provides for 7,765 hae of extractive capacity. That capacity under the current proposal is allocated 5,425 hae being taken up by irrigators, 1,825 hae by Tasman District Council and 515 hae via Tasman District Council for Nelson City Council. The proposed Dam also provides for environmental flows in the river and a public good contribution to the District. These two components have been assessed as 30% of the capital cost of the project.
- 18.20 Following the unsuccessful Council-proposed fully rates-funded approach consulted on in 2014, irrigators undertook to develop an investment ready proposal for consideration by the Council. That proposal was subsequently received and rejected by the Council. Over the last 18 months or so the Council, Irrigators, Crown Irrigation Investments Limited and our advisors have been meeting and developed a proposal that would see this key project proceed. That work identified a need by all parties to move significantly from their opening positions. **In essence we all get there together or we don't get there at all.** The negotiated approach was agreed and a commitment letter setting out the respective parties obligations was signed on behalf of the Council in February 2018. Now that the ECI process has been concluded and the budgets revised we have identified an increase in costs of circa \$26m. That means that the Council and the irrigators will both need to make a larger financial contribution to the project if it is to proceed.
- 18.21 Enquiries have been received from iwi and Industrial users on how they could assist in funding the project. The most logical place to insert this funding would be directly into the Council Controlled Organisation (CCO). This could be by way of "dry" shares. These shares do not link to a right to for affiliation. The share issue would need to be to a small number of sophisticated investors and in large denominations (\$500k-\$1m+). An issue of redeemable preference shares could provide for a return at rates at or below what Council could borrow from the Local Government Funding Agency. The shares could be redeemable at a future date out (say 15-25 years). At this time Council would be able to replace the shares with a capital injection to the CCO. At all times however, Council would need to control 51% of the voting shares in the CCO.

18.22 This option along with others would be explored in the lead up to financial close and subject to agreement with the other joint venture parties would be included as an option in the agreements.

Financial rationale for Water Re-supply provisions

18.23 The water re-supply provisions that cover Waimea Irrigators Limited (WIL) resupplying industrial users and Council supplying rural users are set out in the Shareholder's Agreement term sheet. They are designed to ensure continued financial viability of the funding arrangements for both parties.

18.24 WIL and Council have agreed the following "Re-supply Principles":

- WIL agrees that it will not supply any water to, or enter into any water supply agreement with, any person who is, at the time of supply, connected to Council's reticulated and extended reticulated networks, without the agreement of Council; and
- Council agrees that it will not supply water to anyone other than for any Base Case Use and not supply augmentation water to apple growers, vineyards, dairy farms or other horticultural or agricultural water users, without the agreement of WIL.
- Other than in respect of any current industrial activities for customers currently supplied by Council, prior to either Party supplying any augmented and non-potable water for any new industrial activities, both Parties shall discuss and agree the proposed supply arrangements.

Costs to Date

18.25 The project costs to 31 July 2018 are set out in the table below. The Council has loan funded costs totalling \$6,362m. These comprise two components, costs recoverable from the Joint Venture CCO should the project proceed totalling \$4.557m and unrecoverable costs totalling \$1.805m.

Figure 18.26:

Waimea Project - Summary Financials							
	Pre June 14	14/15	15/16	16/17	17/18	18/19	Total
Expenditure (excludes WIL WCDL Costs)	Actual	Actual	Actual	Actual	Actual	Actual	Actual
Stage 1 - Pre Feasibility	412	0	0	0	0	0	412
Stage 2 - Feasibility	1,564	0	0	0	0	0	1,564
Stage 3	222	0	0	0	0	0	222
Design	1,929	0	0	0	0	0	1,929
Governance	214	0	0	0	0	0	214
Project Management	59	335	69	308	487	10	1,269
Consenting	205	815	8	8	36	0	1,073
Water Supply Solution (Tonkin Taylor/Beca)	0	557	86	125	1,886	276	2,930
Land and Access	0	102	288	273	1,406	41	2,110
Professional Support CCO Structure/Borrowing Agreement	0	4	26	234	295	0	559
Communications	0	17	0	18	1	0	36
Statutory Process	0	16	0	2	3	0	21
Hydro	0	0	0	0	68	3	71
Project Office	0	0	0	29	510	48	587
Interest on Loan Funding	0	0	74	71	165	0	310
Total	4,606	1,846	552	1,067	4,858	378	13,307
The above is funded by;							
WIL 50%	0	0	0	65	1,246	162	1,473
TDC WCD BAU Loan	0	322	110	507	863	3	1,805
TDC WCD JV Loan	0	658	442	495	2,749	213	4,557
Historic Funding Sources	4,606	866	0	-0	0	0	5,472
Total	4,606	1,846	552	1,067	4,858	378	13,307

Cost to Financial Close

18.27 There are three sets of costs that will be incurred through to financial close.

18.27.1 The Council specific costs that are paid in full by the Council. These include director recruitment costs, professional advice including on the commercial negotiations and documents, public consultation and support for the Council decision making processes.

18.27.2 WIL specific costs that are paid in full by WIL. These include their normal company costs, capital raising costs, professional advice including on the commercial negotiations and documents.

18.27.3 JV core project costs – These are costs that cover work streams within the overall project budget. Examples are the conclusion of the ECI design work. Meeting the consent conditions setting up the CCO etc. Promoting the local bill and completing the land and access negotiations. Some of these JV costs are initially met by the Council and others shared through the heads of agreement with WIL. All these costs will be reimbursed to WIL and the Council at financial close should the project proceed.

- 18.28 **Council specific costs** - In October 2017, the Council approved (unrecoverable) expenditure on the project through to financial close of \$640,000 plus an additional \$100,000 to investigate further the hydro-power options. To the end of July 2018 \$493,000 has been spent. This leaves \$247,000 available to fund the Council costs out to financial close. I expect that we can complete the negotiations and commercial arrangements within this budget. These costs along with other unrecoverable costs have been provided for in the LTP by way of a 30-year loan. If a decision is made to engage in a further round of public consultation then additional funding will be required. If a decision is made not to proceed with the project these costs will need to fully funded over the next 5 years.
- 18.29 **Joint Venture Costs** The JV office has assessed JV costs to financial close .These include Councils costs to complete the land and access process. These costs are recoverable from CCO if the project proceeds.

Summary Estimated Costs to Financial Close	August Budget	September Budget	October Budget	November Budget	December Budget
Procurement & ECI Phase	1,131,644	140,289	50,000	50,000	0
Land and Access	50,000	0	0	25,000	100,648
Project Office	46,669	45,036	47,475	47,475	47,475
Governance & Corporate	10,000	10,000	10,000	54,915	68,832
Construction	0	0	0	0	0
Consent Compliance	1,000	1,000	1,000	1,000	1,000
Construction Related Professional Services	48,400	28,000	0	0	0
Total	1,287,713	224,325	108,475	178,390	217,955

Allocation of Project Costs

- 18.30 The Joint Venture Working Group developed a cost allocation proposal for consideration that was subsequently agreed by all parties that involves the Council covering the full capital costs of the environmental flows. The Council has also agreed to meet the operating costs on the environmental capacity. The Council's capital and operating costs for the environmental flow capacity will be partly offset by the government funding of up to \$7 million over three years from the Freshwater Improvement Fund and a \$10m interest free loan over 10 years from CIIL.
- 18.31 The current allocation of operating costs will see the Council contribute 51% of operating costs and irrigators 49%. This approach would see the Council's operating cost contribution to be in the order of \$864k per annum based on current LTP and dam operating cost estimates, (inflation adjusted to year 4 and with the \$100k uplift). This assumes that Tasman District Council meets Nelson City Council's dam capacity operating costs and that Nelson City Council makes a capital grant of \$5 million. The final arrangements with Nelson City Council are subject to the successful completion of negotiations over the cross-boundary water supply agreement.
- 18.32 Under the current proposal central government and irrigators meet \$48.5m of the project capital costs (excluding the CIIL loan to the Council) and 49% of the operating costs. The Council also benefits from a \$10m CIIL concessional loan at nil interest rate over 10 years. In any alternative scheme, the Council will meet 100% of the capital and operating costs.

Capital and Operational Cost Allocation		JV Capital \$000s	TDC Unrecoverable Costs Loan Funded \$000s	Total TDC Loans net of other funding \$000s	TDC Share of Operational Costs \$000s	TDC Annual Loan Repayments \$000s	TDC Total Annual Costs \$000s
Project Cost		\$ 99,172	2,500				
Environmental Flow	30%	29,752	1,468	13,824	507	821	1,328
Balance to be funded by extractive Users							
Irrigation Interests	5,425 Ha	48,500					
Urban - TDC	1,825 Hae	16,316					
Urban Ncc	515 Hae	4,604					
Total Urban	2,340 Hae	20,920	1,032	12,538	357	745	1,101
Total Extractive Use	7,765 Hae	69,420	1,032	12,538	357	745	1,101
Total Project Cost Recovery		99,172	2,500	26,362	864	1,565	2,429

Operational Expenditure

- 18.33 A review of operating costs is being undertaken. These updated estimates will be finalised by financial close. Most operational costs have previously been peer reviewed. The exception has been the costs of consent compliance a rigorous review of these cost will be undertaken in September. All costs will be subject to another final review prior to financial close.
- 18.34 In the 2018-28 Long Term Plan the estimated Council share of operating costs (\$715,000 pa) were inflation adjusted. These may need to be adjusted upwards as numbers are finalised for the Council's share of operating costs.
- 18.35 Waimea Community Dam Council share of operational costs (at practical completion) only make up 34 % of the total annual costs to the Council. In the rates modelling we have included the inflation adjusted operating costs provided for in year 4 (\$811,000) of the Long Term Plan plus an uplift in JV costs of \$100,000 pa.

Rates

- 18.36 In the rates modelling we have included the inflation adjusted operating costs provided for in year 4 (\$811,000) of the Long Term Plan plus an uplift in JV costs of \$100,000 pa. The allocations of the rates are based on 2018/19 base for rates ie Capital value in the ZOB, number of rateable properties, water usage and water meter numbers. With the growth projections and a 3- yearly revaluation should the dam proceed, there will a different final allocation of costs. It should be noted that the rates examples are at year 4 of the LTP ie post the practical completion of the dam when the full operating costs need to be met.
- 18.37 The allocation of Council capital and operating costs was consulted as part of the Revenue and Financing Policy review leading up to the adoption of the 2018-28 Long Term Plan. A layered approach was taken with the costs related to the community water supplies being charged to the "Water Club". These costs are combined with other water club costs and are recovered from club members through a combination of fees and charges, a fixed targeted rate and a volumetric targeted rate.
- 18.38 The portion of costs related to the public good and environmental benefits are being recovered through two targeted rates. The first is a fixed charge per rateable unit across all

units in the district. The second is a charge based on capital value for all properties within the geographically defined Zone of Benefit.

18.39 The high level rate modelling is based on the 2017/18 rates strike. That included the number of rateable units and the capital value in the current ZOB. The water rates are modelled on current budget consumption and meter numbers. There will be another district wide property revaluation before the dam project reaches final completion that is likely to move the incidence of rates again.

18.40 Annual Costs with No PGF support and \$3m in savings on \$102m of project capital costs:

Typical Rates Inc GST			\$000s		\$000s
Total Project Capital Cost			\$ 99,172	less PGF Funding	\$ -
Total Project Annual Operational Costs			\$ 1,690,653		
Rates Funding					
Zone of Benefit Rates Costs	Annual Charges (Inc GST)				
\$ 458,196	\$ 458,196	Zone of Benefit CV Rate			
\$ 429,690	\$ 1,069,125	District Wide Fixed Charge - approx 40% collected in the ZOB			
\$ 312,057	\$ 405,240	Water Rates Fixed Charge approx 77% collected in ZOB		77%	
\$ 620,018	\$ 861,136	Water Rates Volumetric Charges Est 77% collected in ZOB			
\$ 1,819,961	\$ 2,793,697				

Typical Rates Inc GST			\$000s		\$000s		
Total Project Capital Cost			\$ 99,172	less PGF Funding	-		
Total Project Annual Operational Costs			\$ 1,690,653				
Example Properties (Incl GST)	Property CV	Fixed Water Charge	Vol Water Charge	Fixed Charge	ZOB Charge	Peak Annual Cost	
Richmond / Best Island	325,000	41	61	46	21	\$ 169	
Richmond	975,000	41	61	46	64	\$ 212	
Mapua	780,000	41	61	46	51	\$ 199	
Brightwater/Hope	522,400	41	61	46	34	\$ 182	
Kaiteriteri	1,300,000	41	61	46	n/a	\$ 148	
Murchison, Wakefield, Pohara	n/a	41	61	46	n/a	\$ 148	
Upper Moutere, Motueka and Takaka (excluding Upper Takaka)	n/a	n/a	n/a	46	n/a	\$ 46	

18.41 These typical rates would be reduced if funding is received through the Provincial Growth Fund. The receipt of \$5m in funding would reduce the rates funding of the Environmental and public good components of the project. This impact is set out in the table below:

Typical Rates Inc GST						
		\$000s			\$000s	
Total Project Capital Cost		\$ 99,172	less PGF Funding		5,000	
Total Project Annual Operational Costs		\$ 1,690,653				
Example Properties (Incl GST)	Property	Fixed Water		ZOB		Peak Annual
	CV	Charge	Vol Water Charge	Fixed Charge	Charge	Cost
Richmond / Best Island	325,000	41	61	36	17	\$ 154
Richmond	975,000	41	61	36	50	\$ 187
Mapua	780,000	41	61	36	40	\$ 177
Brightwater/Hope	522,400	41	61	36	27	\$ 164
Kaiteriteri	1,300,000	41	61	36	n/a	\$ 137
Murchison, Wakefield, Pohara	n/a	41	61	36	n/a	\$ 137
Upper Moutere, Motueka and Takaka (excluding Upper Takaka)	n/a	n/a	n/a	36	n/a	\$ 36

Credit Support

- 18.42 The irrigator capital contribution will need to increase to cover their share of the increased capital costs. WIL are currently looking at options to raise additional funds.. As previously noted CIIL require security (credit support for the loan to the CCO for Irrigators). That security includes the loan being secured over the whole dam asset and given a dam is an illiquid asset (you can't sell it easily) additional credit support by the Council is key to securing the CIIL borrowing.
- 18.43 A key component in arriving at an acceptable funding and finance outcome is the commercial negotiations with CIIL to achieve acceptable loan conditions. These conditions were set out in the respective Term Sheets. We continue to work with CIIL and WIL to finalise the detailed documentation covering rate, tenor and structures/security for the loans.
- 18.44 The level of credit support provided by the Council and the decision that the loan is made directly to the joint venture CCO has enabled the lending to proceed and reduced loan interest costs significantly. This decision has made the project more affordable to irrigators, this helped ensure that there was adequate irrigator uptake. CIIL also required a financial exit strategy when the loan matures in 15 years.
- 18.45 As noted above, at or before maturity, the outstanding CIIL irrigator loan will need to be refinanced at commercial rates. Those additional costs will need to be met by WIL. The request for a high level of Council credit support should be seen in light of the fact that the Council in any case would step in in a financial crisis to protect its own investment and the benefits the project provides for the wider community.
- 18.46 As large and as complex as the Waimea Water Augmentation project may seem, the reality is that the Council's funded capital contribution of \$38.7m to the project is only about 10% of its likely \$390m capital works budget over the next 10 years.

Current Provisions of the Long Term Plan 2018-2028

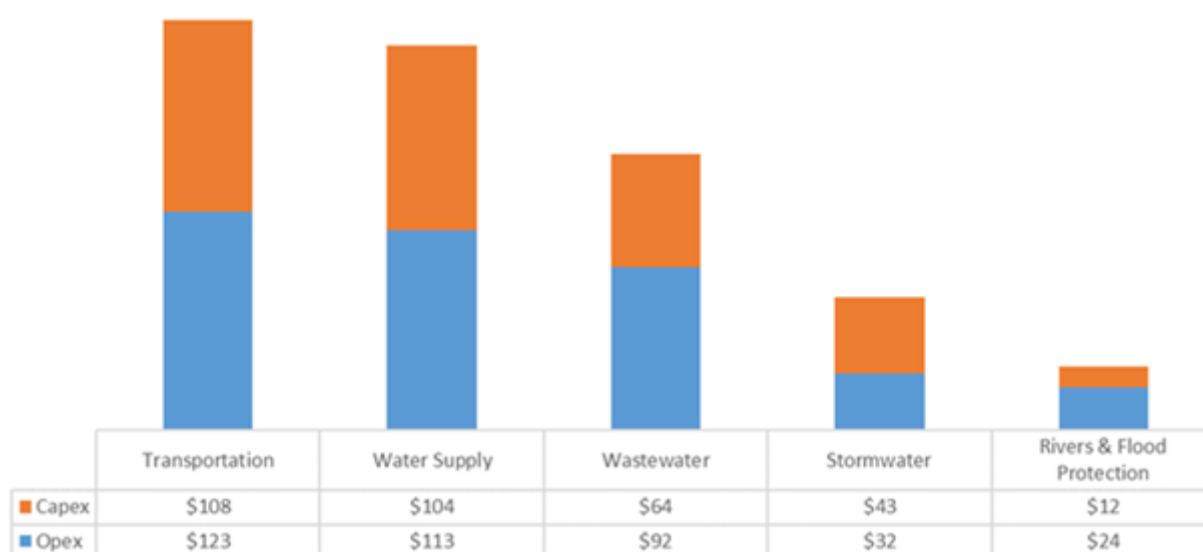
- 18.47 In the current Financial Strategy adopted with the 2018-28 LTP, a key assumption is that the Waimea Community Dam confirmed by the Council in July 2017 as the most cost effective alternative for augmenting the water supply would be operational from 31 July 2021.
- 18.48 The LTP provides \$26.8m in capital funding and \$715,000pa (inflation adjusted) in opex to fund the building and operation of the dam.

Long Term Plan Funding Provision		Budget LTP 2018/19
Waimea Community Dam Council Investment - 2018-2028 LTP		
CCO JV Funding		
Equity Investment in CCO		26,844
Equity Investment in CCO (FIF)		7,000
Investment in CCO shares		33,844
Funded by:		
Funding from Development Contributions		1,916
Unallocated Capacity - Enterprise Activities Transfer		2,910
Environmental CIIL (Interest free, 10 years)		10,000
30 year table loans		12,018
FIF Grant		7,000
Total		33,844
WIP unrecoverable cost loan converted to 30 year table loan		2,500

Waimea Community Dam Council Investment - 2018-2028 LTP		Budget LTP 2018/19
Council Loan Funding		
30 Yr Table Loan - Public Good JV Investment	36%	4,383
30 Yr Table Loan - Water Club JV Investment	64%	7,635
Total		12,018
30 Yr Table Loan - Public Good Unrecoverable Costs	36%	912
30 Yr Table Loan - Water Club Unrecoverable Costs	64%	1,588
Total		2,500

Long Term Plan Funding Provision										
Council Investment	Budget LTP 2018/19	Budget LTP 2019/20	Budget LTP 2020/21	Budget LTP 2021/22	Budget LTP 2022/23	Budget LTP 2023/24	Budget LTP 2024/25	Budget LTP 2025/26	Budget LTP 2026/27	Budget LTP 2027/28
Annual Charges Recovered from the Community	Construction	Construction	Construction	Operating	Operating	Operating	Operating	Operating	Operating	Operating
Water Club										
Share of CCO Operating Costs	70,518	90,506	210,029	295,631	301,929	308,371	315,248	322,583	330,102	338,117
Loan Interest/Repayments	577,869	545,780	545,780	545,780	545,780	545,780	545,780	545,780	545,780	545,780
Total	648,387	636,286	755,809	841,411	847,709	854,151	861,028	868,363	875,882	883,897
District Wide and ZOB										
Share of CC Operating Costs	89,267	129,324	354,402	515,602	527,460	539,592	552,542	566,356	580,515	595,608
Interest on Loan	332,161	313,716	313,716	313,716	313,716	313,716	313,716	313,716	313,716	313,716
Total	421,428	443,040	668,118	829,318	841,176	853,308	866,258	880,072	894,231	909,324
Total	1,069,815	1,079,326	1,423,927	1,670,729	1,688,885	1,707,459	1,727,286	1,748,435	1,770,113	1,793,221

18.49 Cost increases in the context of the 2018-28 LTP investment in infrastructure services



18.50 In the Long Term Plan, the Council proposes to spend \$331m on infrastructure capex and \$384m on operational costs for infrastructure. The additional Council funding required for the proposed Waimea Community Dam project of circa \$11.5m only represents 3.5% of this total capex. The overall accuracy of the budgets are unlikely to exceed +/- 10-15%. This supports a view that the additional costs can be accommodated within in the overall budgets and can be incorporated with the updates to the programme and its costings that will occur with the Annual Plan budgets and certainly within the next iteration of the Long Term Plan.

Finance and Funding – Alternative Options

- 18.51 All proposed alternatives to the Waimea Community Dam only deal with the community water supply (urban water) fed from the Richmond treatment plant (Richmond, Mapua, Hope, and possibly Brightwater). Under the current Revenue and Financing policy the entire cost would be borne by the urban water club. The urban water club consists of Richmond, Murchison, Upper Takaka, Pohara, Collingwood, Brightwater, Hope' Wakefield, Tapawera, Mapua, Kaiteriteri', Riwaka and rural extensions to the urban supply.
- 18.52 In addition to funding the capital and operating costs of any alternatives. Council Council would need to fund the sunk and non-recoverable costs from the abandoned Community Dam project these would be circa \$7.5-\$8m. They would need to be fully funded over 5 years from 2018/19. This adds to the cost of any alternative.
- 18.53 The most likely alternative to the proposed Waimea Community dam is the 800,000M3 Riverside pond option. This has a Capital Cost of \$60m and operating costs of circa \$1.9m pa. Given the transition of time to completion the design, obtaining consents etc capital and operating costs are likely to increase further due to inflation over a 5 year period.

	July 2017 Estimate	August 2018 Estimate	Operating Estimates
Riverside Pond (500,000m ³ Storage, 4,000m ³ /day)	\$24,827,933	\$24,706,500	\$733,780 per year
Riverside Pond (800,000m ³ Storage, 13,000m ³ /day)	\$54,134,220	\$59,849,500	\$1,920,581 per year
Motueka Aquifer to Mapua (5,900m ³ /day)	\$38,481,859	\$56,178,114	\$908,663 per year

- 18.54 The Council funded capital contribution to the \$99m Waimea Community dam is \$38.7m plus \$2.5m in unrecoverable costs. A total of \$41.2m with annual operating costs of \$864K in year 4. The capital costs and operating costs of the alternative (after taking into account a loan for the \$4-5m cost otherwise recoverable from the WCD JV) is \$64-\$65m with annual operating costs of \$1.9m.
- 18.55 Accommodating the increased capital (+\$27m) and operational spend (+\$1m) within the fiscal limits set in the LTP would require a substantial reprioritisation of capital projects and operational spend. That reprioritisation could likely lead to a drop in levels of service.

Rates for an alternative

- 18.56 As the alternative only provides water to meet urban demand all costs need to be met from the water account. Council would need to determine which ratepayers would need to meet the costs of the loan repayments for the WCD costs. For rates modelling purposes we have included the Public good element (58.7%) of the residual WCD costs as a fixed district wide charge in the rates table below.
- 18.57 Currently approximately 64% of the water costs are recovered through volumetric charge (\$2.17/m³) plus approximately 36% is through a fixed service charge - currently \$332.74/year in urban water supply metered connections (these figures are in Page 11, Volume 2, of the Long Term Plan 2018-28).
- 18.58 We have used the current split between fixed and variable rates charges. Should council choose an alternative to the Waimea Community dam option then the current allocation between fixed and variable charging is likely to change.
- 18.59 Notwithstanding the charging the current costs are primarily fixed (94%) due to the significant investment in infrastructure and operational costs that are not strongly aligned to the volume of water delivered. This means that the costs will not reduce substantially or in line with any reduction in demand due to price increases.

Typical Rates Inc GST							
		\$000s					
Total Project Capital Cost		\$ 59,850					
Waimea Dam Loans		\$ 7,000					
Total Project Annual Operational Costs		\$ 1,921					
Example Properties (Incl GST)	Property CV	Fixed Water Charge	Vol Water Charge	Fixed Charge	ZOB Charge	WDS Fixed	Peak Annual Cost
Richmond / Best Island	325,000	211	310	-	-	12	\$ 521
Richmond	975,000	211	310	-	-	12	\$ 521
Mapua	780,000	211	310	-	-	12	\$ 521
Brightwater/Hope	522,400	211	310	-	-	12	\$ 521
Kaiteriteri	1,300,000	211	310	-	n/a	12	\$ 521
Murchison, Wakefield, Pohara	n/a	211	310	-	n/a	12	\$ 521
Upper Moutere, Motueka and Takaka (excluding Upper Takaka)	n/a	n/a	n/a	-	n/a	12	\$ 12

- 18.60 The impact on ratepayers in the water club is significant if the alternative option is chosen. The annual costs is \$521 per property with typical water use. For industrial users and high use properties the increases would be higher.

Example Properties (Incl GST)	Property CV	WCD Rates	Alternative option		
			Rates	Increase \$	Increase %
Richmond / Best Island	325,000	169	\$ 521	352	208%
Richmond	975,000	212	\$ 521	310	146%
Mapua	780,000	199	\$ 521	322	162%
Brightwater/Hope	522,400	182	\$ 521	339	186%
Kaiteriteri	1,300,000	148	\$ 521	373	253%
Murchison, Wakefield, Pohara	n/a	148	\$ 521	373	253%
Upper Moutere, Motueka and Takaka (excluding Upper Takaka)	n/a	46	\$ 12	- 34	-74%

- 18.61 As shown in the table above the additional costs to water club members over the Dam option range between \$310 and \$373 per annum the only reduction is in the district wide fixed rate.
- 18.62 There would be similar increases for industry and the cross boundary water supplied to Nelson South. It is not clear that Nelson City Council and industries based in Nelson South would in the long term want to be supplied by Tasman District Council. Their disconnection from the Tasman District Council supply would increase costs further to other users.

19 Technical Aspects of the Waimea Community Dam**Land and Access**

- 19.1 All of the private interests have been acquired except for Ngati Koata and Tasman Pine. Although agreements with Ngati Koata and Tasman Pine have not been finalised, we are down to finalising detail.
- 19.2 The draft Ngati Koata agreement has been provided to them. The main compensation is the roading and the modest annual fee.
- 19.3 The proposed agreement with Tasman Pine is nearly complete. The main issue with Tasman Pine is replacement access; all parties are happy with the proposed options which have been finalised and costed. The compensation for the affected trees is fairly minor.
- 19.4 The required interests have been taken compulsorily from JWJ Forestry Limited. An agreement on compensation has been sent in draft form. The company is considering this. If in the unlikely event that agreement cannot be reached, the matter will be determined by the Land Valuation Tribunal.
- 19.5 The Local Bill is progressing and will provide for the inundation of the Department of Conservation land. The bill is not expected to pass prior to financial close. CIIL have confirmed provided all other conditions have been met, that their support will be confirmed by 15 December 2018 subject only to the bill passing in due course. The Local Bill is covered in more detail below.

Commercial Arrangements

- 19.6 Work on the various documents to establish the CCO and give effect to the JV agreed terms will recommence post this meeting. As noted previously initial drafts of key documents have been produced and are currently being reviewed by all parties. Most matters are covered by the existing term sheets and these term sheets remain commercially confidential. Any changes to the proposed structure as it is finalised may require adjustment to the documents.
- 19.7 By way of a reminder the project documents comprise -
- Direct Deed
 - Project Agreement
 - Shareholders Agreement and CCO Constitution
 - Wholesale Water Augmentation Agreement and 'downstream' agreements
 - Documents relating to the CIIL/WIL facility
 - Documents relating to the CIIL/Council environmental loan facility
 - Credit Support Agreement.
- 19.8 A number of these documents are likely to be impacted by the commercial arrangements surrounding closing the \$26m funding gap. Notwithstanding, we will continue with our JV partners to work to complete key provisions in the documents. This is to ensure that a target 30 November 2018 financial close can be met and all matters can be finalised by 15 December 2018 when the CIIL funding would cease to be available. Negotiations will recommence on the finalisation of the documents underlying the JV post this Council meeting.
- 19.9 WIL may raise additional funding by the issuing of Convertible Preference Shares (CPS) to an institutional investor. This would dilute the long term value of the existing shares. In effect

they would be discounting future share sales to obtain additional cash up front. This would be advantageous for the Council as it reduces some of the risks surrounding the refinancing of the CIIL borrowing. This is because as CPS convert to normal shares in WIL, the holders will be responsible for meeting an ongoing share of the operating and finance costs. Having refinancing costs spread over a wider shareholder base will assist with keeping those costs affordable.

- 19.10 The JV partners have now agreed that arrangements for hydro-power generation will be included within the existing agreements prior to financial close. This will be by way of a separate heads of agreement covering the costs of hydro-power and its operation. Any hydro-power scheme will need to operate without impacting on the primary purpose of the dam. The marginal cost of including a hydro-power option will need to be met in full by the Council.
- 19.11 The construction of the dam is only made possible through Tasman District Council and WIL working collaboratively in the funding and development of the dam, during the construction phase, but also on an ongoing basis as the debt funding to develop the dam is repaid and the operating and capital expenses for the operation of the dam are shared between the parties. Accordingly, the Re-Supply Principles prevent WIL from supplying water to Tasman District Council's existing reticulated water supply customers, and prevent Tasman District Council from supplying water to WIL's agricultural and horticultural irrigation scheme customers. The Council has considered these Re-Supply Principles from a competition law perspective, and is comfortable that the principles do not give rise to issues under the Commerce Act, including because:
- The Council and WIL be owning and operating the dam as a collaborative joint venture activity on an ongoing basis;
 - The Council is committing to the dam project in order to achieve water supply for its Council water supply obligations, and WIL is committing to the dam project in order to achieve water for irrigation scheme purposes;
 - Neither could commit to funding and operating the dam without the returns provided under the Re-Supply Principles; and
 - In the absence of the collaborative joint venture between the Council and WIL, the dam could not be built and operated on an ongoing and viable basis.
- 19.12 Accordingly, we are comfortable that enabling the construction and funding of the dam is in the interests of customers, and does not reduce any competition that could otherwise exist in the absence of the Re-supply Principles.
- 19.13 Concern has been raised that a major industrial water user has purchased shares in WIL. WIL have confirmed that they have made it clear in a very specific discussion with them, that they would NOT be able to use these WIL share rights for their industrial water. They resolved to purchase WIL shares anyway on the basis of their land holdings.

Local Bill

- 19.14 In order for the construction of the Waimea Community Dam to proceed, security of tenure of the dam structure and the inundated area behind the dam is needed. The Dam will be constructed on 1.35 hectares (ha) of Lee riverbed land that is presently vested in the Crown. The Dam will result in the formation of an 87.5 ha lake. Approximately 11% of the lake (i.e. 9.67 hectares) will inundate land of the Mount Richmond State Forest Park that is vested in the Crown. Council has been advised that it is unable to acquire (vest or easement) this land through the Public Works Act. As such, the Council has decided to

pursue the option of a Local Bill. The Tasman District Council (Waimea Water Augmentation Scheme) Bill 2018 seeks to vest the 1.35 ha of land for the Dam structure to the Council and to confer a 9.67 ha inundation easement directly to the Council.

- 19.15 The Bill states that the land vested to the Council may be transferred to a Council-controlled organisation. Should the dam not proceed or is subsequently removed, there is an obligation to sell the land back to the Crown. The easement will only be in effect for so long as there is a lake inundating the easement area. At all other times, the public will have the same level of access to the non-inundated area as they currently have to the immediately surrounding Mount Richmond State Forest Park.
- 19.16 The Council has completed the required preliminary procedures for a Local Bill. A three-week notification period ceased on 26 July 2018 and all directly interested parties have been informed of the Bill (including iwi, relevant government departments and other relevant stakeholders). All documentation for the Bill was submitted to Parliament's Office of the Clerk and Hon. Dr Nick Smith introduced the Bill to the House on 14 August 2018. It is likely it will receive its First Reading on 5 September 2018, and assuming it passes the First Reading, it will be sent to the Select Committee for consideration. The Select Committee may or may not make modifications to the Bill and then a public consultation process may follow. The Council remains in control of the process and may withdraw the Bill at any time.

Construction Programme

- 19.17 The project has been developed and priced on the basis of starting the construction phase in early January 2019. The following table outlines the various components of the construction phase with their intended commencement and completion dates.

Table Showing Construction Tasks and Programme

Task	Start Date	End Date
Contractor Mobilises	23/11/2018	7/12/21
Establish on Site	7/1/2019	29/03/19
Clear Vegetation	7/1/2019	29/3/2019
Site Roding Works	7/1/2019	29/3/2019
Earthworks	14/1/2019	5/2/2021
River Diversions	28/1/2019	6/7/2020
Plinth and Grouting Works	1/2/2019	7/10/2020
Concrete Face	18/5/2020	26/5/2021
Wave Protection	17/11/2020	24/9/2021
Spillway	27/7/2020	9/7/2021
Bridges	11/3/2021	8/9/2021
Mechanical & Electrical	21/6/2021	7/10/2021
Fish Pass	27/7/2020	19/3/2021
Instrumentation	1/2/2021	22/9/2021

Miscellaneous Structures	18/9/2020	28/7/2021
Fill Reservoir	22/9/2021	3/12/2021
Commissioning	22/9/2021	9/12/2021
Project Close Out	18/11/2021	9/2/2022
Official Opening	10/2/2022	

19.18 At this stage the programme indicates that the reservoir will start filling in September 2021 and be filled by early December 2021. With final commissioning and project closeout it is intended that the dam will be officially opened in February 2022. Potentially the dam could be releasing water during the summer of 2021/22.

Vegetation/Detritus Clearing

19.19 The vegetation clearance methodology has been finalised with Fulton Hogan Taylor Joint Venture during the ECI phase and is outlined as follows:

- a) The mature pines are to be logged by a logging contractor and sold where appropriate. The remaining vegetation will raked down the hill by excavator and mulched. The mulching will either be undertaken by a mobile mulcher or the vegetation will be carted to a mulching site. Stumps will be removed within the dam and spillway construction footprint. Where the terrain is steep the vegetation raking will be winch assisted.
- b) The medium size pines and scrub will be cut down by mechanical felling or manual felling depending on the terrain. It will be cleared off the hill by shovel logging/slash raking to where it can be put through the mobile mulcher or loaded and carted to the mulcher site. In steep terrain the shovel logging/slash raking will be winch assisted. In steeper terrain a winch logging operation will clear the hill.
- c) Small pines and scrub will be mulched by an excavator and/or a tractor fitted with mulching attachments. The mulched material will be left on the ground to decompose. These areas will need to be mulched twice about 12-18mths after first mulch to further break down the vegetation and enhance decomposition. In steep terrain the excavator mulching will be winch assisted. Where the ground conditions are too rocky for excavator and tractor mulchers they will need to be raked and mulched by the mobile mulcher.
- d) In the areas where there are steep terrain and bluffs, the vegetation will be felled by a rope access manual felling team.
- e) The same methodology as outlined above will be used for native vegetation areas. Any mature native logs will be stockpiled and offered to iwi/landowners depending on where they come from.
- f) The Douglas fir trees will be logged by Tasman Pine. The clearing of vegetation off the hill and at the landing will be raked up and mulched.
- g) The mulching will be done by a 950hp Horizontal Grinder. The grinder is mobile and can either be taken to the work site and vegetation fed directly or it can be fixed in an appropriate location and the vegetation brought to it.
- h) The mulch will be spread by a large wheel tractor and mulch spreader with side conveyer. Mulch will be spread within appropriate areas of the reservoir footprint and on adjacent landowner forests. The landowners have indicated they would like to

benefit from the mulch compost. Mulch will also be used to stabilise exposed areas as appropriate.

- 19.20 The vegetation clearance has been scoped, assessed and priced by Fulton Hogan Taylor Joint Venture. The fixed price for vegetation clearance is \$2,435,265 (plus GST). Any revenue from the sale of timber has not been accounted for but will be credited to Waimea Water as a recovery against the project. An assessment of likely revenue has not been undertaken.

Geology of the Lake Footprint and Potential Leakage

- 19.21 The rock beneath the dam and reservoir generally has a very low permeability. There are a number of fractures in the basement rock and these do influence groundwater flow. During its geological investigations and assessments, Tonkin and Taylor has not encountered any defects that could lead to loss of water from the reservoir that would have a long term effect on reservoir storage.
- 19.22 Higher permeability joints and zones of shattered rock were identified in the investigations, notably in the near surface rock where weathering has acted to dilate the rock mass. Tonkin and Taylor expect that these features will take up water on initial lake filling and will provide an additional (small) storage volume to the reservoir. In dryer periods when the reservoir is drawn down, the stored water in the rock will seep back into the reservoir, ie, it is not lost.
- 19.23 There is potential for loss of water beneath the dam footprint as this is where the hydraulic gradient is the highest ie, the water level on the upstream side of the dam is 50 m higher than the water on the downstream side of the dam. The difference in water level acts as a driving force to push water through cracks. This is why Tonkin and Taylor has designed a number of measures into the dam to limit the potential for seepage beneath and around the side of the dam.
- 19.24 Special attention is paid during construction to provide a seal along the base of the dam and up the full height of the dam abutments. This is the area where there is the greatest potential for seepage. This seal is achieved by drilling holes and pumping cement into any open joints in the rock. The design is to ensure that seepage through the rock around the dam will be less than one million times lower than the flow in the river. Hence seepage losses are insignificant with regard to inflow into the river.
- 19.25 It is always expected that there is some seepage back into the river downstream of the dam. This will be significantly lower than the requirement for a minimum discharge from the dam to maintain a residual flow in the river. The residual flow requirement is 500 litres per second. Seepage losses will form a small part of this flow and will not adversely impact on reservoir storage.

Sedimentation of the Reservoir

- 19.26 In November 2009 NIWA presented a report on the “Analysis of Suspended Sediment Data from the Upper Lee River, Nelson”.
- 19.27 From April 2007 until the time of the NIWA report, the Council undertook the monitoring of water turbidity and suspended sediment concentration at a site draining 65 kms of the native-forested Upper Lee River catchment in the Richmond Range, Nelson. The main objectives of this monitoring was to assess water clarity and potential sedimentation rates in a proposed reservoir. NIWA then analysed the data and determined the annual average sediment load expected at the monitoring site.

- 19.28 The analysis approach included calibrating the turbidity record to a record of cross-section mean suspended sediment concentration using sediment samples collected with an auto-sampler and with a depth-integrating sampler. A good relationship was found between event sediment yield and event peak discharge, and this was used to estimate the average suspended sediment yield over the 2.2 year duration of flow record (April 2007-August 2009). The sediment yield over this period was approximately 2900 tonnes/year (45 tonnes/km²/year).
- 19.29 By comparison with the longer flow record from the adjacent Wairoa catchment, this figure is considered to be representative of the average sediment yield over the past two decades. The Upper Lee sediment yield per unit catchment area is 3-7.5 times less than that from the adjacent Wairoa and Pelorus catchments.

Hydrological Links between Wairoa and Waimea Rivers and Aquifers

- 19.30 There has been extensive research, modelling and peer reviewing of the hydrological links between the Wairoa and Waimea Rivers and the aquifers under the Waimea Plains.
- 19.31 The initial groundwater modelling was undertaken by GNS and outlined in its report “Groundwater-river interaction modelling for a water augmentation feasibility study, Waimea Plains Nelson” dated March 2007. Tonkin and Taylor referred to the GNS report in its report “Waimea Water Augmentation – Component 1 Water Demand and Availability” dated May 2007. The conclusion from these reports was that for the Wairoa and Waimea Rivers there was a strong connection with the aquifers.
- 19.32 The Waimea Plains cover an area of 75km². They are formed of late Quarternay terrestrial terrace and floodplain gravels deposited by the Waimea River major tributaries. There are three major aquifers under the Waimea Plains;
- Lower Confined Aquifer (LCA);
 - Upper Confined Aquifer (UCA); and
 - Appleby Gravel Unconfined Aquifer (AGUA).
- 19.33 The AGUA is 15m thick with the water table two to three metres below ground level. The main river recharge zones are between the Wairoa Gorge and Brightwater Township, the area upstream of the State Highway 60 Bridge near Appleby and downstream of Spring Grove on the Wai-iti River.
- 19.34 The UCA extends from its recharge zone near the Wairoa Gorge towards the coast at Rabbit Island in the depth range of 18-32m. The UCA is ruptured within the recharge zone and also from the Appleby northwards, providing a hydraulic connection with the overlying AGUA.
- 19.35 The LCA is lithologically similar to the UCA. It extends from the Wairoa Gorge to beyond the entrance of the Waimea Inlet east of Rabbit Island. It is 30-50m deep and is recharged near the Wairoa Gorge. Recharge occurs in winter from gravel fans, which recharge the UCA from the eastern hills. Seawater intrusion is a potential concern in this aquifer because of large pumping wells near the coast.
- 19.36 The groundwater-river interaction model was developed by GNS incorporating all three aquifers. Three generations of groundwater models have been developed and tested for the Waimea Plains. All three models were calibrated using river flow information available at the time. Landcare Research stated in its September 2016 peer review that the

MODFLOW groundwater flow model is well calibrated and can be relied on to predict the response of the groundwater system to varying scenarios of water management.

19.37 The March 2007 GNS report outlined three modelling stages that were undertaken:

- a) Stage 1 comprised establishing the river flow at Irvine-Wairoa Gorge to maintain a minimum flow of 500 l/s at the Nursery-Appleby Bridge in the Waimea River based on actual usage in a 1-in-10 dry year (1991/92). The modelling calculated that the minimum flow at Irvine-Wairoa Gorge would need to be 1650 l/s and 1825 l/s to maintain minimum flows of 250 l/s and 500 l/s respectively at Nursery Appleby Bridge;
- b) Stage 2 built on Stage 1 and deduced the flow rate at the Irvine-Wairoa Gorge needed to maintain the target minimum flows for two scenarios: 600 l/s and 1100 l/s in the Waimea River at the Nursery-Appleby Bridge in the Waimea River in a nominal dry year (1982/83). The modelling calculates that a minimum flow at Irvine-Wairoa Gorge of 2513 l/s and 2981 l/s would be required to maintain a minimum flow of 600 l/s and 1100 l/s respectively at the Nursery-Appleby Bridge;
- c) Stage 3 was a forward scenario simulation using a 1-in-20 year drought (1982/83) to confirm that the proposed augmented water release regime by Tonkin and Taylor will meet the downstream requirements. The modelling confirmed that a minimum flow at Irvine-Wairoa Gorge of 2663 l/s and 2981 l/s would be required to maintain a minimum flow of 600 l/s and 1100 l/s respectively at the Nursery-Appleby Bridge.

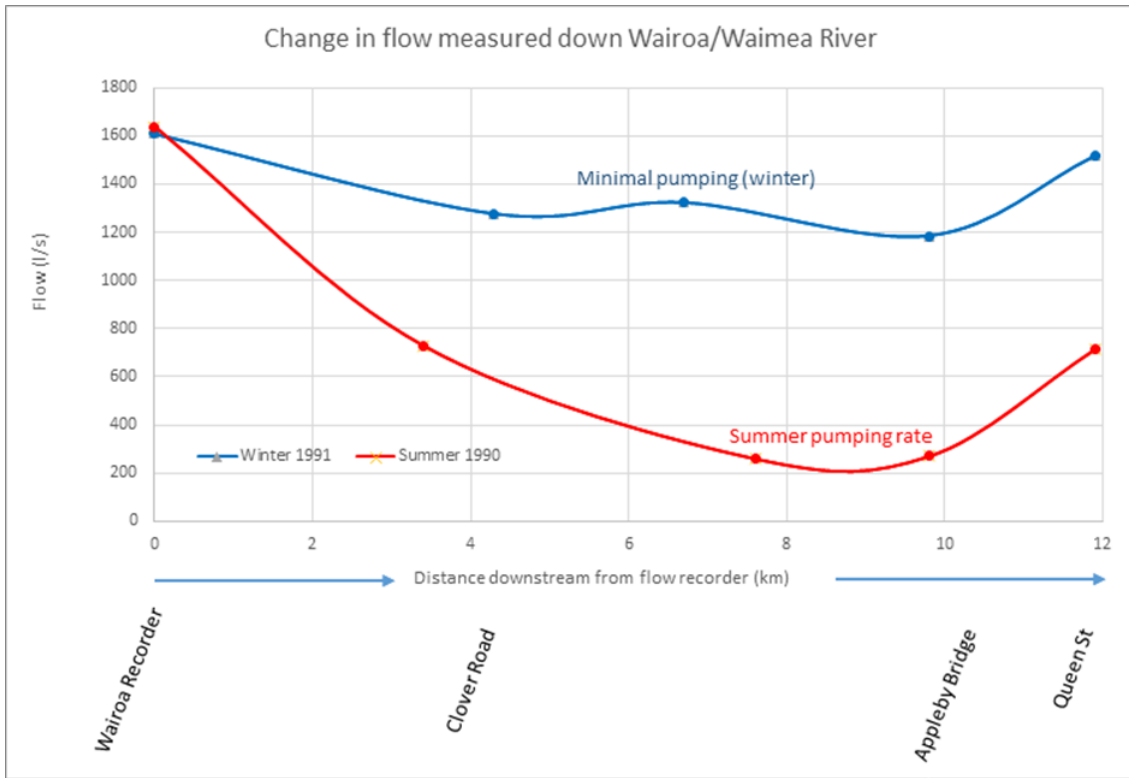
19.38 The March 2007 GNS report did also note that the sensitivity of aquifer recharge was affected by riverbed level changes and potential seawater intrusion in certain areas. Landcare Research also undertook a peer review of the this report covering the groundwater modelling as well as water demand profiling, catchment and storage modelling and the coupling of groundwater and surface water components.

19.39 This whole subject was further peer reviewed by Landcare Research in answering specific questions from individuals in the community. This review by Landcare Research is outlined in its report "Waimea Community Dam: Peer Review of Waimea Plains hydrology underpinning the proposal" dated September 2016. This report concluded that based on the review of the documents, comparison of the GNS and Aqualinc modelling results and additional modelling of scenarios that, subject to the observations made in its review, the hydrological and modelling basis for recommendations affecting design and operation of the proposed Waimea Community Dam is fit-for-purpose.

19.40 In addition to this information the Council has also logged flows in the Wairoa and Waimea Rivers from the Wairoa Gorge recorder to Lower Queen Street. In 1990/91 there was an occasion where the summer and winter flows coincided at the Wairoa Gorge recorder. The summer flows were measured whilst abstraction was occurring from the aquifers in the Waimea Plains.

19.41 The graph below shows how the summer flows dropped compared to the corresponding winter flows when abstraction was presumed to be at minimal levels. It is clear that over the first 4km that approximately 1000 l/sec is lost in summer compared to 300 l/sec in winter. Over 7.5 km approximately 1,300 l/sec in the summer and 500 l/sec in the winter. Although there would be greater evaporation in the summer, it is likely that most of the loss would be to groundwater and aquifers.

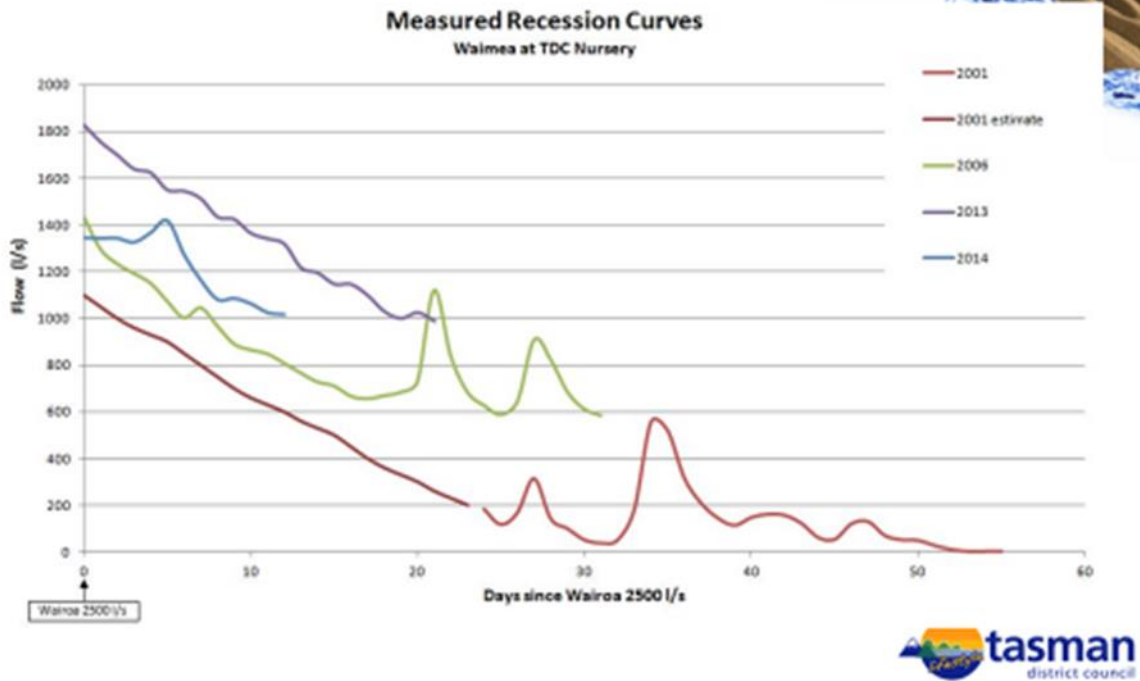
Table Showing the Changes in flow in summer and in winter



- 19.42 The graph below outlines the actual flow recession that is measured at the Nursery-Appleby Bridge when the flows at the Wairoa Gorge reach 2,500 l/sec.
- 19.43 It is clear from this graph that in 2013 the flow was around 1,800 l/sec which indicates a loss of 700 l/sec over the reaches of the Wairoa and Waimea Rivers between the Wairoa Gorge and Nursery-Appleby Bridge.
- 19.44 Correspondingly in 2001 it is estimated that the flow was around 1,000 l/sec which indicates a loss of 1,500 l/sec over the same reaches.
- 19.45 Although there will be some losses arising from evaporation, it is very likely that most of the losses are a direct consequence of water being transmitted into the aquifers.

Table Showing how the flows in the Waimea River recede when flows drop below 2,500 l/sec at the Wairoa Gorge

How the flows in the Waimea River at Appleby (TDC Nursery) recede when flows drop below 2500 l/s at the Wairoa Gorge



Hydro Generation Option

- 19.46 At its meeting 28 June 2018, Council considered a report that indicated that the hydro generation option was still viable. However it needed to have more certainty around construction costs and commercial items to confirm its viability. The indicative costs were outlined as being in the range of \$5.68 million to \$6.54 million with estimated revenue of between \$485,000 and \$624,000 per annum in 2023.
- 19.47 Council passed the following resolution that kept the option of hydro-generation on the table for inclusion into the Waimea Community Dam project;
1. That the Full Council receives the Waimea Community Dam - Hydroelectric Power Generation report RCN18-06-05; and
 2. instructs staff to negotiate a separate agreement with the Joint Venture Partners for the provision of hydro generation in association with the proposed Waimea Community Dam; and
 3. notes that the Council does not expect there to be any compensation or facilitation payments to the Joint Venture Partners or any adjustment to the previously agreed allocation of operating costs as a result of any agreement on the provision of hydro generation in association with the proposed Waimea Community Dam; and
 4. notes that progressing with detailed design and marketing scenario assessments for the hydro generation option will be delayed until the dam project is approaching financial close; and

5. approves Council funding of up to \$80,000 to ensure that a 22kV power line is installed as part of the dam construction.

19.48 The hydro-generation will be considered further by Council when the project is approaching financial close.

20 Attachments

1.	Attachment A - MWH Evaluation of Urban Water Supply Alternatives	85
2.	Attachment B - Further Information on Urban Water Supplies	89
3.	Attachment C - Onsite Storage vs Waimea Community Dam	99
4.	Attachment D - Nelson City Council Water Supply	105
5.	Attachment E - Weirs on the Waimea and Wairoa Rivers	109
6.	Attachment F - Managed Aquifer Recharge (MARs)	111
7.	Attachment G - Northington Report	113
8.	Attachment H - Oxford University Paper	129
9.	Attachment I - List of Specialist Reports	133
10.	Attachment J - 9 August 2018 Report to Full Council	139

Summary of early evaluation of urban water supply alternatives to the WCD by MWH 2014/2015.

Scheme	Description	Potential daily flow	Pros	Cons	Consent-ability	Risk	Long Term Reliability	Overall assessment
Supply from Nelson (1A and 1B)	Water from Roding River Dam	1/15 of Roding take up to 909 m ³ max (1A) or up to 2,000 m ³ per day from Roding if new agreement can be reached (1B)	<ul style="list-style-type: none"> • Agreement and consent already in place for Option 1A • Few reticulation changes required • Could provide some water most summers 	<ul style="list-style-type: none"> • No agreement in place for Option 1B, which would likely compromise Nelson City Council's supply options. • Insufficient water at max entitlement for current needs and no growth capacity • Less water available in dry summers, and high risk of cease take • Restrictions every second year (when cease take hold was 100l/s) • Recent consent lifted the "cease take" river flow from 100 l/s to 150 l/s. 	Already consented	<ul style="list-style-type: none"> • Medium most years • High in dry years 	Low	Not sustainable and unlikely to be possible to secure more water
Moutere deep bore (2A and 2B) inc. Redwoods Hall Bore (7A)	Several deep (500m+) bores	100-200 m ³ per bore.	<ul style="list-style-type: none"> • Could supplement Redwood Valley supply 	<ul style="list-style-type: none"> • Insufficient water • Untested and slow recharge aquifer • Risks to aquifer from sustained extraction • Requires substantial pump and piping to deliver water • Significant construction, testing and monitoring costs to determine sustainability 	Uncertain – need to prove takes are sustainable	High (Low knowledge and confidence in supply volumes)	Medium	Totally insufficient. High risk and low yield insufficient to make real difference to urban water supply shortfalls

Scheme	Description	Potential daily flow	Pros	Cons	Consent-ability	Risk	Long Term Reliability	Overall assessment
Off river harvesting (3A, 3B and 3C)	Shallow ponds/lakes on Waimea Plains filled by river winter flows	4,000 – 13,000 m ³ depending on size and water security LOS sought	<ul style="list-style-type: none"> • Sufficient water outside of drought period to fill ponds • Some areas identified that are potentially feasible • Could provide sufficient capacity for current needs • Could be expanded in later years to provide for growth 	<ul style="list-style-type: none"> • Relationship between discharge and aquifer uncertain • Probably needs to be piped and treated • Requires top up flows. 	<ul style="list-style-type: none"> • Extraction and construction – Good • Discharge into river or aquifer – uncertain 	Low	High	Recommended for further development. Can provide good volumes and water security. Significant uncertainty around whether intensive treatment and significant piping and pumping is required.
Upper Motueka River source (10D)	Pipe from Motueka River near Spooner Hill	None – not considered available	<ul style="list-style-type: none"> • Engineering works are constructible 	<ul style="list-style-type: none"> • No water available. Resource is already fully allocated with conservation order • Requires corridor • Transfer water between catchments • Requires extra treatment 	Poor	High	Low	High Cost and no water allocation available in Upper Motueka
Small Dam (11A and 11B)	Small Dam (Teapot Valley site used to test case)	4,000 – 13,000 m ³ depending on size and water security LOS sought	<ul style="list-style-type: none"> • Several potential sites with sufficient catchment • One site identified as potentially feasible • Could provide sufficient capacity for current needs 	<ul style="list-style-type: none"> • No focused site identification • Needs to be piped and possible treated • Relationship between discharge sand aquifer uncertain • “One time” build. Difficult to expand capacity later 	<ul style="list-style-type: none"> • High if piped and treated • Uncertain for discharge into river or aquifer 	Low-Med	High	Recommended for further development. Can provide good volumes and water security. Significant uncertainty around whether intensive treatment and significant piping and pumping is required.

Scheme	Description	Potential daily flow	Pros	Cons	Consent-ability	Risk	Long Term Reliability	Overall assessment
Spring Grove bores (Wakefield)	Use spare capacity at Springs Grove to supplement Brightwater, Richmond and Mapua	3,000 m ³	<ul style="list-style-type: none"> • 9/10 year drought security • Good short “stop gap” measure, especially for Brightwater • Wakefield treatment plant upgrade already planned 	<ul style="list-style-type: none"> • Insufficient water at max entitlement for current needs and no growth capacity • Requires changes to consent • Requires construction of new Spring Grove treatment plant at full capacity and upgrade of existing Wakefield treatment plant • Requires major reticulation and pumping upgrades to deliver water beyond Brightwater • Mixes chlorinated and un chlorinated supplies 	Good	<ul style="list-style-type: none"> • Med in most years • High in dry years 	Low (long term)	Does not provide security long term for all of Waimea. However, could help with Brightwater.

Attachment B - Further information on urban water supplies

Historical Demand Trends

- 1.1 Total water use fell markedly between 2005 and 2010 as households and businesses become more water efficient, driven by price increases, more efficient appliances and smaller sections (Figure A). The trend in usage per property can be seen in Figure B. Until recently, the reduction in water use per property has outweighed the growth in number of connections, so overall water demand fell.
- 1.2 This trend stopped in 2015/16 as water demand per connection levelled off and more recently has started increasing. As a result, the impact of growth and development is starting to be felt more strongly and overall water use is starting to track back up again.

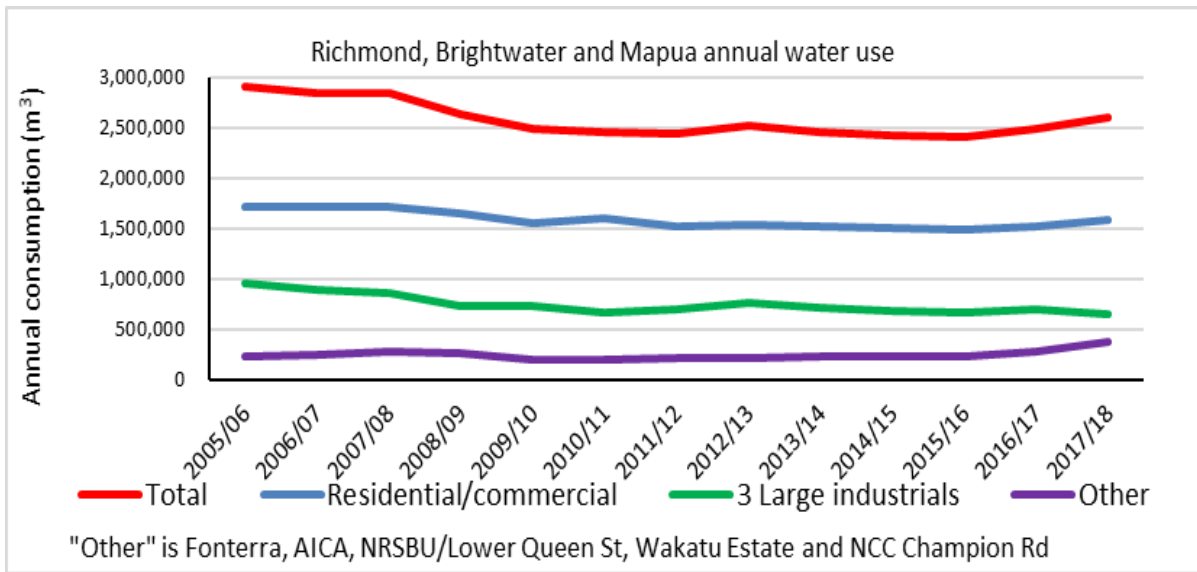


Figure A. Annual Water use by Sector since 2005

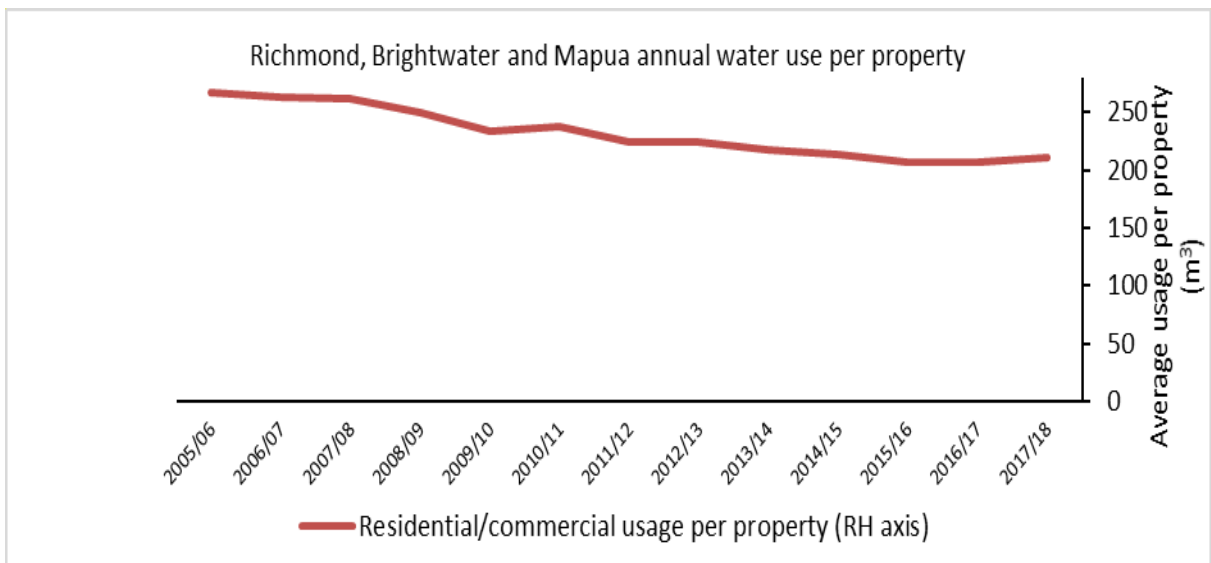


Figure B. Annual Water Use per property (commercial and residential)

- 1.3 The most important contributors to these recent increases in demand are residential water use driven by development and “other” demand growth. “Other” includes Fonterra, AICA,

NRSBU, Wakatu Estate and the bulk supply to Nelson City Council. The bulk supply to Nelson is mainly for residential properties north of Champion Road, where there has been recent large scale residential development.

- 1.4 There was a small dip in industrial water demand in 2017/18, caused by a short season for Cedenco. The dip was muted somewhat because Nelson Pine Industries and Alliance have actually been using more water in recent years. Cedenco expect to return to normal water demand levels in the future, which will further lift total water demand further in future years.

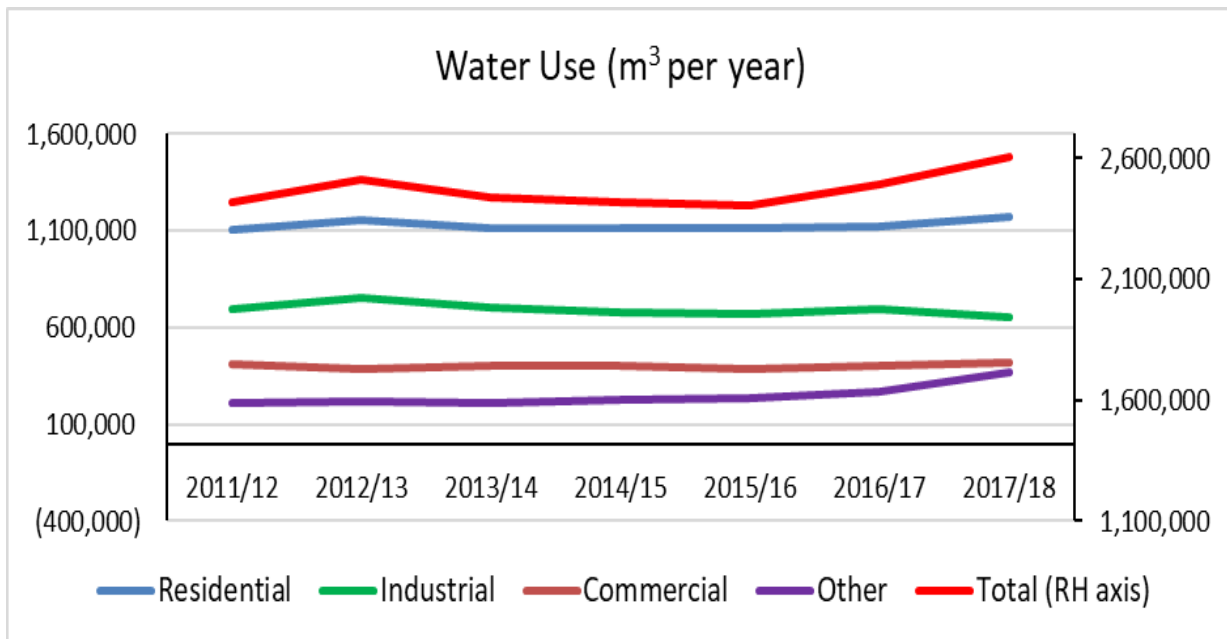


Figure C: Annual water use by sector since 2011

Growth

- 1.5 Water demand is expected to continue growing steadily in the future. This assessment is based on:
- Staff forecasts based on current usage per property and the Council's Growth Demand and Supply Model population growth (dashed line); and
 - An independent assessment of peak water demand growth in 2017 by MWH (now Stantec).
- 1.6 Importantly, the MWH assessment was a "ground up" assessment of water demand based on trends in use within households. It accounts for scenarios where water conservation and efficiency measures are taken up by households (called the plumbing code in the model).
- 1.7 The water demand forecasts in figure D are the staff forecasts out to 2047/48. These increases forecast are very similar to those generated by the 2017 MWH Waimea water demand model for peak water demand. In summary, they forecast:
- Increases of 10-12% in usage for the next 10 years under high growth.
 - Increases of 17-19% in usage for the next 30 years under medium growth.

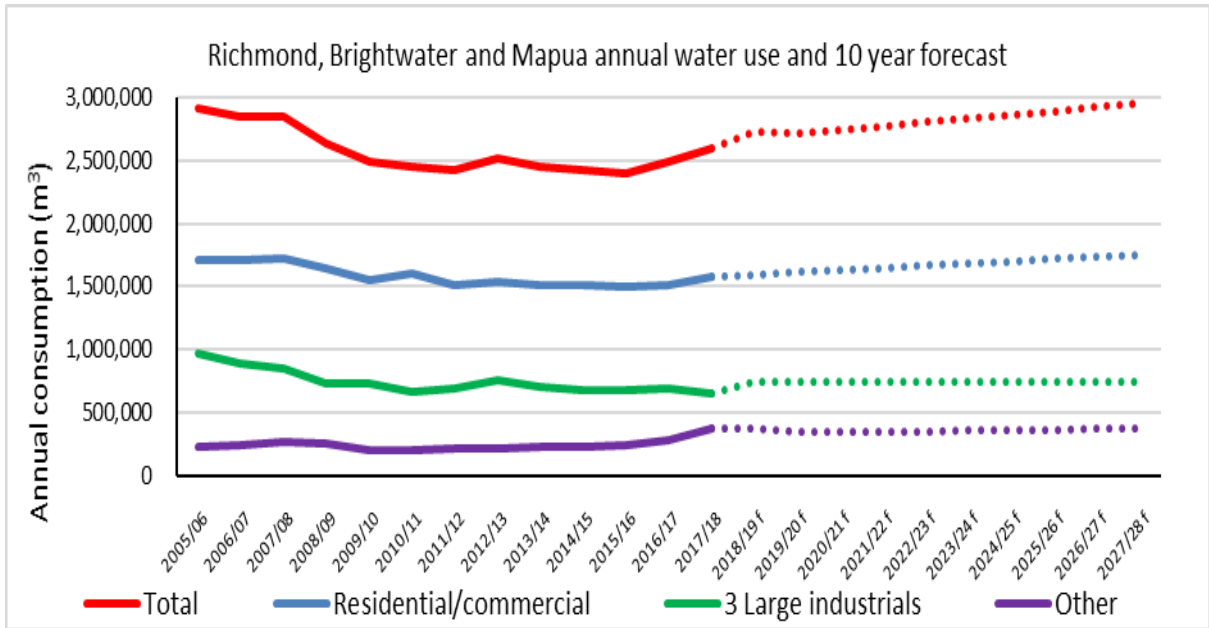


Figure D: Staff 10 year annual water demand forecast by sector

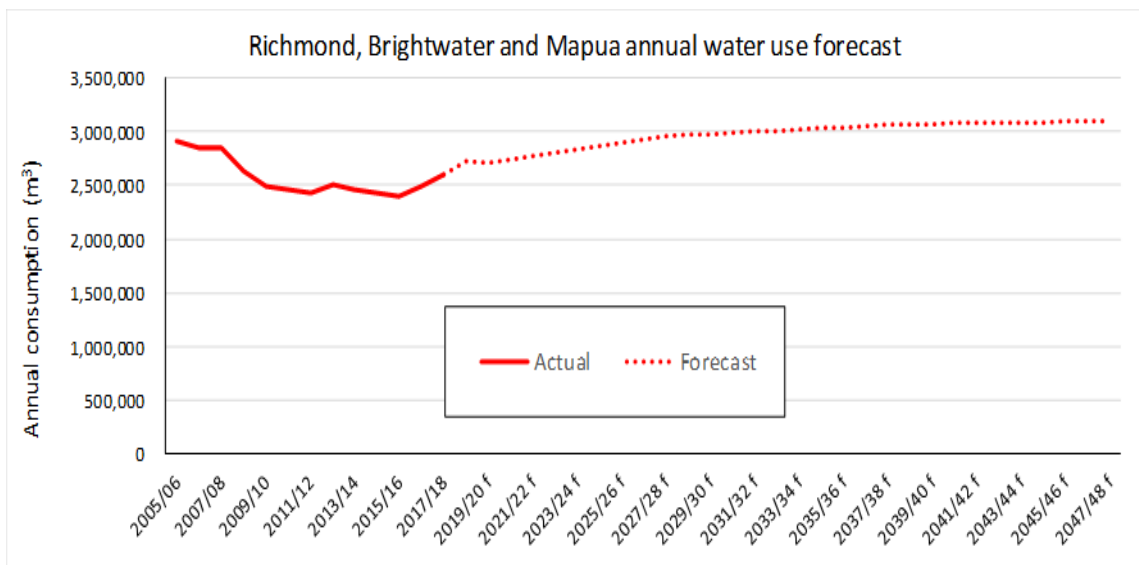


Figure E: Staff 30 year annual demand forecast – all sectors

1.8 The MWH Waimea water demand model also forecast peak week average daily water demand for 100 years. The range of estimates provided by the model are shown in Figure F This shows forecasts for medium and high growth futures, with and without water conservation and efficiency measures for our customers. In this case, the forecast excludes Wakefield. In all cases, solid and steady growth is forecast for the Council’s urban water demand.

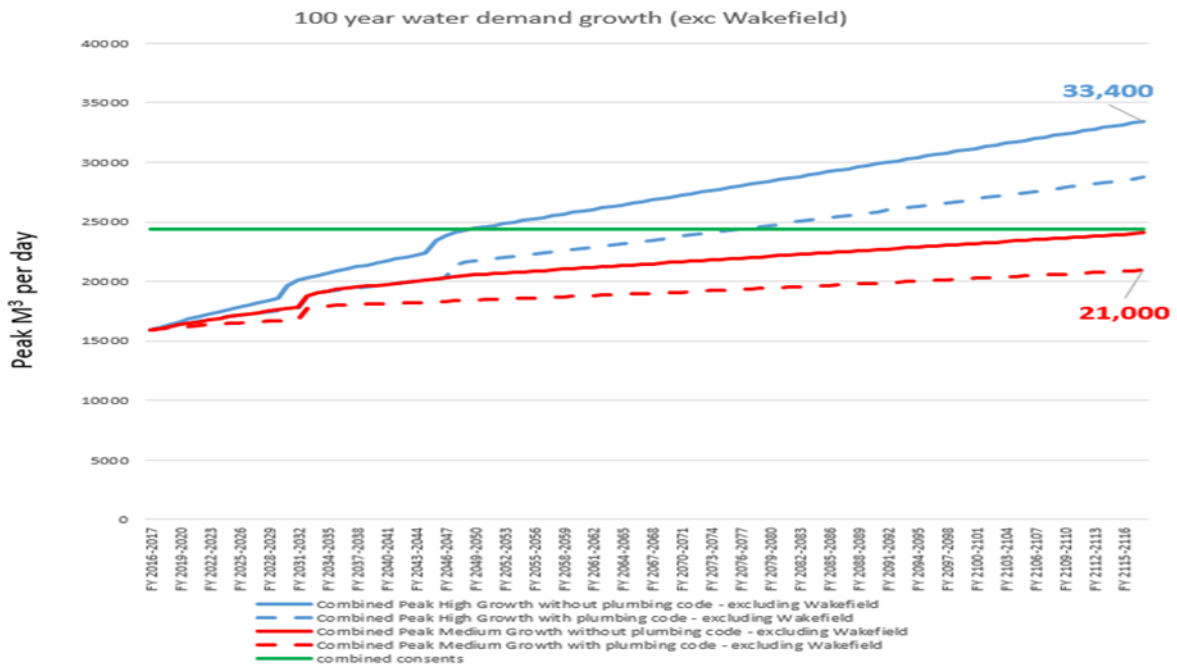


Figure F: 100 year peak week daily demand forecast – all sectors (exc Wakefield)

Rationing Under the TRMP

The figures below illustrate how the no dam TRMP rationing rules would have applied to the 2017/2018 summer water demand for different schemes. The column graphs show how that rationing would have translated to the percentage of normal water demand our customers would be permitted for both an average week, and for a “peak demand” week.

Richmond and Mapua

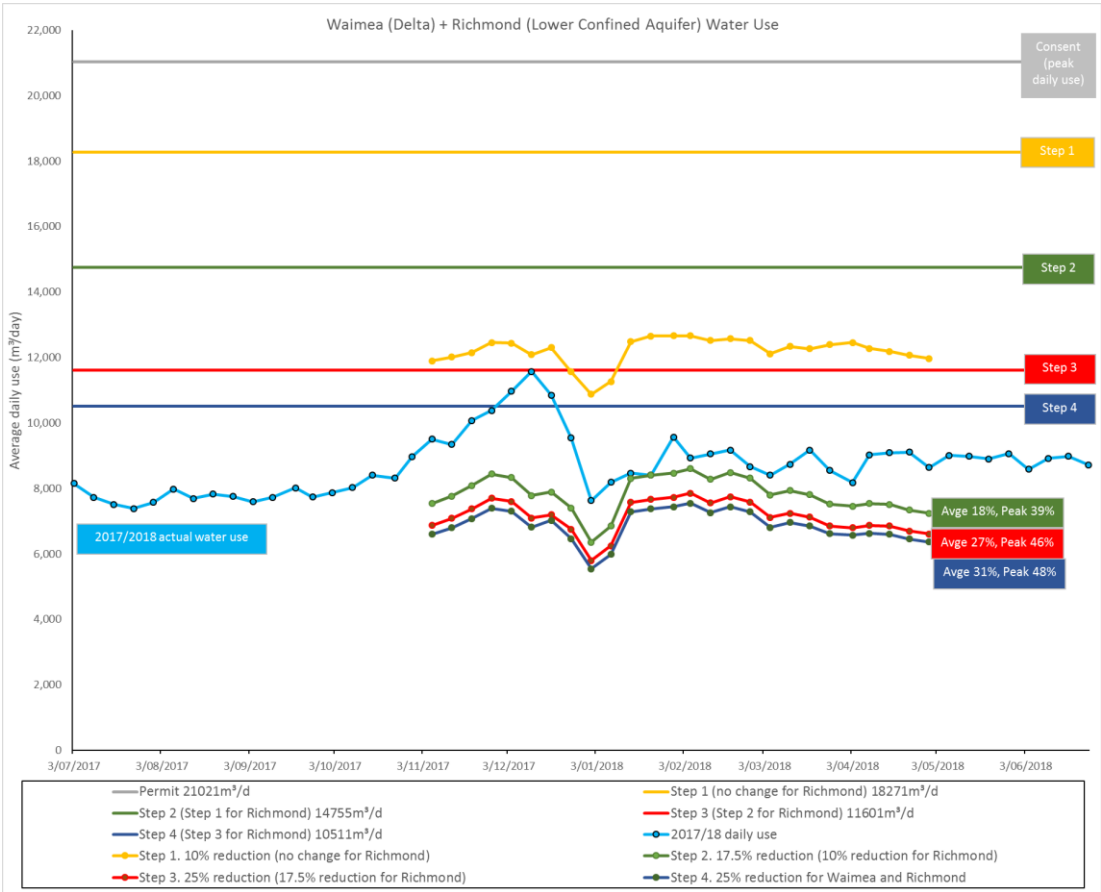


Fig G. Application of no dam rationing rules at different stages compared to the 2017/2018 summer water demand for Mapua and Richmond

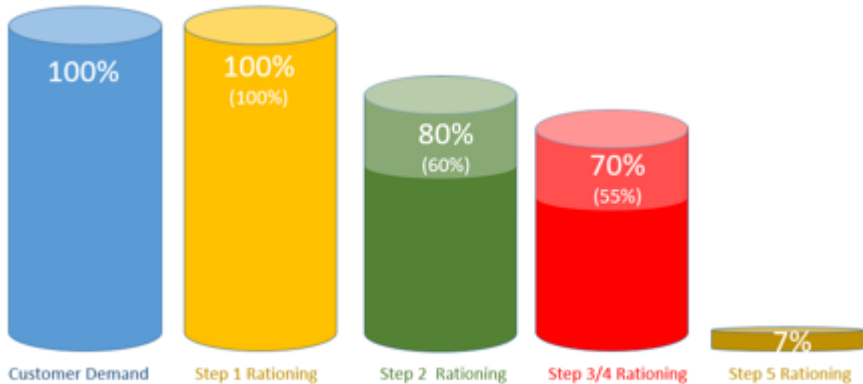
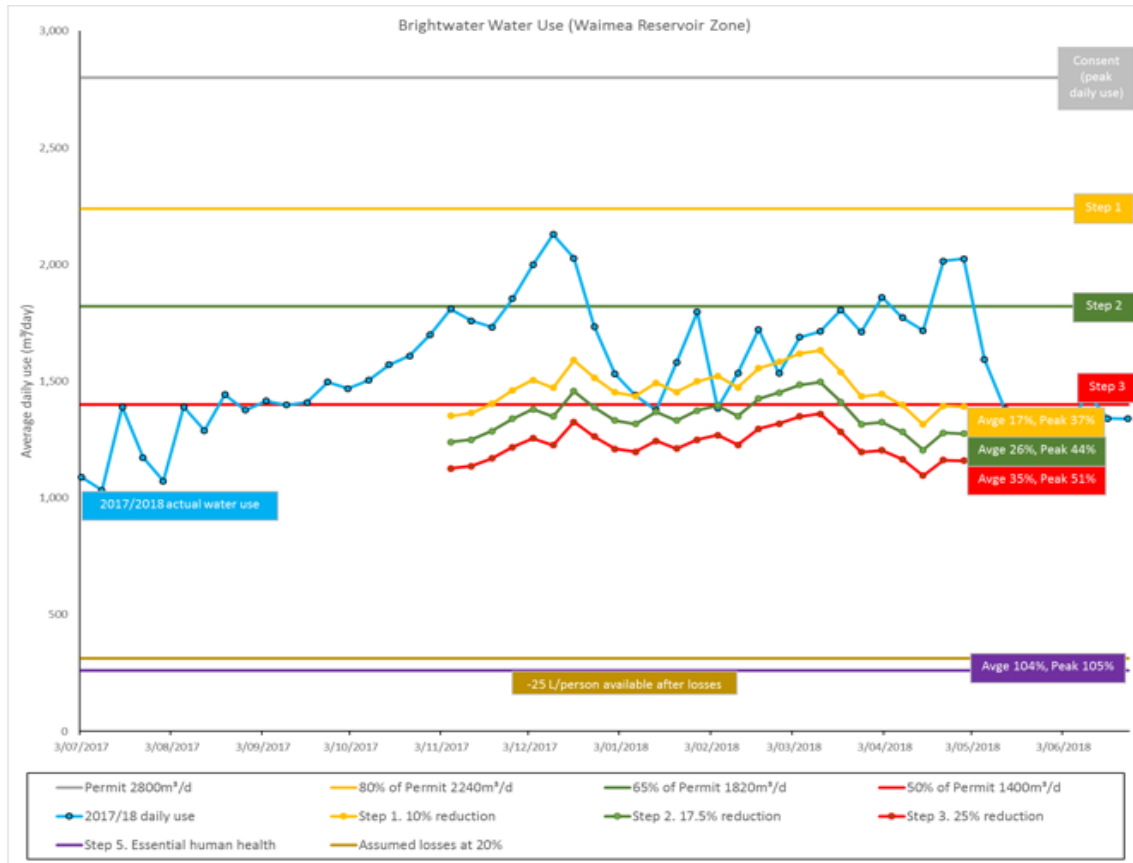


Fig H. Translating rationing into 2017/2018 customer restrictions in Richmond and Mapua

Brightwater



Application of no dam rationing rules at different stages compared to the 2017/2018 summer water demand for Brightwater

Fig I.

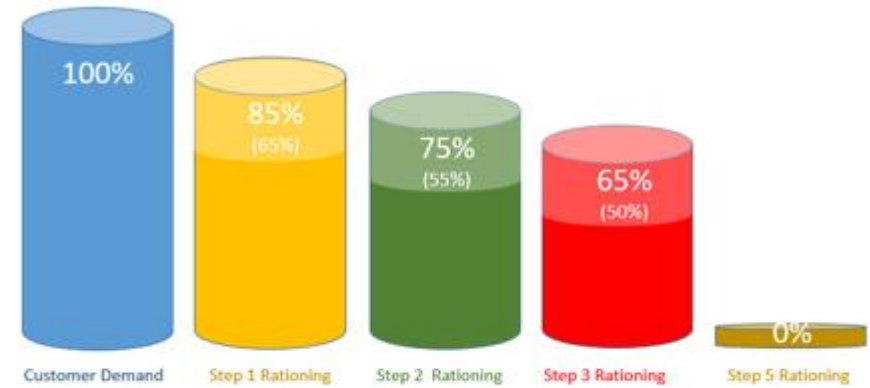


Fig J. Translating rationing into 2017/2018 customer restrictions in Brightwater

Future Rationing with ‘No Dam’ TRMP Rules

- 1.9 The MWH model and staff forecasts indicate that rationing under the no Dam rules in the TRMP will be more onerous as time passes.
- 1.10 Staff used forecast growth, together with replicating the last 18 years of hydrological data, to simulate rationing out to 2033. This has allowed us to predict the effect that rationing will have on the 8-year average demand, which is the limiting factor in times of restrictions. Figure M illustrates how the rationing forecasts in this assessment translate to demand reductions required by our Mapua and Richmond customers in 2032/2033 “on average” for each rationing step. This is compared to the reductions that would have applied under the “no dam” TRMP rules for the most recent summer. It is worth noting that years with Step 5 restrictions will have a large/disproportionate impact on the 8-year average, resulting in larger reductions being required during rationing in subsequent years.

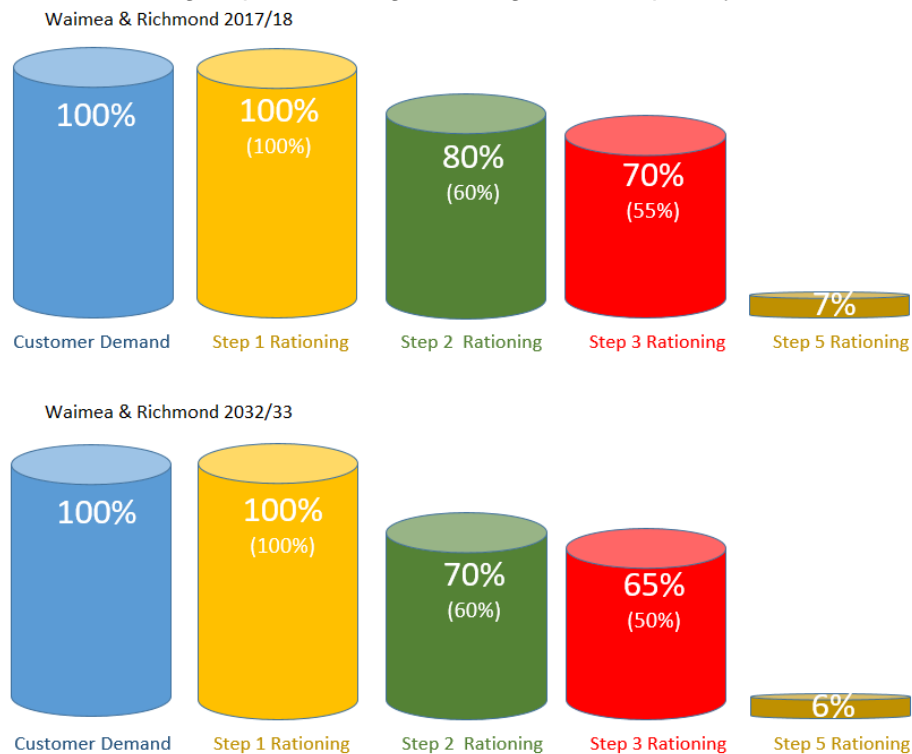


Figure M.

- 1.11 The 2017 MWH model forecast the peak week average daily water gap under the “no dam” TRMP rules for 100 years. The range of estimates are shown in Figure N for a medium growth future with and without water conservation and efficiency measures for our customers. In this case, Wakefield is included. (Wakefield will need water from the Waimea Community Dam for growth beyond 30 years). This clearly shows that the rationing challenge will grow over time.

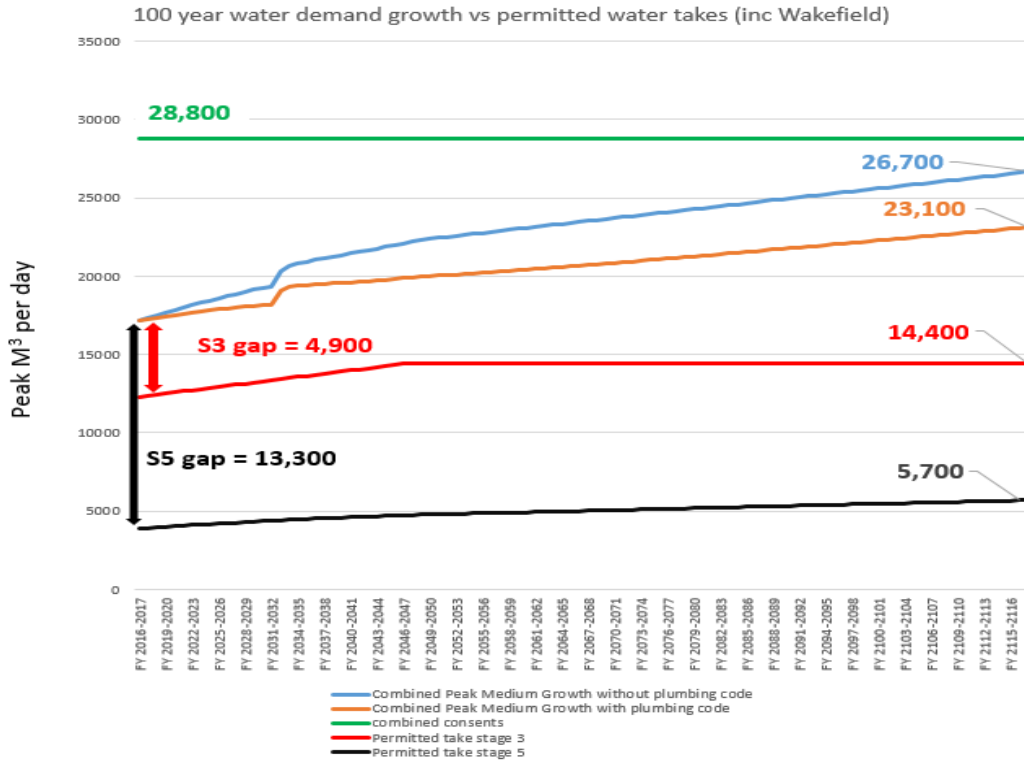


Figure N:

Attachment C - Value proposition of water tanks

Water Storage Tanks

- 1.1 Individual property water tanks provide one possible means of addressing or mitigating the impact of rationing on the urban water supply. Proponents argue they provide a lower cost alternative to the Waimea Community Dam. There are many tank configurations possible, making a comparison with the Waimea Community Dam across all of the alternatives difficult.
- 1.2 To overcome this, the approach taken in this report is to consider the value proposition of a simple low cost tank configuration in comparison to the Waimea Community Dam. We then consider what possible variations to the low cost tank scheme might mean in terms of cost and levels of service, and then aggregate our analysis to consider the costs and impact on our community and on water supply system as a whole. We also consider some of the practical implications of rolling out a large-scale urban water tank scheme.



3 m³ tank. Too small to have any meaningful impact and relatively high cost.

Waimea Community Dam versus individual property tank(s)

- 1.3 To compare the value and costs of tanks versus the Dam, ie the value proposition, we consider what it means for an individual household.
- 1.4 In this case, the system is a simple low cost option of a 10 m³ stormwater feed storage tank used for watering gardens and other outdoor water. This configuration and size has been chosen because most properties should be able to accommodate this, it is low cost compared to options that are plumbed to a house or business, and it does not require a building consent. Depending on house size and weather, such a system could provide between 10 m³ and 30 m³ effective storage over 90 days (summer) assuming it is full at the start. 10 m³ is all it will provide in a really dry summer when there is virtually no rain, but it will be able to provide 30 m³ of effective storage for water in an average summer because the tank is refilled.
- 1.5 The cost of a 10 m³ tank and installation varies considerably. In this case, our estimate needs to reflect the challenges and costs presented by existing properties, and by the smaller sites that are typical of new subdivisions. Because of this, many sites will not be able to take advantage of the cheapest solution, being a simple round tank which can drain via gravity and which retails for around \$2,500 before installation. These are typically 2.5 m in



5 m³ tank configured for outdoor use only. Two of these makes up 10 m³. Most homes should be able to accommodate these.



25 m³ tank. Suitable only for large sections with good access. In a mid-density urban area, these would be unusual and need to comply with recession plane setbacks (note height).

diameter and height, meaning it can be difficult to find a site to accommodate their size, especially with recession plane requirements. Nor will all sites require the relatively expensive rectangle tanks and be drained via pumps. These provide more options for smaller and existing sites, but retail for around \$6,000 for the tank alone, before installation, and electrical and pump costs.

- 1.6 For this assessment, an installed and plumbed cost of \$5,000 is used as average for our simple roof water tank system example. Staff consider this figure a reasonable midpoint to use. Across all 8,500 residential and commercial properties serviced in Mapua, Richmond, and Brightwater, an “average” \$5,000 cost tank set up would sum to \$42.5 million.
- 1.7 The effective storage in the Dam is around 5.4 million m³ for the urban water supply for 90 days¹, to be shared among the 8,500 odd connections that would receive water from the Waimea Community Dam. Two cost options are considered for comparison – the existing contribution from the water club (around \$11.5 million), and another scenario where the water club contributes \$28million. Two scenarios are tested in the comparison.
- **Scenario 1.** Average summer where tanks provide 30 m³ of storage, and where the urban water club contributes \$28 million to secure its water. This scenario should show how tanks compare in circumstances most favourable to them.
 - **Scenario 2.** Dry summer where tanks provide only 10 m³ of storage, and where the urban water club contributes \$11.5 million to secure water. This scenario should show how tanks compare in circumstances least favourable to them.
- 1.8 The key statistics from this comparison are tabled and illustrated below.

Scenario 1. Average summer / \$28 million

	Tank	WCD	Ratio
Effective storage (90 days)	30 m ³	635 m ³	1/20
Cost per household	\$5,000	\$3,294	1.5
Cost to community	\$42.5m	\$28m	1.5

- 1.9 In this case, the tank cost for each household is around 1.5 times the cost of its share of investing in the Waimea Community Dam, but provides less than 1/20th of the water. Alternatively, the cost of investing in the Dam is 66% of the cost of the tank system, but provides over 20 times as much water storage.

Scenario 2. Dry summer / \$11.5 million

	Tank	WCD	Ratio
Effective storage	10 m ³	635 m ³	1/60
Cost per household	\$5,000	\$1,350	3.7
Cost to community	\$42.5m	\$11.5m	3.7

- 1.10 In this case, the tank cost for each household is around 4 times the cost of its share of investing in the Waimea Community Dam, but provides less than 1/60th of the water.

¹ The effective storage in the WCD for the urban water supply is around 8.4 million m³, or around 55% more than the effective storage used in this analysis. We have used just 5.4 million m³ as this allows us to compare “90 day” water supply volumes for tanks and the WCD.

Alternatively, the cost of investing in the dam is around a quarter of the cost of the tank system, but provides over 60 times as much water storage.

- 1.11 These scenarios represent two extremes. In all likelihood, “reality” is somewhere in-between and will vary depending on the weather experienced in any particular summer, the contribution the Council makes from the urban water account to the Dam and the price and configuration of tanks on individual properties.

Tank versus Waimea Community Dam value proposition for our customers

Tanks

WCD



VS.



WCD Scenario 1: \$3,300

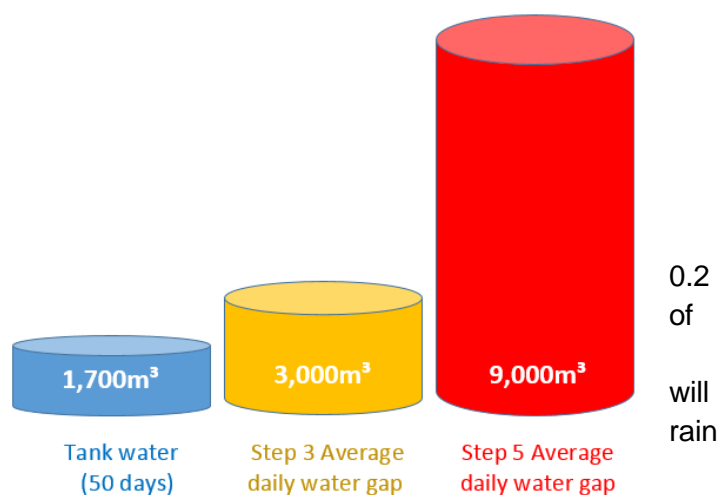


WCD Scenario 2: \$1,350

Tank drought protection LOS

1.12 In terms of providing a level of service for drought protection, a network of tanks would fail to provide adequate water during a drought, especially a longer duration drought.

1.13 If a household or business uses m^3 per day (about a bath's worth of water) from the tank scheme described above, the tank water last 50 days (7 weeks) without any topping it up. Fifty days is the average drought rationing period per year annum, when you apply the 'no dam' rationing threshold to the period 2000-2017.



50 day tank supply vs daily rationing water gap using 2017/2018 summer water demand

1.14 That translates to $1,700 m^3$ of water saved per day across all of Redwood Valley, Brightwater, Richmond and Mapua. How this compares to the water gap per day at Stage 3 and 5 rationing is illustrated in here, using the 2017/2018 summer average daily water demand as a basis. 2017/2018 was a relatively wet summer, so this provides a conservative estimate of the rationing water gap compared to most years.

1.15 The collective capacity of the tanks could bridge about 56% of the daily water gap at Stage 3, and less than 20% of the water gap at Stage 5.

1.16 In reality, peak water demand (and the peak water gap) can be higher than indicated here, and 50% of years have drought period longer the 50 days, meaning tanks will provide a lower level of service than illustrated here for those years. It is likely that by the time Council goes into any Stage 5 rationing, tanks will be extremely low if not empty, providing no meaningful level of service to our customers.

1.17 A higher level of service could be provided with larger tanks or more tanks which will cost more. In most cases, this will require those tanks to be plumbed into the household/business supply for toilets and washing machines to make use of the extra water. These systems are discussed below.

Plumbed in and greywater systems

1.18 The tank system described above is simple and low cost, but it has some limitations and associated risks. It only provides for outdoor water use and in a major drought, some people may be tempted to top-up their tank with water from the urban supply (contrary to water restrictions) so that they can continue to water their gardens from their 'tank'.

1.19 An alternative to the simple tanks concept used above is to use a greywater system, or a stormwater tank system that is plumbed into the house. The plumbed-in system means tank water can be used for toilets and washing machines. A grey water system provides water (typically from baths, showers, and the washing machine) for re-use in toilets and for outdoor water purposes and provides a more reliable supply of water than roof water.

- 1.20 These systems are considerably more expensive, require building consent and have some limitations. The Council has been provided a quote at \$9,300 for a 10 m³ stormwater tank plumbed and pumped into a new house for washing machine and toilet use. A larger tank system will provide a greater level of security, but will add more to this cost.
- 1.21 Greywater systems need careful installation and management practices to avoid risks of contamination and health issues. Water from greywater systems should only be used for a limited range of functions such as toilet flushing and some outdoor water uses. If stored for too long, it will go septic.

Practical considerations

- 1.22 In practice, the Council is likely to face some major hurdles in rolling out a Waimea-wide urban tank scheme of the scale considered above. The extent to which individual businesses and households would be able to use or accommodate tanks or various configurations and sizes will differ markedly.
- 1.23 The Council would have to explore what legal avenues it has to require existing homes to provide water tanks. This is most likely through the TRMP or through the Public Water Supply Bylaw, but is likely to be legally and politically challenging. It is possible the Council could only impose such a requirement over time as homes and businesses undertake renovation requiring building consent, land use consent or subdivision.
- 1.24 New developments may appear to be easy targets for new tanks, but this is not necessarily the case. New developments are planning on providing sections sizes down to 250–350 m² and average sizes of around 400–450 m². Developments at this end of the scale are already very dense and space is constrained. This will require more expensive tanks and configurations than those used in this analysis. Providing plumbed-in systems in all of the new housing developments in Richmond West (say 1,000 lots), that would require investment of \$10 million in tanks to save 200 m³ of water per day from this area. This is on top of the cost for existing customers and it will not offset existing demand.
- 1.25 In addition, some development would need to provide for stormwater detention tanks in addition to any water supply tanks. This is likely to be challenging, especially in infill areas. Underground tank and pumps systems will be needed in many cases, escalating costs further. This will erode the feasibility of some infill developments, making achievement of the Council's densification objectives more difficult.
- 1.26 Finally, this analyses has focused on the average connection in our network. There will be some large water users with large roof areas that could make use of water for non-potable purposes. The economics for these setups will be better than those considered above per m³, but will still not match the Dam for value for money. Nor are they likely to make the difference for all of our customers and our network as whole.

Conclusion

- 1.27 Water secured from the Waimea Community Dam is a much lower cost option for our customers when compared to tanks – and will provide a level of security many times greater. The low cost tank configuration used in this analysis will not address our water shortage. Tank systems can be developed to provide a greater level of security or use, and/or can fit the constraints of existing sites and smaller sites, but are significantly more expensive. Requiring new developments to install tanks will address only a portion of new demand and will not offset existing demand. In practice, a wide scale urban tank scheme for all customers

is going to be difficult to implement, and it may take decades to approach the level of impact contemplated in the analysis above. At 5 Stage 5 rationing, no urban tank system will provide a meaningful benefit to businesses, households, or the water supply network or stave off restrictions limiting urban water supply to essential human health only.

- 1.28 By comparison, the cost of the Waimea Community Dam to our customers is lower than tanks in any configuration, even if we significantly increase our contribution to the Waimea Community Dam. The Waimea Community Dam provides security for all business and household water uses including potable supply, provides for growth, protects against extreme drought, and protects our environment. In short, the Waimea Community Dam provides large-scale storage and economies of scale that tanks cannot match. Our community will get less and pay more with any tank scheme.

Attachment D

Nelson City Council Water Supply

General Overview

Council has asked Nelson City Council to confirm its intentions on upgrading its water supply. This includes upgrades to its reticulation links in the vicinity of Stoke/Nelson South.

The Nelson City Council has confirmed that its Tantragee Water Treatment Plant has the capacity to treat 50,000m³/day. However until it installs its primary clarifier it cannot guarantee that production. This would generally occur during summer months when the raw water quality from the Maitai Dam is compromised.

The Nelson City Council has therefore confirmed that it could only provide Tasman District Council up to 5,000m³/day. Previously it indicated 5-10,000m³ per day could be available, however until the primary clarifier is installed in 2029/30 that may not be possible.

The Nelson City Council has very little budgeted for water supply infrastructure in the South of the City for the immediate future. The only items of work that are relevant are:

1. A primary clarifier is identified and budgeted in Year 11 of its Infrastructure Strategy to treat the organics in the raw water from the Maitai dam (estimate \$18.0 million).
2. It has looked at reticulation upgrade options to supply up to 5,000m³/day across the boundary to Richmond.
3. A developer is expected to install a 200mm diameter pipeline in 2018/19 from Suffolk Road to near Hill Street North but not connected to Hill Street North at this stage. The Nelson City Council intend paying the additional cost to upgrade the size of this pipe to 250mm.
4. An upgrade reticulation link between Stoke and Richmond has been identified and budgeted in Year 11 of its Infrastructure Strategy (\$3.0 million).
5. No works are intended to address the silt build up in the Maitai dam reservoir.

There are three other items of work that Nelson City Council had previously identified as being needed to upgrade its water supply. No detailed design has been undertaken for any of these and nothing has been budgeted in its Long-Term Plan 2018/28. These are outlined as follows;

- **Maitai duplicate pipeline pump station upgrade** - NCC expects this would be required if it decommissioned the original raw water supply pipeline or if additional demand over the summer months means it needed a greater level of resilience than the current duplicate provides. This would likely occur if NCC had to supply the city and Richmond from the dam only. It could take a couple of years to design, consent and construct so remains a real risk if NCC was to supply Richmond. **(estimate \$2.0 million)**
- **Second clear water reservoir at Tantragee Water Treatment Plant** – NCC expects this would be required as growth in demand occurs out beyond the next ten years or earlier if NCC has to take over south Nelson and supply water to Richmond. **(estimate \$1.0million)**.
- **Tantragee WTP pumps/pH correction/general plant upgrades** – NCC has a preliminary report on coagulant chemicals and alternative pH correction chemicals and would expect more detailed discussion over the next three years. Likely it will be added to the next LTP. If NCC need to supply large volumes of water direct from the dam for more than a week or so it would have to bring this all forward. **(estimate \$1.0million)**.

Cross Boundary Links:

With the current reticulation, simply opening the valves at Champion Road could deliver up to 2,000m³/day at 40m head to Richmond. However the Nelson City Council has indicated that this would reduce the current pressure in south Stoke from the current 40m head to 30 m head which may cause problems for some properties in this area. This is therefore only considered to be a short-term measure rather than a permanent measure.

Both the Tasman District and Nelson City Council have worked together to model a range of options to supply water across the boundary. These include the short term with little expenditure and the medium and longer terms. These include;

1. Install a new 200mm supply line in the vicinity of the Main Road Stoke/Saxton Road intersection to connect to the Tasman District Council 375mm main. This would include a pressure reducing valve. This could provide up to 3,000m³/day at 40m head in the short term but could still compromise the current pressure for some Nelson City Council properties in the vicinity (approximately \$300,000).
2. In addition, install 2.5km of 200mm (may increase to 250mm) pipe down Suffolk Road from Kingsford Drive to near Hill Street North. This could deliver up to 4,000m³/day. This along with option 1 could deliver a combined volume of up to 7,000m³/day at 40m head but there would be concerns about impact of head loss on properties in the immediate area. (Approximately \$3.0 million). *Note – although this option could provide 7,000m³/day, Nelson City Council currently only has 5,000m³/day available.*
3. Install 4km long 250mm pipe from Marsden Road to Champion Road along Main Road Stoke. This could deliver up to 9,500m³/day at 40m head but concerns about impact of head loss on Nelson City properties. (Approximately \$6.0 million). *Note – although this option could provide 9,500m³/day, Nelson City Council currently only has 5,000m³/day available.*

Options to provide water at a 60m head were also investigated for the short and longer term but these result in less flow being available. There is less impact on head loss for other properties in Nelson. Nelson City Council has also looked at other supply scenarios but there was not much additional flow gained and the potential to compromise head loss on other properties remained.

The option of Tasman District Council supplying water to Nelson City Council were also modelled. In the short term, the current treatment plant and reticulation could allow up to 4,000m³/day to be delivered to Nelson City Council at Champion Road. However this would only be considered very short-term and probably only in an emergency.

To supply 10,000m³/day would require significant upgrading of the reticulation from the water treatment plant to Champion Road. This plus the additional UV treatment train and associated infrastructure in the treatment plant would cost approximately \$4.5 million.

To supply the 22,000m³/day allocated to Nelson City Council should it contribute to the dam would cost approximately \$22.0 million.

Both Councils have not investigated optimising the reticulation configuration to allow the Nelson, Richmond, Hope, Mapua networks to operate as a combined network. Given the water reforms currently being considered this is likely to be a priority in the near future irrespective of the water augmentation challenge currently before Council.

Options for the Tasman District Council

If the Tasman District Council wanted to utilise up to 5,000m³/day that could be available from the Nelson City Council it would probably need to consider providing some investment to implement these upgrades sooner. The likely investment required would be;

• Maitai duplicate pipeline pump station upgrade	\$2.0 million
• Second clear water reservoir at Tantragee Water Treatment Plant	\$1.0 million
• Tantragee WTP pumps/pH correction/general plant upgrades	\$1.0 million
• Install new reticulation Suffolk Road, Stoke Main Road Stoke	\$3.0 million
• Install new reticulation Main Road, Stoke	<u>\$6.0 million</u>
Total	\$13.0 million

The Nelson City Council has indicated that it cannot make more than 5,000m³/day available at this stage. If the Tasman District Council needed up to 10,000m³/day then it would need to convince the Nelson City Council with a value proposition. Council would probably need to not only invest \$13.0 million in the infrastructure outlined above, but also offer some sort of investment in the other major upgrades identified and not yet funded by the Nelson City Council. These are outlined and are summarised as follows;

• Primary Clarifier at the Tantragee WTP	\$18.0 million
• Upsizing the Suffolk Road Hill Street North Link	<u>\$ 1.0 million</u>
Total	\$19.0 million

Comment

The Nelson City Council has invested in its water supply including investing in the Maitai Dam. It is well within its rights to not allow permanent access to additional water as it needs to protect its future. From a regional and resilience perspective placing reliance on Nelson City Council to augment the water supply to Richmond and beyond is not sustainable. Additional augmentation will be required at some time in the short to medium term

Attachment E**Weirs on the Wairoa and Waimea Rivers**

A weir is a barrier across a river which holds water back and alters the flow characteristics in the river. Weirs are built for a multitude of purposes and have various impacts depending on how they are designed and constructed.

The option of constructing weirs across the river bed in the Wairoa/Waimea Rivers has been suggested many times in previous years. As a water augmentation option they could recharge the adjacent/underlying aquifers in the area. The key consideration is the bed morphology, the height of the weir and the flow regime of the river.

In the case of the Wairoa River, the flows at the Wairoa Gorge range between just over 1 m³/sec during dry periods up to around 1500 m³/sec during floods. With these flow ranges, considerations such as the impact on the stopbanks and other environmental considerations like fish passage need to be considered. The height and design of any weir and the associated impacts would have to be considered very carefully.

Weirs slow down the river flow and raise the water level in the river upstream of the weir. This results in groundwater mounding around the weir and raising the water table. This enhances seepage to the underlying and adjacent unconfined aquifer (i.e. groundwater recharge). This is a positive effect from a groundwater recharge point and in also maintaining groundwater levels and improving groundwater storage.

However with the flow losses to groundwater from the Wairoa Gorge downstream to Appleby during dry summers (>1000 l/s), weirs also pose a risk of water stagnating behind the weirs and raising water quality problems. With the weirs also enhancing groundwater recharge, river flows would reduce downstream. This flow reduction raises a range of issues downstream i.e. lower river flows with the risk of river flow drying up below the weir(s) in prolonged droughts. This also compromises the ability to meet minimum flow limits set downstream and seawater intrusion risk near the coast due to reduced river flows. Without providing for continuous enhanced/augmented flows especially during drier periods in the river, the weirs would only provide some short term relief during earlier parts of droughts and would not be a long term augmentation solution.

As part of its review Landcare Research modelled the effects on groundwater levels and net river recharge of building five weirs in the Wairoa and Waimea rivers. The modelling confirmed localised benefits but the scale of the added recharge created by the weirs is small in comparison with the change in recharge from flow releases from an upstream dam. In addition, without augmented river flows during low flows, upstream weirs may deprive flow from downstream reaches, drying the river sooner.

Weirs are only effective if there is constant and sufficient flow in the river. They are not sustainable when river flows drop to lower levels.

Attachment F

Managed Aquifer Recharge (MAR)

Managed Aquifer Recharge (MAR) is reintroducing water into aquifers for subsequent recovery and/or for environmental benefits. This is achieved by several methods and includes injection wells, infiltration basins and galleries. There needs to be source water to undertake this recharge.

The efficiency of MAR systems is strongly dependent on natural conditions like hydraulic conductivity and ambient groundwater flow.

In the case of the Waimea Plains, the Waimea River divides the plains into two and the Wai-iti Zone has already got its own augmentation via the Wai-iti Dam.

Any method employed will have to be sited in either side of the plains to address the separation by the river. Much more detailed investigation and trials including modelling would have to be undertaken to determine which of the methods or combination of methods can be realistically considered including location, number of sites and efficacy of each method. As groundwater is continuously moving in the unconfined gravel aquifer at a minimum any MAR method will at the least need to be in operation prior the key water demand period from November to April.

The source water for any MAR method would need to come from somewhere. This source water availability and quality would be some of the key considerations prior trying to recharging groundwater. The source of recharge water needs to be evaluated for quality and volume to ascertain if will recharge the aquifer sufficiently. Because of the minimum flow requirement for the Waimea River and the large demand over summer, any source water would need sufficient volumes to meet the aquifer needs.

Each MAR method has its own considerations that need to be investigated in some detail because of the variance in the hydraulic property of the overlying geological material. MAR would likely have to deploy numerous sites to achieve plains wide benefit. Single sites tend to only provide localised groundwater mounding. As stated earlier continuity in recharge needs to happen if not the water will flow along the ambient groundwater flow direction.

The MAR methods are outlined as follows;

1. Injection Wells: The size, number, location, depth and injection rates need to be ascertained. Single injection could also encompass pumping cost. Injection rates will be limited by the hydraulic properties of the injection well and the need to assess issues of clogging.
2. Infiltration Basins (Leaky Ponds): these are basically large open sinks generally above the water table. The size, number, depth location and injection rates need to be ascertained. Infiltration basins will be limited by the hydraulic properties of the basin bottom and walls. Assessment of clogging issues will also need to be made.
3. Infiltration Galleries: These include large diameter wells – that are dug and also include dug trenches. Similar matters to infiltration basins also apply for these.

The primary factor counting against MARs is the potential contamination of aquifers. Generally the water stored for MARs is stored in surface ponds which effectively is open to contamination. Treating this water before re-charging aquifers could be considered tough it would make this option less cost-effective.

Summary

The consideration of MARs as an option would require more detailed localised investigations. It is difficult to assess the efficacy and viability (cost and time and maintenance) of MAR in providing benefit to augmentation.

The challenge remains as to where the recharge water would be sourced. It is unlikely the river (Wairoa/Waimea) could be a source during summer because of minimum flow requirements and current abstraction demands. Another secondary storage system to store water from winter harvesting will have to be investigated. This would include the conveying to storage sites to carry this out.

The potential contamination of surface water being injected into aquifers is a major concern. Sufficient to count this option out as a viable and cost-effective.



Waimea Dam Economic Cost of The No-Dam Alternative

August 2018

 **Northington**
Partners

Executive Summary

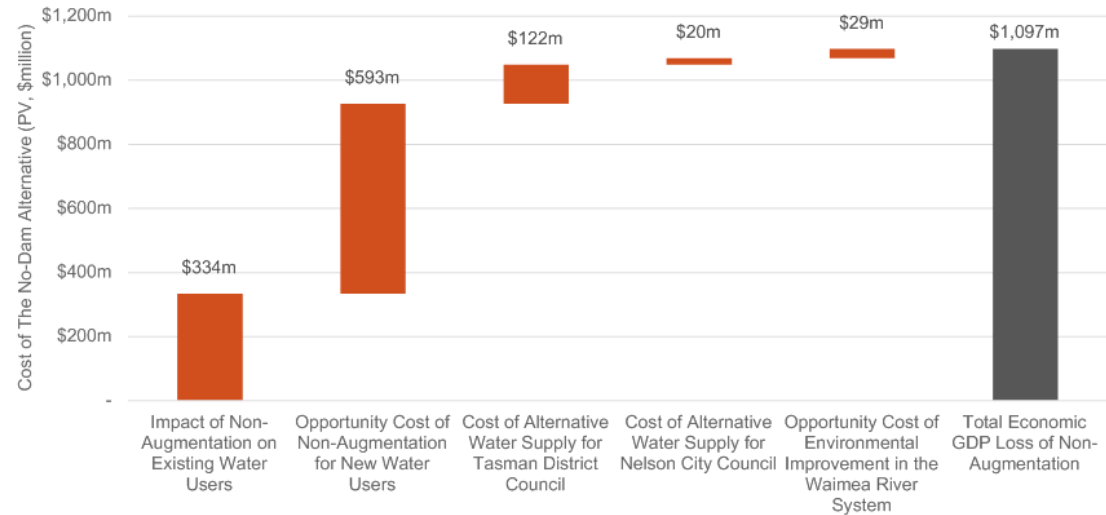
We estimate the total financial and economic cost of the No-Dam Alternative at \$1,097 million

This report provides a summary of the potential financial and economic impacts of the Waimea Dam not going ahead (“**No-Dam Alternative**”). Our estimate draws on a number of existing reports and focuses on five core components:

1. Impact of Non-Augmentation on Existing Water Users (Source: NZIER);
2. Opportunity Cost of Non-Augmentation for New Water Users (Source: NZIER);
3. Cost of Alternative Water Supply for Tasman District Council (Source: Tasman District Council);
4. Cost of Alternative Water Supply for Nelson City Council (Source: Nelson City Council); and
5. Opportunity Cost of Environmental Improvement in the Waimea River System (Source: Northington Partners).

Cost estimates for each component are presented in Figure 1. The estimated total impact on the No-Dam Alternative is \$1,097 million.

Figure 1: Aggregate Cost of Non-Dam Alternative (Mid-Point)



Introduction and Scope

Background

Waimea Water (“**Waimea Water**” or “**Company**”) has been established by the Tasman District Council (“**TDC**”) and Waimea Irrigators Limited (“**WIL**”) as an unincorporated joint-venture to advance the funding, technical development and construction of the Waimea Dam augmentation scheme (“**Waimea Dam**”).

Waimea Water has engaged Northington Partners to provide a summary of the potential economic impacts of the Waimea Dam project not proceeding (“**No-Dam Alternative**”). Our assessment is primarily based on existing work that has been completed by a range of parties over an extended period, and is intended to provide a high level summary of the financial and economic consequences of the No-Dam Alternative. These estimates take account of the alternative courses of action available to all of the stakeholders in the Waimea Dam.

The implications of the No-Dam Alternative have been assessed in the context of the 2014 Regional Plan changes introduced by TDC regarding Waimea Water Management and Water Augmentation. In the event that the Waimea Dam does not proceed, these plan changes provide a framework for managing water use for rural, urban, industrial and environmental purposes. For irrigators, the new rules will be implemented by:

- i. Reducing all allocations in line with each user’s previous use (over the 2003 – 2013 period), or standard allocations for specific soil types or specific crops;
- ii. Implementing new rationing trigger levels and allocation cuts required in the event of drought episodes of different severity; and
- iii. Placing restrictions on the types of activity that can be allocated new water.

Without the Waimea Dam, successively deeper rationing cuts will be triggered as river flows pass lower thresholds, with 70% cuts when flows at the Appleby Bridge in the Lower Waimea are at or below 800 litres per second.

Scope of Our Assessment

Our summary has focussed on the following key components:

- a. The loss of potential output from limiting primary production and supporting industries on land that is currently irrigated;
- b. The opportunity cost associated with the inability to provide irrigation to dryland;
- c. The potential economic cost of foregone regional growth resulting from limits to water quality, availability and reliability;
- d. The cost to TDC in providing an alternative storage solution to meet the domestic, urban and industrial needs of the projected population of the wider Waimea Basin over the next 50 years;
- e. The cost to the Nelson City Council of providing an alternative water solution to meet the needs of the projected population of the Nelson region over the next 50 years; and
- f. The environmental and social costs of maintaining the health of the Waimea River and associated amenities (and the extent to which these benefits are utilised / available to Nelson city residents).

All source documents referenced throughout this report are listed in Appendix II.

Section 1

Cost Components of No-Dam Alternative



Impact of Non-Augmentation - Existing Water Users

The total impact of potential water restrictions on existing irrigators is estimated at \$334m

Introduction

Approximately 3,800 hectares are currently irrigated in the Waimea Catchment, and all land uses would be adversely affected under the No-Dam Alternative.

Measurement Basis

All previous economic impact reports have used variants of the same analytical framework:

- Based on the potential for up to 70% cuts in current water allocations, the productive irrigable area is estimated to reduce from 3,800 ha to 705ha in a worst case scenario;
- The reductions in area are assumed to be applied on a pro-rata basis across all existing crop types;
- Potential impacts of more moderate water cuts are modelled using linear interpolation between the current position (no loss) and the worst case scenario.

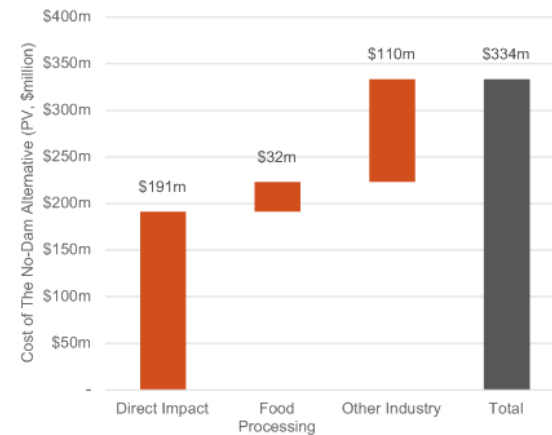
NZIER (2017) used a CGE model of the Nelson-Tasman economy to estimate the economic impacts of a 20% and 35% reduction in water availability. Impacts are measured in terms of regional GDP, and reflect the direct impact on existing irrigators through lower production and margins, as well as indirect impacts on the food processing and other industries.

The present value of aggregate impacts are measured over a 25 year period (discounted at 8%).

Results

The aggregate impact on non-augmentation (at the mid-point of the 20% and 35% scenarios) is summarised below in Figure 2. The total reduction in regional GDP is \$334m, of which approximately 60% is due to the direct impact on existing irrigators.

Figure 2: Economic GDP Cost of Non-Dam Alternative to Existing Water Users (Mid-Point)



Source: NZIER (2017) Waimea Dam Economic Assessment

Separate results for the 20% and 35% scenarios are set out in Section 2.

Opportunity Cost of Non-Augmentation – New Water Users

The opportunity cost of being unable to supply an additional 1,800 hectares of irrigated land is estimated at \$593m

Introduction

The Waimea Dam is expected to provide sufficient new water to irrigate 1,800 hectares, enabling a significant potential increase in production volume and profitability compared to current dryland uses.

If the Waimea Dam does not proceed, the potential GDP uplift will not be realised and this value therefore represents an opportunity cost of the No-Dam Alternative.

Measurement Basis

NZIER (2017) modelled the potential impact of the new irrigated area using the same framework as previous reports, but with updated capital costs, margins and some variations to the assumed crop types.

The assumed composition of the new irrigated area is set out in Table 1.

Table 1: Assumed New Crop Areas

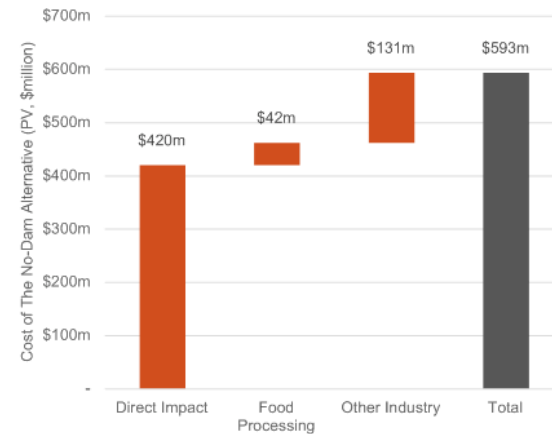
Crop Type	New Area (Hectares)
Pasture	400
Apples	960
Kiwifruit	90
Grapes	200
Berries	150
Total New Area	1,800

NZIER (2017) assessed the economic impact of the new irrigation with the same modelling framework that was used to measure the potential impact of non-augmentation on the land which is currently irrigated.

Results

The total opportunity cost of non-augmentation is \$593m (measured at the mid-point of the 20% and 35% scenarios). As summarised in Figure 3, most of this value relates to the direct loss from new irrigated land, although approximately 33% is derived from the impact on downstream industries.

Figure 3: Economic GDP Cost of Non-Dam Alternative to New Water Users (Mid-Point)



Source: NZIER (2017) Waimea Dam Economic Assessment

Separate results for the 20% and 35% scenarios are set out in Section 2.

Cost of Alternative Water Supply for Tasman District Council

Based on the available information, we estimate the cost of an alternative water source for TDC at \$122m

Introduction

If the Waimea Dam is not built, TDC will need to pursue an alternative solution. The estimated cost of establishing a different water source represents another impact of the No-Dam Alternative.

Measurement

A number of reports have examined a wide range of alternatives to the Waimea Dam at varying levels of design and cost detail. Some of the alternatives will deliver sufficient water to service both consumptive and environmental requirements, but typically at lower levels than the Waimea Dam.

In the context of this assessment, we are interested in the cost of a scheme which only services TDC's urban and industrial demand. Because the economic impact of the No-Dam Alternative on irrigation and environmental benefits is accounted for separately elsewhere, incorporating the cost of a full alternative to the Waimea Dam would include an element of double counting.

Storage Pond Alternative for TDC

The alternative water supply for TDC is a storage pond on the Waimea Plains which would be filled during winter for use in summer. The alternative would only provide security to supplement the Council's principal water supplies for existing customers and growth for the next 10 – 20 years.

Additional storage would be needed to provide for longer term growth and it is assumed that additional ponds would be needed in 10 - 20 year intervals.

Estimated Cost of Storage Pond Alternative

Set out below is the assumed staging, capital and operating cost associated with TDC's alternative water supply:

- Initial construction of a 0.8 million m³ storage pond to deliver 13,000 m³/day. Assumed to be constructed in 2023 for ~\$60m (2018 dollars), as TDC estimate that it would take five years before any alternative storage option could be built.
- Additional 0.8 million m³ of storage added in 2043 at additional cost ~\$60.0m (2018 dollars) to deliver 26,000m³/day (Waimea Dam can provide up to 60,000m³/day).
- Annual operating cost of \$1.9m for the 0.8 million m³ storage lake (2018 dollars), increasing to \$3.8m (2018 dollars) per annum once the additional storage is added in 2043.
- Assumed that construction and operating cost increase at 2% per annum.

Table 2 below, summarises the estimated 50 year cost of the alternative water supply to TDC.

Table 2: Estimated Cost of Storage Pond Alternative

Component	Value
Estimated 50 Year Capital and Operating Cost	\$424m
50 Year Present Value (6% Discount Rate)	\$122m

Source: TDC, NPL Analysis

Potential for a Smaller Storage

TDC note that a smaller storage option with a 50 year present value cost of ~\$90m could potentially provide sufficient headroom for urban supply. However, the smaller storage option is likely to significantly increase water rationing requirements for urban and industrial users. Therefore, for the purposes of our analysis we do not believe that it is appropriate to compare this option to the urban and industrial supply components of the Waimea Dam.

Cost of Alternative Water Supply for Nelson City Council

We estimate that the cost of providing an alternative future water supply for NCC could be approximately \$20m

Introduction

While Nelson City Council (“NCC”) is not currently a direct abstractor from the Waimea aquifer, the Waimea Dam could potentially provide NCC with sufficient water to service its future regional needs until approximately 2100. Initial modelling has assumed that approximately 5% of the Waimea Dam’s storage capacity would be allocated for this purpose.

Measurement

If the Waimea Dam does not proceed, it is likely that TDC will cease supplying water to NCC in south Nelson. TDC supply to south Nelson represents approximately 9% of NCC’s current water supply. Therefore the cost of an alternative water supply for NCC includes:

- i. Reticulation upgrade to service south Nelson from NCC’s current water supply; and
- ii. Increase water supply to compensate for the ~9% supplied by TDC and to provide for future urban and commercial growth.

Alternative Water Supply Options for NCC

The cost of upgrading reticulation supply to south Nelson is estimated by NCC at \$5 million.

NCC has commissioned a number of studies regarding alternatives to the Waimea Dam. The lowest cost alternative for NCC is to invest in pre-treatment of existing water sources at an estimated cost of approximately \$15 million.

Another alternative is to construct a high dam on the Roding River to augment the water already extracted from this source. The cost of constructing a dam on the Roding River is estimated between \$45 million to \$75 million.

Estimated Cost of NCC Alternative

Based on upgrading reticulation supply to south Nelson and enhanced pre-treatment of existing water sources, the cost of providing an alternative to the Waimea Dam for NCC is approximately \$20 million.

We note that should a dam on the Roding River be required, the potential cost of the NCC alternative would be between \$50 million - \$80 million.

Opportunity Cost of Environmental Improvement in the Waimea River System

We suggest a lower bound for the value of environmental benefits at \$28.6m

Introduction

On the face of it, there will be no further environmental degradation in the Waimea River catchment under the No-Dam Alternative because of the increased restrictions that would be placed on consumptive users.

However, the Waimea Dam will enable an increase in the minimum environmental flow to be raised from 800 l/s to 1,100 l/s at the Appleby Bridge. The No-Dam Alternative therefore imposes an opportunity cost relating to this foregone benefit.

Measurement

Attributing a monetary value to the environmental benefit associated with the increase in the minimum flow is extremely difficult. While in theory there are a range of approaches that can be applied, each has practical implementation issues and typically relies on a number of key input parameters that are difficult to determine.

Therefore, our approach has been to base the value of the environmental benefit on the estimated cost of providing the benefit. While this is clearly a relatively crude measure, we suggest that it provides a reasonable lower bound on the likely value. The actual value of the environmental benefit is expected to be higher, especially considering that allowance for the enhanced environmental flow is one of the key enablers for the “consentability” of the scheme.

Previous work indicates that catering for the proposed increase in the minimum flow in the Waimea River requires 30% of the overall live storage in the dam. The cost of the environmental improvement is therefore assumed to be 30% of the overall capital cost for the scheme, plus 30% of the assumed on-going operating costs.

Result

Our cost assessment is summarised in Table 4 below, based on values referenced in the Morrison Low (2015) and NZIER (2015) reports.

Table 4: Cost Allocation to Environmental Benefit

Component	Value
Estimated Capital Cost (P ₉₅)	\$82.5m
Allocation to Environmental Benefit	30%
Cost Allocated to Environmental Benefit	\$24.8m
Annual Operating Costs	\$0.5m
Capitalisation Rate (Real)	4%
Total Capitalised Costs	\$12.5m
Cost Allocated to Environmental Benefit (30%)	\$3.8m
Total Cost for Environmental Improvement	\$28.6m

Source: Morrison Low (2015), NZIER (2015) and NPL Analysis

The degree to which the environmental benefit is enjoyed by (and therefore could be allocated to) residents living in both the Nelson and Tasman regions is difficult to measure. However, we note that NZIER (2015) consider an allocation range between 20% and 50% for Nelson residents. Given the relativities between the populations of the two regions, we suggest that a minimum allocation of 30% to Nelson seems reasonable.

Section 2

Economic Impact Scenarios for No-Dam Alternative



Incremental Economic GDP Loss from Non-Augmentation - 20% Water Cut

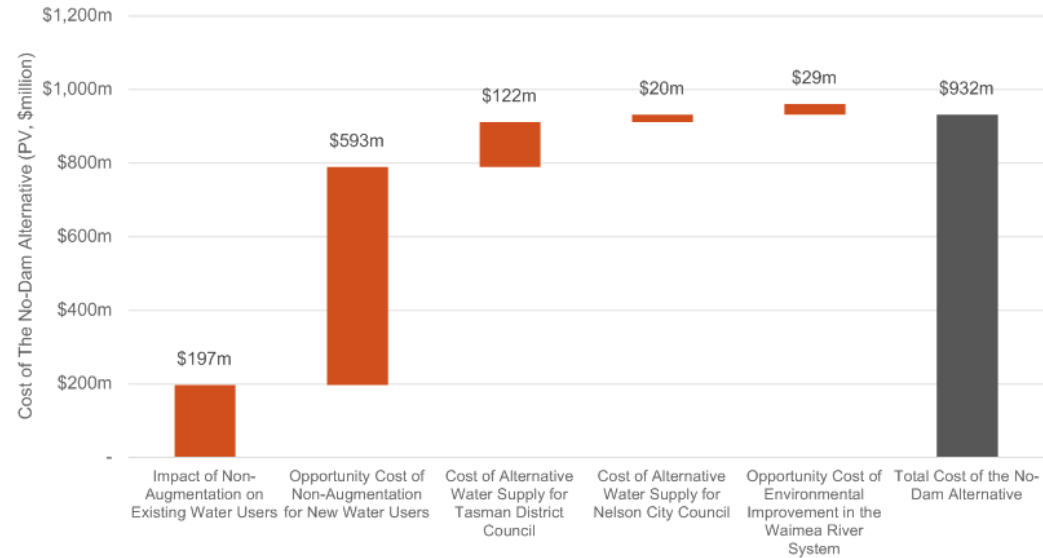
Impact of 20% Water Cut

Summarised in Table 5 and Figure 4 below is the impact of non-augmentation on existing water users on the basis of a 20% water cut. The estimated total impact of the No-Dam Alternative is \$932 million under this scenario.

Table 5: Cost of Non-Dam Alternative (20% Water Cut)

Component	GDP PV\$m
Impact of Non-Augmentation on Existing Water Users	\$197m
Opportunity Cost of Non-Augmentation for New Water Users	\$593m
Cost of Alternative Water Supply for Tasman District Council	\$122m
Cost of Alternative Water Supply for Nelson City Council	\$20m
Opportunity Cost of Environmental Improvement in the Waimea River System	\$29m
Total Cost of the No-Dam Alternative	\$932m

Figure 4: Cost of Non-Dam Alternative (25% Water Cut)



Incremental Economic GDP Loss from Non-Augmentation - 35% Water Cut

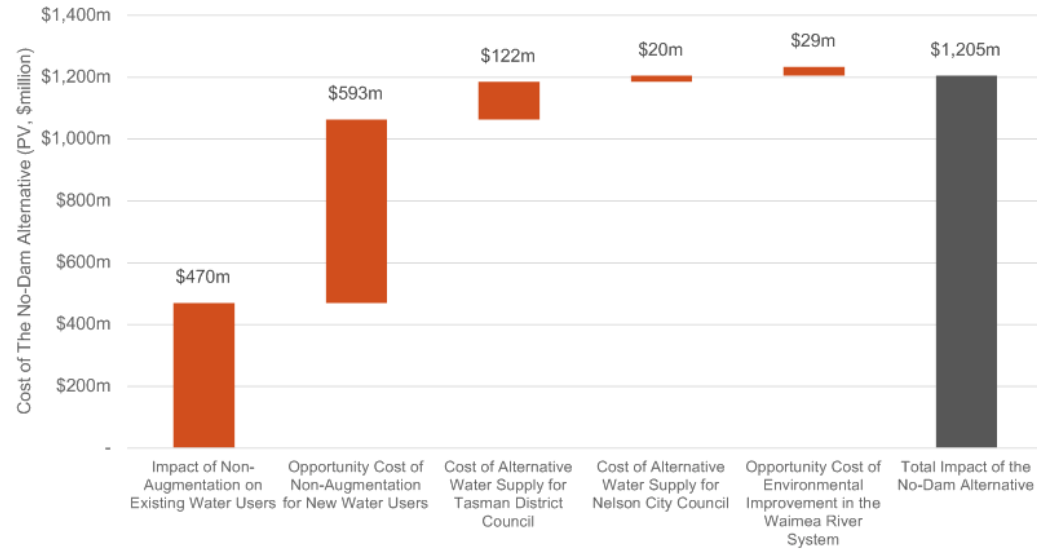
Impact of 35% Water Cut

Summarised in Table 6 and Figure 5 below is the impact of non-augmentation on existing water users on the basis of a 35% water cut. For this scenario the estimated total impact of the No-Dam Alternative is \$1,205 million.

Table 6: Cost of Non-Dam Alternative (35% Water Cut)

Component	GDP, PV\$m
Impact of Non-Augmentation on Existing Water Users	\$470m
Opportunity Cost of Non-Augmentation for New Water Users	\$593m
Cost of Alternative Water Supply for Tasman District Council	\$122m
Cost of Alternative Water Supply for Nelson City Council	\$20m
Opportunity Cost of Environmental Improvement in the Waimea River System	\$29m
Total Cost of the No-Dam Alternative	\$1,205m

Figure 5: Cost of Non-Dam Alternative (35% Water Cut)



Appendices



Appendix I: Qualifications, Declarations and Consents

Declarations

This report is dated 23 August 2018 and has been prepared by Northington Partners at the request of Waimea Irrigators Limited on behalf of Waimea Water for the purposes as set out on page 2. This report, or any part of it, should not be reproduced or used for any other purpose. Northington Partners specifically disclaims any obligation or liability to any party whatsoever in the event that this report is supplied or applied for any purpose other than that for which it is intended.

Qualifications

Northington Partners provides an independent corporate advisory service to companies operating throughout New Zealand. The company specialises in mergers and acquisitions, capital raising support, expert opinions, financial instrument valuations, and business and share valuations. Northington Partners is retained by a mix of publicly listed companies, substantial privately held companies, and state owned enterprises.

The individuals responsible for preparing this report are Greg Anderson B.Com, M.Com (Hons), Ph.D and Richmond Tait B.Com, B.Sc.

Disclaimer and Restrictions on the Scope of our Work

In preparing this report, Northington Partners has relied on information provided by Waimea Irrigators Limited. Northington Partners has not performed anything in the nature of an audit of that information, and does not express any opinion on the reliability, accuracy, or completeness of the information provided to us and upon which we have relied.

Northington Partners has used the provided information on the basis that it is true and accurate in material respects and not misleading by reason of omission or otherwise. Accordingly, neither Northington Partners nor its Directors, employees or agents, accept any responsibility or liability for any such information being inaccurate, incomplete, unreliable or not soundly based or for any errors in the analysis, statements and opinions provided in this report resulting directly or indirectly from any such circumstances or from any assumptions upon which this report is based proving unjustified.

We reserve the right, but will be under no obligation, to review or amend our report if any additional information which was in existence on the date of this report was not brought to our attention, or subsequently comes to light.

Furthermore, our assessment is reliant on a number of key assumptions that have been outlined in this report. Should any of these assumptions not be accurate, our assessment and our conclusions could be materially affected.

Indemnity

Waimea Irrigators Limited has agreed to indemnify Northington Partners (to the maximum extent permitted by law) for all claims, proceedings, damages, losses (including consequential losses), fines, penalties, costs, charges and expenses (including legal fees and disbursements) suffered or incurred by Northington Partners in relation to the preparation of this report; except to the extent resulting from any act or omission of Northington Partners finally determined by a New Zealand Court of competent jurisdiction to constitute negligence or bad faith by Northington Partners.

Waimea Irrigators Limited has also agreed to promptly fund Northington Partners for its reasonable costs and expenses (including legal fees and expenses) in dealing with such claims or proceedings upon presentation by Northington Partners of the relevant invoices.

Appendix II: References

Reference	Full Title of Report / Source
Cook & Northington (2011); Waimea Community Dam Economic Impact Analysis	Waimea Community Dam Economic Impact Analysis; report to Nelson Regional Economic Development Agency
Morrison Low (2015); Business Case to support Council investment in the Waimea Community Dam	Business Case to support Council investment in the Waimea Community Dam report to Tasman District Council
NCC (2012); Water Supply Asset Management Plan 2012-2022	Water Supply Asset Management Plan 2012-2022
Northington Partners (2010); Financial and Economic Assessment of Water Augmentation in the Waimea Catchment	Financial and Economic Assessment of Water Augmentation in the Waimea Catchment; report to Waimea Water Augmentation Committee
NZIER (2017); Waimea Dam Economic Assessment	Update of economic impact assessment of Waimea Community Dam
NZIER (2015); NCC Value in Waimea Dam	NCC Value in Waimea Dam - Outflow from a dam Economic benefits for Nelson City of the proposed Waimea Community Dam NZIER report to Nelson City Council
NZIER (2014); Waimea Dam Economic Assessment	Waimea Dam Economic Assessment - Review and update of economic impact assessment of Waimea Community Dam
Tokin & Taylor (2007); Assessment of Water Augmentation Options for the Waimea Plains – Final Report Summary	Assessment of Water Augmentation Options for the Waimea Plains – Final Report Summary for Waimea Water Augmentation Committee / Tasman District Council.



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Attachment H**The Oxford University Paper****Background**

Understanding the purpose of this research paper is critical to understanding its relevance to the Community dam.

Its clearly stated purpose was to examine “whether the benefits of new dams will outweigh the costs” when providing electricity supplies - particularly in developing countries. This was because the de facto response to electricity needs is still often ‘big solutions’ at a time when it’s becoming clear that alternative electricity sources (such as solar and wind) and much smaller dams can be provided much more quickly, with greatly reduced environmental impacts and scope for community ownership.

Because of this energy focus it’s important to note that the paper was published in 2014 in the publication, **Energy Policy under the title: ‘Should we build more large dams? The actual costs of hydropower mega-project development’**. So a critical context is that the costs/benefits being examined are in terms the resultant electricity produced by the hydro dam complexes - of which dam construction costs and models of development are clearly a critical element.

It’s a long and very complex paper that examines many aspects of the cost benefits of large hydro power schemes as part of energy security - including the psychology of dam cost estimation, currency fluctuations, procurement, project management skills etc.

By way of further background below is the Abstract as in the published paper. Using that as a scene setter - comments on the paper, and its relevance to the Waimea Community Dam project, are as below.

Abstract

A brisk building boom of hydro power mega-dams is underway from China to Brazil. Whether benefits of new dams will outweigh costs remains unresolved despite contentious debates. We investigate this question with the “outside view” or “reference class forecasting” based on literature on decision-making under uncertainty in psychology. We find overwhelming evidence that budgets are systematically biased below actual costs of large hydropower dams—excluding inflation, substantial debt servicing, environmental, and social costs. Using the largest and most reliable reference data of its kind and multilevel statistical techniques applied to large dams for the first time, we were successful in fitting parsimonious models to predict cost and schedule over runs. The outside view suggests that in most countries large hydropower dams will be too costly in absolute terms and take too long to build to deliver a positive risk - adjusted return unless suitable risk management measures outlined in this paper can be affordably provided. Policy makers, particularly in developing countries, are advised to prefer agile energy alternatives that can be built over shorter time horizons to energy mega projects.

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A key point is that the paper examines a sample of 245 dams (mostly hydro) out of over 50,000 globally and focused on very large ones (80% of the sample had a wall height of over 30 meters and 30% over 100 meters). In addition 75% of the dams were in developing countries and the average cost was US\$1.44 billion in 2010 dollars.

A significant focus of the paper was on how the decision making process for large energy projects proceeded - how evidence based perspectives are incorporated, how transferable experience from North America is to developing tropical areas in terms of costing, procurement, project management and dealing with corruption. This is summed up in the following quote from the paper.

“We noted, three out of four dams had a North American firm advising on the engineering and economic forecasts. Consistent with anchoring theories in psychology, we conjecture that an over-reliance on the North American experience with large dams may bias cost estimates downwards in rest of the world. Experts may be “anchoring” their forecasts in familiar cases from North America and applying insufficient “adjustments”, for example to adequately reflect the risk of a local currency depreciation or the quality of local project management teams. Instead of optimistically hoping to replicate the North American cost performance, policy makers elsewhere ought to consider the global distributional information about costs of large dams.”

The paper concludes with four policy propositions - all aimed at reducing the risk to desired energy outcomes. These were:

“Policy proposition 1. Energy alternatives that rely on fewer site specific characteristics such as unfavourable geology are preferable.

Policy proposition 2. Energy alternatives that rely on fewer imports or match the currency of liabilities with the currency of future revenue are preferable.

Policy proposition 3. The best insurance against creeping inflation is to reduce the implementation schedule to as short a horizon as possible. Energy alternatives that can be built sooner and with lower risk of schedule overruns, e.g. through modular design, are preferable.

Policy proposition 4. Energy alternatives that do not constitute a large proportion of the balance sheet of a country or a company are preferable. Similarly, policy makers, particularly in countries at lower levels of economic development, ought to avoid highly leveraged investments denominated in a mix of currencies.”

Relevance to Waimea Community Dam Project

All the focus of study elements outlined above indicate that the conclusions from *‘Should we build more large dams? The actual costs of hydropower mega-project development’* are not directly applicable to the Waimea Community Dam. The purpose of the study and scale and circumstance of projects examined are very different from those we face in NZ today and the Waimea Community Dam project in particular. However some more specific comment is valid.

1. The Study states that there was overwhelming evidence that costs were systematically biased towards underestimation. It implies that this bias was to enhance the business case to ensure the project was initiated. The natural consequence of this is would increase the overrun percentage.

The ECI process has minimised the risk of any underestimation in the construction component of the project.

2. The costs attributed to the sample of 245 dams appear to be a misrepresentation. In a subsequent study by the International Commission on Large Dams (ICOLD) questions are raised about the voracity of the 99% overrun in costs as it cannot be explained by the six references quoted in the study. Another important aspect that is not clear in the study is - which estimate is used to calculate the cost overruns. Is it when the business case is developed to determine viability? Or is it after preliminary design and before procurement? Or is it when procurement has been completed and the construction contract signed?
3. The study has endeavoured to account for the variables and characteristics of each of the 245 dams in regard to scope, estimates, detailed design, procurement and project management. However it is not clear whether these inputs into the model were specific enough to give robust outputs - but given its focus on mega hydro projects that is, to some extent, an unknown.
4. As highlighted above the focus of the study was on hydropower mega-project development. The Waimea dam does not fall into this category given its modest size and a 2018 projected budget of US\$68.184 million compared with the studies average of US\$1.44 billion in 2010 dollars. **It is primarily for maintaining river flows, augmenting the aquifers under the Waimea Plains to facilitate abstraction for urban water supplies and for horticulture and agriculture - thus it has multiple benefits.**
5. The study does observe that the proponents of large dams envisage multiple benefits but given the primary justification was mostly hydro electricity production the cost-effective delivery of wider benefits was seldom achieved. The study suggests the use of an 'outside view' or independent advisors is preferable to minimise the risk of this occurring. **That has been our approach and in particular the extensive involvement of the community in the earlier stages of developing means of water augmentation has been a very important part of the planning process**

Attachment J - Waimea Water Augmentation**Full list of reports**

Date	Report	Author
1991	Water Resource Augmentation Options – Waimea Basin	MAF, Agricultural Engineering Institute
2005	Assessment of Water Storage Options – Waimea Catchment	Tonkin & Taylor
	Review of biological data relating to the Waimea Catchment	Cawthron report 996
	Instream habitat flow analysis for the Waimea River and provisional minimum flows for proposed dam sites in the upper Wairoa and Lee catchments.	Cawthron Report 1061
	Blue duck in the Wairoa and Lee Rivers	D Barker
	Water in the Waimea Basin – Community Values and Water Management Options	ESR
2006	Preliminary economic assessment of water augmentation in the Waimea Catchment	Crighton Anderson
	Issues and mitigation options associated with water storage in the Lee River.	Cawthron Report 1223
	Assessment of two alternative water storage options – Upper Lee and Left (Eastern) Branch, Wairoa Rivers – Waimea catchment	Tonkin & Taylor
	Botanical values of the Wairoa and Lee River Valleys. Assessment in relation to possible dam and reservoir sites.	P Simpson
	Waimea Water Augmentation Project – Future Water Demand by Water Zone	AgFirst
	A cultural impact assessment as part of the feasibility study into a proposed Waimea Water augmentation scheme	Nelson Iwi Resource Management Advisory Komiti
2007	Groundwater-river interaction modelling for a water augmentation feasibility study, Waimea Plains, Nelson	GNS Science
	Assessment of Water Augmentation options for the Waimea Plains – Final Report – Summary	Tonkin & Taylor
	Waimea Water Augmentation – Component 1 Water Demand and Availability	Tonkin & Taylor
	Waimea Water Augmentation – Component 2 Storages Assessment	Tonkin & Taylor
	Waimea Water Augmentation – Component 3 Environmental and Economic Assessment	Tonkin & Taylor
	A review of water allocation options for the Waimea Water augmentation project	Landcare Research Contract Report LCO607/032

Date	Report	Author
	Documenting and evaluating the Waimea Water Augmentation Committee Process for Stage one of the Feasibility Study	ESR
2009	Aquatic Ecology – Mitigation and management options associated with water storage in the proposed Lee Reservoir.	Cawthron Report 1701
	Upper Lee River Waimea Water Augmentation – Assessment of effects on recreation	Rob Greenaway & Associates
	Lee Valley Storage Dam – Engineering Feasibility report	Tonkin & Taylor
	Lee Dam Feasibility Study – Enhancement opportunities scoping plan	Tonkin & Taylor
	Enhancing Water Distribution from the Waimea Water Augmentation project	Landcare Research Contract Report LC0910/019
	Lee Dam Feasibility Investigations – Geotechnical Investigation report	Tonkin & Taylor
	Lee Dam Feasibility Study – Terrestrial Ecology Effects Assessment	Tonkin & Taylor
	A management plan for Lee Valley – a Tangata Whenua perspective	Tiakina te Taiao
	Waimea Water Augmentation Phase 2 – Water Resource Investigations	Tonkin & Taylor
	Water allocation options and resource consent requirements for the Waimea Water Augmentation project.	Landcare Research Contract Report
	Analysis of suspended sediment data from Upper Lee River, Nelson.	NIWA Client Report CHC2009-179
2010	An acoustic bat survey of the Lee River catchment development area	B Lloyd
	Financial and economic assessment of water augmentation in the Waimea catchment	Northington Partners
	Waimea Water Augmentation – Phase 2 – Lee Valley Dam feasibility investigations – summary report	Tonkin & Taylor
2012	Lee Valley Dam Detailed Design Report – Stage 3	Tonkin & Taylor
	Lee Valley Dam – Hydropower Preliminary Design	Tonkin & Taylor
2013	Upper Lee River Waimea Water Augmentation – Assessment of effects on recreation	Rob Greenaway & Associates
	Lee River Dam – Vegetation update	P Simpson
	Lee Valley Dam – Transportation assessment report	TDG
	Lee Valley Dam – Response to Peer Review of Stage 3 Design	Tonkin & Taylor

Date	Report	Author
	Summary of hydrology and water management bases for decisions on Waimea water management, with and without water augmentation	Landcare Research
2014	Waimea Dam Economic Assessment Report	NZIER
	Assessment of Environmental Effects – Lee Valley Community Dam	Tonkin & Taylor
	Aquatic ecology – mitigation and management options associated with water storage in the proposed Lee Reservoir – Addendum.	Cawthron Report 1701A
	How to Pay for a Dam	NZIER
	Lee Valley Community Dam – Outline Biodiversity Enhancement Management Plan – Draft Outline	Tonkin & Taylor
2015	Waimea Community Dam: Cost/Risk and Alternative Options Review for an Affordable Dam – 2 volumes	BECA
	Assessment of Base Case for Waimea Basin Urban Water Supplies in the event the Waimea Community Dam does not proceed	MWH
	Business Case for TDC investment in Waimea Community Dam	Morrison Low
	Waimea Community Dam – Procurement Strategy	BECA
	Evaluation of Options for Waimea Basin Urban Water Supplies in the event the Waimea Community Dam does not proceed	MWH
2016	Waimea Community Dam – Peer Review of Groundwater Hydrology	Landcare Research
	Economic Cost of the No-Dam Alternative	Northington Partners
2017	Updated Economic Cost of the No Dam Alternative	Northington Partners
	Waimea Dam Economic Assessment – Update	NZIER
	Seismic Risk Review	OPUS Consultants
	Seismic Hazard Assessment for the proposed Waimea Dam	GNS Science Consultancy
	Waimea 100-Year Water Demand and Supply Modelling	Stantec

* Hay, J, Young, R & Strickland, R (2009)	Aquatic Ecology: Mitigation and Management Options Associated with Water Storage in the Proposed Lee Reservoir. Cawthron Report No. 1701	Extended by, and to be read in conjunction with, Young, R & Doehring, K (2014)
Rob Greenaway & Associates (2009)	Upper Lee River Waimea Water Augmentation. Assessment of Effects on Recreation	Superseded by Rob Greenaway & Associates (2013)
* Tonkin & Taylor Ltd (2009i)	Lee Valley Storage Dam Engineering Feasibility Report	Extended by Tonkin & Taylor Ltd (2012a)
Tonkin & Taylor Ltd (2009ii)	Lee Dam Feasibility Study: Enhancement Opportunities Scoping Plan	Superseded by this AEE
Fenemor, A & Bealing, J (2009)	Enhancing Water Distribution from the Waimea Water Augmentation Project. Landcare Research Contract Report LC0910/019	Stand-alone report
* Northington Partners (2010)	Financial and Economic Assessment of Water Augmentation in the Waimea Catchment	Supersedes Crighton Anderson (2006)
* Tonkin & Taylor Ltd (2009iii)	Lee Dam Feasibility Investigations Geotechnical Investigation Report	Stand-alone report
* Tiakina te Taiao (2009)	A Management Plan for Lee Valley. A Tangata Whenua Perspective	Additional to, and to be read in conjunction with, Nelson Iwi Resource Management Advisory Komiti (2006)
* Tonkin & Taylor Ltd (2009iv)	Lee Dam Feasibility Study Terrestrial Ecology Effects Assessment	Parts updated by, and to be read in conjunction with, Simpson, P (2013)
Fenemor, A & Grace, E (2009)	Water Allocation Options and Resource Consent Requirements for the Waimea Water Augmentation Project	Supersedes Fenemor, A (2007)
* Tonkin & Taylor Ltd	Waimea Water Augmentation	Stand-alone report

Phase 3 - Consenting	* Tonkin & Taylor Ltd, (2012a)	Lee Valley Dam Detailed Design Report Stage 3	Updates Tonkin & Taylor Ltd (2009i)
	* Young, R & Doeiring, K (2014)	Aquatic Ecology: Mitigation and Management Options Associated with Water Storage in the Proposed Lee Reservoir: Addendum. Cawthron Report No. 1701A	Extends, and to be read in conjunction with, Hay, J, Young, R & Strickland, R (2009)
	* Rob Greenaway & Associates (2013)	Upper Lee River Waimea Water Augmentation. Assessment of Effects on Recreation December 2013 (Final)	Supersedes Rob Greenaway & Associates (2009)
	* Simpson, P (2013)	Lee River Dam Vegetation Update	Updates, and to be read in conjunction with, Tonkin & Taylor Ltd (2009iv)
	* TDG (2013i)	Lee Valley Dam Tasman District. Transportation Assessment Report	Stand-alone report



8.8 WAIMEA DAM PROJECT REPORT

Information Only - No Decision Required

Report To:	Full Council
Meeting Date:	9 August 2018
Report Author:	Janine Dowding, Chief Executive Officer
Report Number:	RCN18-08-09

1 Summary

- 1.1 This is the 23rd status report on the **Waimea Water Augmentation Project**. The report covers the key issues that the Project Office and Project Governance Board are dealing with. The Project Governance Board last met on Wednesday 25 July 2018.
- 1.2 The project timeline is being reviewed in light of the need to address the funding gap and still meet the 15 December 2018 deadline for Central Government Crown Irrigation Investments Limited (CIIL) funding to irrigators and Council.
- 1.3 The land and access work stream is proceeding. The Local Bill option for access to the Department of Conservation (DOC) land is progressing with timeframes out of Council's hands. Negotiations are progressing with Ngati Koata who remain supportive of the project.
- 1.4 Council loan funded costs to 30 June 2018 are \$6,145k. The unexpected and disappointing increase in costs (\$26m) will pose one of the greatest challenges to the project yet. The Joint Venture (JV) partners are working on bridging the funding gap that will require compromises by all parties. It would be premature to abandon the project without fully investigating all options to bring it to a successful conclusion.
- 1.5 In detail construction and other project workstream costs are provided along with a risk overview.
- 1.6 The work on the various document work streams to give effect to the project term sheets continues. Initial drafts have been produced for some documents and are being circulated for initial feedback. Other work streams are also proceeding with the financial close date of 15 December 2018 rapidly approaching.

2 Draft Resolution

That the Full Council

1. receives the Waimea Dam Project Report RCN18-05-04; and
2. notes a funding application to the Provincial Growth Fund requesting a grant of \$18m to support the project was lodged on 30 July 2018.

3 Purpose of the Report



WAIMEA DAM PROJECT REPORT

- 3.1 The purpose of this report is to provide an update on Waimea Community Dam project work streams.

4 Overall Project Timeline

- 4.1 As was noted in the last report, the overall project timeline has been reviewed and extended. While access to DOC land is critical, dealing with closing the funding gap and reaching financial close by 15 December 2018 is the most pressing need if the project is to proceed.

5 Risks

- 5.1 As noted, obtaining access to the **Mount Richmond Forest Park land** for the Waimea River flow augmentation and ground water recharge scheme is critical to the Water Augmentation Project proceeding. We are progressing this through the introduction of a Local Bill (which we have been contemplating for some time). The Bill also addresses the matter of the dam footprint on the river bed. Council has no control over the time the Bill will take to progress through the legislative process. We have, however, been given assurances by CIIL that their funding will not be withdrawn provided all other matters are completed by 15 December 2018.
- 5.2 Nelson City Council's (NCC) decision on its proposed \$5m contribution has been included in their 2018-28 Long Term Plan. A grant is to be made in year three of their Long Term Plan, linked to an agreement to take water at some future time. There is still a risk relating to the proposed terms of agreement. Staff will shortly commence discussions with NCC over those terms.
- 5.3 With the need to find a solution to closing the \$26m funding gap, significant pressure is now on the time line to financial close. Financial close must be achieved by 15 December 2018 (excluding the Local Bill) if the Government funding is to remain available. Government funding is a critical piece of the funding of the project that makes it more affordable for the community.
- 5.4 Whether or not we need, or can get, the DOC land becomes moot if we cannot close the **funding gap** arising from completion of the contractor procurement work stream (the ECI process) and the review of the other work streams. We will need to focus resourcing across all work streams to meet the 15 December 2018 deadline.
- 5.5 Completion of the ECI process, and nearing completion of the detailed design work reduces the risk of construction cost overruns.
- 5.6 Given we are at a critical junction for the project we need to ensure that we do not take a premature decision to abandon the project until we have exhausted all options, and Councillors are provided with the reports and information to ensure that their decision-making obligations under the Local Government are met. Such a premature decision would open Council to legal challenge.



WAIMEA DAM PROJECT REPORT

6 Finance and Funding

- 6.1 The current (preliminary) position on total project investment to 30 June 2018 is \$13m (including \$6.6m of pre-2015 sunk costs). Of the post 2014/15 costs \$6,145k have been loan funded by Council. As part of our year end processing we are separating out the Council internal loan into costs that will be reimbursed by the CCO should the project proceed, and those that will be met in full by Council. We have also (as provided for in the LTP) started rating for Council's share of the dam costs. These rates will be applied to the repayment of sunk costs to date.

Waimea Project - Summary Financials						
	Pre June 14	14/15	15/16	16/17	17/18	Total
Expenditure (excludes WIL WCDL Costs)	Actual	Actual	Actual	Actual	Actual	Actual
Stage 1 - Pre Feasibility	412	0	0	0	0	412
Stage 2 - Feasibility	1,564	0	0	0	0	1,564
Stage 3	222	0	0	0	0	222
Design	1,929	0	0	0	0	1,929
Governance	214	0	0	0	0	214
Project Management	59	335	69	308	487	1,259
Consenting	205	815	8	8	36	1,073
Water Supply Solution (Tonkin Taylor/Beca)	0	557	86	125	1,886	2,654
Land and Access	0	102	288	273	1,406	2,069
Professional Support CCO Structure/Borrowing Agreement	0	4	26	234	295	559
Communications	0	17	0	18	1	36
Statutory Process	0	16	0	2	3	21
Hydro	0	0	0	0	68	68
Project Office	0	0	0	29	510	539
Interest on Loan Funding	0	0	74	71	165	310
Total	4,606	1,846	552	1,067	4,858	12,928
The above is funded by;						
WIL 50%	0	0	0	65	1,246	1,311
TDC WCD BAU Loan	0	322	110	507	863	1,802
TDC WCD JV Loan	0	658	442	495	2,749	4,343
Historic Funding Sources	4,606	866	0	-0	0	5,472
Total	4,606	1,846	552	1,067	4,858	12,928

- 6.2 Part of the increase in total project costs (\$26m) represents a different approach to the classification and treatment of operational costs between the JV and Council. Council does not include operational costs in its capital budgets but expenses them when they occur. The JV proposes that all costs through to completion of the dam be treated as capital.



WAIMEA DAM PROJECT REPORT

- 6.3 Councillors should note that the original estimates date from circa 2010 and have been updated since then. As has been noted in the past, the P₉₅ confidence level was on the construction cost component only.
- 6.4 The immediate focus of all parties is on finding ways to close the current funding gap. If that is to be achieved it will require some compromises all round.
- 6.5 One of the options available was to apply to the Government's Provincial Growth Fund. This has been undertaken with an application for a funding grant of \$18m lodged on 30 July 2018.
- 6.6 A Council decision to put an immediate stop on Council spending on the project, while being premature, would also not be possible to give immediate effect to as Council has entered into binding agreements and contracts covering many of the work streams. A decision to stop spending would result in destabilisation of the project and it would not meet critical timeframes.

7 The Council Controlled Organisation and Commercial Terms

- 7.1 Work on the various documents to establish the CCO and give effect to the JV agreed terms continues. Initial drafts of key documents have been produced and are being reviewed by all parties. This work has been delayed by the need to focus on the ECI process. The term sheets remain commercially confidential. They have, however, been made available to Councillors on request, on a fully confidential basis.
- 7.2 By way of a reminder the project documents comprise -
 - 7.2.1. Direct Deed
 - 7.2.2. Project Agreement
 - 7.2.3. Shareholders Agreement and CCO Constitution
 - 7.2.4. Wholesale Water Augmentation Agreement and 'downstream' agreements
 - 7.2.5. Documents relating to the CIIL/WIL facility
 - 7.2.6. Documents relating to the CIIL/Council environmental loan facility
 - 7.2.7. Credit Support Agreement.
- 7.3 A number of these documents are likely to be impacted by the commercial arrangements surrounding closing the \$26m funding gap. Notwithstanding that, we will continue with our JV partners to work to complete key provisions in the documents. This is to ensure that a 15 December 2018 financial close can be met.



WAIMEA DAM PROJECT REPORT

8 Construction - Early Contractor Involvement Process and Outcomes

- 8.1 The Early Contractor Involvement process was established to:
- 8.1.1 Provide contractor input to aid the designer in detailed design;
 - 8.1.2 Determine the construction methodology and programming;
 - 8.1.3 undertake value engineering;
 - 8.1.4 determine the construction risks and mitigation measures; and
 - 8.1.5 provide a robust construction price.
- 8.2 As the detailed design reached a conclusion the methodology and design criteria were incorporated into a schedule to be priced. The Contractor (Fulton Hogan Taylor Joint Venture - FHTJV) and the Independent Estimator (BondCM) independently priced the schedule utilising the design methodology that had been developed.
- 8.3 The price exchange took place on 29 June 2018 under probity conditions. The two parties then proceeded to review each of the items within the schedule to determine where there were differences and try and align those differences to reach an indicative construction price.
- 8.4 The direct cost items within the schedule were agreed between the ECI contractor and the Independent Estimator on 6 July 2018. Since that time the non-direct cost matters, that can only be addressed after the direct cost pricing is agreed, have been given further consideration and assessment.
- 8.5 Currently the FHTJV boards are confirming their company's willingness to enter into the Construction Contract. They have yet to confirm that the agreed prices for the direct cost items and the proposed sharing of liabilities for items, such as risk allowances and inflation, are formally accepted.
- 8.6 The Price Exchange values for construction, along with costs identified for wider aspects indicate that the total project cost will be significantly above the funding budgets used by TDC and WIL.
- 8.7 The following table outlines the construction price derived from the ECI process.

Table 8.7 - Outlining the Construction Price

Item	Revised April 2015 - Estimate	ECI Agreed Dam Construction Price	Variance	Commentary
Environmental	595,000	1,254,048	(659,048)	The Resource Consent had been granted when revised estimates were derived in April 2015 but was subject to appeal to the Environment Court, all appeals being resolved in July 2015. Additional conditions were imposed as a result of this agreement that were not included in the April 2015 estimate. The conditions require extensive monitoring and environmental controls. The equipment and site infrastructure provisions are significant. Costs have increased since 2015.

Page 5



WAIMEA DAM PROJECT REPORT

Diversion Works - Construction Contractor Design and Build	6,686,395	8,959,095	(2,272,700)	The diversion works were in the 2015 estimate were preliminary design only. The detailed design and actual works have proved to be more expensive.
Earthworks	8,438,906	10,977,987	(2,539,081)	Additional earthworks associated with the increased volumes of cut and rock processing as defined by T+T's revised specification during the Stage 4 design. Some 90,000 tonnes more aggregate to process and place compared to the 2015 estimate.
Slope Protection	294,814	2,688,758	(2,393,944)	Additional permanent slope stabilisation works are required compared to what was allowed for in the 2015 Estimate (900m ² in 2015 Estimate and 2800m ² in detailed design). In addition the 2015 estimate made no allowance for temporary slope protection while works are being carried out on the downside of the right-hand slope (Health and Safety requirements).
Concrete Works	15,040,201	16,747,075	(1,706,874)	The 2015 estimate did not allow sufficient for concrete delivery. There are also slightly increased volumes of concrete. The lower rate and higher volumes result in the increased cost.
Mechanical and Electrical	2,637,069	5,600,000	(2,962,931)	The 2015 estimate did not specifically include electrical, communications or instrumentation. The design for the Mechanical and Electrical (M&E) was not required at the time and it was assessed that the requirements would be fairly simple and low cost. There were increased requirements for monitoring (requiring increased equipment such as sensors), increased instrumentation and logic, increased communications and system resilience. The main penstock and pipe work only had an outline design, and this was not improved upon until late in the detailed design process. The pipe work and pipe fixing design is heavier and more complex than anticipated in 2015.
Testing & Commissioning	38,700	233,257	(194,557)	The 2015 estimate did not include sufficient for this item. The M&E design is now more sophisticated and requires much more attention during the testing and commissioning phase. It is also likely the original estimate did not allow for the time delays that are likely to occur while the dam fills. The M+E equipment cannot be commissioned until all the different dam level scenarios have occurred naturally.
Preliminary & General (P&G) & Contractor's Margin	13,882,569	20,103,969	(6,221,400)	Contractors P&G pricing has increased sharply over the last few years due to changes in the risk profile within the construction market. This reflects the greater risk in the market (reflecting the demise of Fletcher Construction and Hawkins Construction), The increased liabilities carried by the contractor, increased Health and Safety requirements, increased cost of on-site supervision. This remote work site results in some inefficiencies compared to other sites. A portion of the increase is the contractor's margin which was confirmed as a percentage with their tender.

**WAIMEA DAM PROJECT REPORT**

FHTJV allowance for Scope Creep during Construction	0	50,000	(50,000)	This is a FHTJV contingency in addition to its own risk allowance.
Contractor's Risk Allowance	0	1,500,000	(1,500,000)	The risk carried by the contractor.
Estimated Items Priced, now within other Items of ECI	2,186,346		2,186,346	Some items originally estimated have been included in other items in the ECI pricing
Totals	49,800,000	68,114,189	(18,314,189)	

9 Construction Price vs Previous Estimates

9.1 The project estimates have been developed and updated since they were first developed in 2012. The following table summarises that development.

Table 9.1 Outlining the Chronology of Construction cost summary

Year	Design Phase	Party responsible for cost estimate	Construction cost	Comment
2012	Stage 3 Design Phase (12 September 2012)	Tonkin and Taylor with Fletcher Construction as a sub-consultant	Base Const - \$53.565m P50 - \$58.1m P95 - \$72.7m	There were a large number of exclusions that T+T recommended WWAC make allowance for. These included: <ul style="list-style-type: none"> • Dam power supply • Reservoir clearance • Inflation • Road access • Landowner access and land purchase • Project management costs • Consent compliance costs • Principals' costs
2014	Resource Consent Phase	NA	NA	No costings or design was undertaken at this
2015	Beca Cost Review Phase (12 May 2015)	Beca and BondCM	Base Const - \$49.8m Other - \$19.2m Total - \$69.0m P50 - \$74.3m P70 - \$77.0m P95 - \$82.5m	The other estimate included; <ul style="list-style-type: none"> • Vegetation clearance (\$1.2m) • Forestry Roads and power (\$0.8m) • Sunk Costs (\$6.6m) • Inflation (BERL 2014) (\$3.2m) • Land purchase & Agreements (\$2.0m) • Project management costs and Consulting Fees (\$5.4m)

Page 7



WAIMEA DAM PROJECT REPORT

Reasons for the price being higher than expected

- 9.2 The primary reasons are (some of which are inferred in the table above);
- 9.2.1 The current construction market has hardened partly due to inflationary pressures and partly in response to the risk and liability climate within the construction market.
 - 9.2.2 The detailed design increased the scope of work that was the basis of the preliminary design undertaken in 2011.
 - 9.2.3 The cumulative effect of the additional work content and the increase in the design standards for dams.
 - 9.2.4 Meeting additional consent conditions (post April 2015 estimates);
 - 9.2.5 The increased health and safety requirements on projects. For this project it impacted when assessing the need to work beneath high exposed rock faces.

Inflation Allowance

- 9.3 The inflation allowance in the 2015 estimate was \$3.2 million. This was to cover the inflation over the duration of construction with construction starting in 2016 and dam commissioned in 2019. Inflation allowance was applied to the construction components and no specific inflation allowance was made for other items.
- 9.4 The 2015 estimate of \$3.2 million will have already been reflected in the current ECI pricing.
- 9.5 With the project now not likely to commence construction until 2019, it is necessary to make another allocation for inflation that occurs from now until commissioning. The project cash flow will need to be used to predict this more accurately. FHTJV are still finalising the project cash flow. In the meantime we have assessed an allowance of \$3.266 million for inflation. The allowance assumes minimum delay in construction start and that construction pricing stabilises rather than continuing to trend as it has in the last 3 years.
- 9.6 A fundamental decision remains as to who carries the risk of inflation, Waimea Water or FHTJV? The FHTJV may be prepared to provide a fixed price, in effect pricing for the inflation and carrying the risk/opportunity of it going over/under their estimate. This would add to the construction cost of the project and negate any potential upside. Should Waimea Water carry the risk then payment would be made quarterly during the construction phase and be based on actual CCI figures published by Statistics New Zealand. This still has to be confirmed as the cash flow for the project is still to be assessed.
- 9.7 It should be noted that the inflationary effect on project delays is in the order of \$80,000 per month.

Developments that have increased construction costs

- 9.8 There are other factors that have impacted on the construction costs.

NZSOLD Guidelines

- 9.9 The New Zealand Society of Large Dams (NZSOLD) publishes guidelines for the operation and construction of Dams in New Zealand. The guidelines were substantially updated in May 2015. This was after the Beca/BondCM price estimate was prepared. The revised guidelines were fairly apparently influenced by the Christchurch earthquakes. Other standards were also revised, and design of structures and construction methodology has become more stringent.



WAIMEA DAM PROJECT REPORT

It has been estimated by, BondCM, that the effect if the more stringent design alone added circa \$2 million directly to the construction cost.

Health and Safety Regulation and Practices

9.10 The sharply increased Health and Safety standards applying to construction result in increased direct expenses for contractors. In addition, on this particular dam design there are some areas that have been upgraded to allow for the current interpretation of what is required. Examples are:

- 9.10.1 The diversion culvert that carries the pipes under the dam was, in the 2015 the Beca/BondCM price estimate, assumed to be ventilated by temporary fans. This assumed that, on the infrequent occasions staff are required to enter it after the dam begins operation, will have temporary fans placed. Currently, it has been priced with fixed fans built in during construction.
- 9.10.2 The right-hand embankment at lower levels becomes covered by the dam as construction rises. However, the contractor identified a potential risk of rock fall and has priced in substantial bank stabilisation works that are only of benefit during construction.

Unit Rates and Scheduled Quantities

9.11 In several instances the 2015 the Beca/BondCM estimate had unit rates and quantities that were lower than the detailed design outcomes. The cumulative effect of unit rate increases and quantity increases has elevated the final price. This can be seen in the table outlining the construction price above.

10 Other Project Work Stream Outcomes

- 10.1 The construction price is the main component of the project costs, however there are other work streams that are part of the whole project. The risk allocation portion is also subject to further negotiation with FHTJV.
- 10.2 There has been significant rigor put into finalising the estimates for the other work streams. Some are directly affected by the ECI process as they components are included in the construction contract. The remaining uncertainties are not very material and the information below provides a reasonable assessment of the final position.

Table 10.2 Outlining the Price Variance Compared to the April 2015 Estimate

	April 2015 Estimate	Estimated Final Project Cost	Variance	Commentary
Procurement, ECI Phase, Design, Project Office	5,400,000	6,091,542	(691,542)	Design costs significantly over budget (\$1.3m budgeted, currently sits at \$2.6m). Significant savings have been achieved in all other areas but not enough to offset the design overspend.



WAIMEA DAM PROJECT REPORT

Land Access and Purchase	2,000,000	3,216,202	(1,216,202)	Additional costs due to additional roading provisions agreed with landowners during access and purchase negotiations
Governance & Company		1,602,875	(1,602,875)	No allowance was made in the 2015 Estimate. Likely to have been assumed to be treated as OPEX. 1. WW Directors fees and expenses during construction - budgeted \$471,000 2. CCO formation costs - budgeted at \$100,000 3. Costs associated with debt funding - budgeted at \$200,000 (Note the comment in the Potential Price Reduction section below, it is likely that the budgeted expenses in 2. and 3. are very conservative). CCO formation costs - budgeted at \$100,000 4. Construction Insurance Premium of \$650,000.
Dam Construction	49,800,000	68,114,189	(18,314,189)	Detailed in table above.
Escalation/Inflation	3,200,000		3,200,000	The 2015 estimate assumed construction completion 2018/19. Construction industry inflation has run well above CPI and the \$3.2m inflation allowance in 2015 estimate will, at a minimum, have been reflected in present pricing.
Escalation/Inflation (Approximate as at July 2018)		3,266,000	(3,266,000)	A further allocation for inflation construction completion has been made at \$3.266m.
Total Contingency Allowance in the 2015 Estimate	13,500,000	(See the 2 Items Below)	These Items are not strictly comparable because the 2015 estimate provided the contingency for a range of matters that will have been	This was included as a single figure to make an allowance for pricing uncertainty and items that had not at that stage been identified.
Risk Allowance (Approximate as at 16 July 2018)		6,546,000		Includes value of risks being carried by Waimea Water. comprising; 1. Flood Risk \$1.67m 2. Shared Risks \$0.438m 3. Measurable Items \$0.456m 4. Waimea Water Risks \$3.982m



WAIMEA DAM PROJECT REPORT

Contingency Allowance (Approximate as at 25 July 2018)		2,000,000	absorbed into the 2018 ECI pricing.	Allowance for costs that cannot be reasonably foreseen.
Site Access, Clearing, Roading	2,000,000	4,183,728	(2,183,728)	Site Access Road design and upgrade completed following geotechnical surveys. Identified that significant slope stabilisation measures are required. Site Access Road upgrade required to facilitate two-way traffic in order to avoid conflicts with foresters. Vegetation Clearance Costs increased following a survey and an acceptable site clearance methodology.
Construction Related Professional Services		4,708,780	(4,708,708)	No allowance was shown explicitly in the 2015 estimate: 1. T+T Onsite QA 2. Engineer to the Contract This item was likely to have been considered as an overhead and/or to have, at least for some line items, considered as overheads and/or OPEX.
Meeting Consent Conditions and Compliance		1,122,472	(1,122,472)	This was over and above allowance made in 2015 estimate for the direct expenses incurred in meeting Resource Consent conditions and monitoring environmental matters. (Note this is the WW responsibility area - FHTJV have priced their obligations in Dam Construction)
Sunk Costs - To recognise expenses incurred by TDC prior to formation of WW		1,320,109	(1,320,109)	This sum represents some costs incurred by TDC between 2015 and the formation of Waimea Water Joint Venture in 2017.
Totals	75,900,000	102,171,897	(26,271,897)	

NOTE: The assessments that appear to be down to the nearest dollar should not be taken literally. This is the result of the Work In Progress on these figures being continually reconciled as a quality check.



WAIMEA DAM PROJECT REPORT

Potential Price Reductions

- 10.3 Since the Price Exchange occurred, work has been done to identify potential price reductions. Extensive and interactive work has been undertaken from early stages of the detailed design work to identify cost effective design solutions. More recently, the thorough ECI process has identified further efficiencies and cost savings. Any further potential price reductions are therefore not likely to be significant and will require further detailed work with key parties to lock them in.
- 10.4 In total the potential price savings identified amount to some \$4.8 million. In practice not all of these will be achieved. If we achieve, say 66% of these savings, then we will have savings of around \$3.2 million.

Opportunities

- 10.5 It should be noted that there are some opportunities for the final project cost to come in less than the \$102.2 million identified. These opportunities include:
- 10.5.1 The potential to sell trees from the clearance works.
- 10.5.2 The possibility that inflation is less than forecast. This is provided that Waimea Water accepts the quarterly formula payment method, rather than fixing it in the contract price (not decided as yet).
- 10.5.3 The possibility that uncertainties allowed for do not eventuate, i.e. the risk allowance of \$6.546 million proves to be conservative - higher than is actually required at project completion).
- 10.5.4 The possibility that the Contingency allowance of \$2.0 million proves to be conservative - higher than is actually required at project completion.
- 10.5.5 Without the final inputs awaited from the FHTJV for the above aspects, it is difficult to provide an estimate based on logic, however these aspects when combined would be very unlikely to exceed, say, \$4.0 million.
- 10.6 Combining the Price Savings and Opportunities assessment above indicate that a maximum of \$7m can be identified. While significant, this sum does not materially change the position.

Construction Contract Price - FHTJV

- 10.7 The indicative price for the construction of the dam is outlined above and totals \$68.114m. The ECI process identified some physical works in the other project work streams that would be more cost-effectively undertaken by the FHTJV. These are outlined as follows;

• Dam Construction	\$68.114m
• Access Roads for Landowners	\$1.213m
• Site Access, clearing, roading	<u>\$4.183m</u>
Contract Price	\$73.510m (excl GST)

- 10.8 This indicative price of \$73.150m is subject to further discussions and confirmation of risk allocation and inflation.



WAIMEA DAM PROJECT REPORT

11 Risk Identification, Assessment and Treatment

- 11.1 A Risk Register was developed early in the ECI process. Currently there are 155 risks remaining on the overall Risk Register. This number varied during the ECI process as new risks were identified and others were mitigated and closed. Most of the risks identified were treated during the development of the construction methodology.
- 11.2 Often it is possible to engineer out the risks that are identified. In other cases, it is a matter of assessing the best technical solutions that minimise the residual risk and establishing most likely volume/cost, along with a minimum and probable maximum volume/cost. When these figures are then applied across the project, a robust total outturn price can be established.
- 11.3 Each risk was allocated to the party that could manage it most appropriately. There is a selection of the Waimea Water company risks and the Fulton Hogan Taylor Joint Venture construction level risks.
- 11.4 The Risk Register has been developed as follows;
- 11.4.1 Each risk title is identified and listed with a description;
- 11.4.2 For each risk title a raw risk (consequence and likelihood) is quantified and shown as "Pre-mitigation Risk Score."
- 11.4.3 As the treatment of the risk is developed the spreadsheets are updated, indicated as "Residual Risk."
- 11.4.4 Then during the detailed commercial and engineering phases of the ECI process, there is a constant discipline and routine of working through and revising the Risk Register. This provides the most benefit to the project. This discipline and routine maintains a very necessary focus on dealing with all the risks that are identified as the technical work proceeds.
- 11.5 The Risk Register used by FHTJV during the ECI phase is also being used by Waimea Water. Using a single method allows the same statistical treatment of across the whole project. As the Risk Register matures, it provides the inputs for statistical analysis. FHTJV is using a well proven tool for this work.
- 11.6 Aside from the Waimea Water company risks there are other risk categories applying to the Construction Activities. These are:
- 11.6.1 Risks Assigned to the Construction Contractor
- Generally, the risk resides with the party that is best able to manage it. In this class of project this is often the contractor when focusing on the construction methodology.
- 11.6.2 Risks that remain with Waimea Water
- There are some aspects of the dam construction that are not able to be determined until the work is under way. The experienced designers (Tonkin and Taylor) have undertaken considerable work, including bore hole sampling, to determine the most likely situation. It is therefore more cost effective for Waimea Water to make financial provisions for covering the variable work content.



WAIMEA DAM PROJECT REPORT

11.6.3 Shared Risks

Some of the variables identified can have cost savings as well as potential over-runs. The most equitable way to handle these is to share in both the potential savings and the potential cost increases. This has the benefit of placing a mild incentive on the contractor to find innovative solutions for problems as they are identified.

- 11.7 In all the categories, creating a robust Risk Register followed by sound analysis provides a high level of certainty at the project level that the risks have been treated and due financial provision is made to handle them within the project outturn pricing.

12 Current Work Streams

- 12.1 The Early Contractor Involvement Process has largely been completed. The work streams that are still progressing and committing cost to the project are;

12.1.1 Project Office (circa \$40,000 per month);

12.1.2 Dam Designers that are completing the following tasks as part of the project (\$400,000 over next 2 months);

- Detailed Design Report (almost completed);
- Mechanical & Electrical Design and Design Report;
- Detailed Design drawings and specifications
- Peer review and Peer Review Report
- Building Consent Application
- Finalised Safety in Design Register
- Failure Mode Effect Analysis
- Test & Commissioning Plan
- Updated Emergency Action Plan
- Updated Operational & Maintenance Manual

- 12.2 There are other work streams that are currently not incurring additional cost. If and when the funding gap is resolved then these work streams will be need to be activated so that the project can be progressed to financial close. These work streams comprise development of contract documentation for the construction, setting up the Council Controlled organisation and other specialists required to facilitate progress to financial close.



WAIMEA DAM PROJECT REPORT

13 Land and Access

- 13.1 This work stream is progressing. The Local Bill covering the DOC land has been covered earlier in this report, and the process was detailed in the project report to the 24 May 2018 Council meeting. Negotiations with Ngati Koata are continuing with good progress. Following meetings and discussions with Ngati Koata, a draft agreement has been prepared for their consideration.

14 Hydroelectric Power Generation

- 14.1 At its meeting 28 June 2018 Council noted that progressing with detailed design and marketing scenario assessments for the hydro generation option would be delayed until the dam project was approaching financial close.
- 14.2 No further progress has been made on this work stream. Inclusion of hydro generation in the project will form part of the final negotiations with our JV partners.

15 Options for the Project

- 15.1 Options will be examined as fully as possible and presented at the Full Council meeting scheduled for 28 August 2018.
- 15.2 There are essentially two options for the Waimea Community Dam project;
1. progressing with the project;
 2. not progressing with the project.
- Both options have consequences.
- 15.3 **Option 1 - Progressing with Waimea Community Dam Project**
- 15.3.1 Funding the financial gap – Staff are currently working with the JV Partners in an endeavor to find a solution to the funding gap. This is likely to require some compromise by all parties, however staff will report back on any options developed.
- 15.3.2 Progress project to financial close by 15th December 2018. There are several work streams that need to be progressed to a conclusion for financial close.
- 15.3.3 In considering its options Council will need to take cognisance of the alternative options. The following two tables outline the option affordability and compliance analysis that was part of a presentation to Council in July 2017.
- 15.3.4 The estimates developed for these options were preliminary only. Although many of the alternatives had been included in various consultant reports previously, they had varying degrees of scope and costings. Direct comparisons in regard to cost without examining what is being costed cannot be done with confidence.
- 15.3.5 The following table 14.2.5 outlines each of the alternative options reviewed in July 2017, showing the storage (m3), Capital Cost (\$), Operational Cost (\$ p.a.), Daily flow (m3/day) and the capital cost per m3/day delivered to the urban supply.

WAIMEA DAM PROJECT REPORT**Table 15.2.5 – Outlining the Capital Cost per (\$'000/m3) of Daily Supply****Option affordability analysis**

Water Augmentation Options	Storage (m3)	Capital Cost (\$'000)	Opex (\$'000 p.a.)	Daily Flow (m3)	Capital Cost/Daily Flow (\$'000/m3 per day)
Waimea Community Dam	13,000,000	\$25,000	\$714	31,000	0.81
Riverside Storage	500,000	\$24,600	\$788	4,000	6.15
	800,000	\$54,000	\$2,297	13,000	4.15
	1,400,000	\$84,000	\$3,498	20,000	4.20
	2,300,000	\$108,000	\$5,024	31,000	3.48
Motueka Aquifer	Aquifer	\$35 – \$40,000	\$750	5,900	6.36
	Aquifer	\$100 – \$120,000	\$1,600	13,000	8.46
	Aquifer	\$160 – \$200,000	\$2,800	31,000	5.81
Roding River Storage	4,000,000	\$120,000	\$3,600	30,000	4.00
Teapot Valley Dam	500,000	\$46,150	\$1,111	4,000	11.54

Note: The Waimea Community Dam capital cost of \$25m addresses both urban and river flow requirements, the other augmentation options only addresses urban requirements

Note – this is taken from a presentation to Council 27th July 2017

15.3.6 It is important that the value proposition of the Waimea Community Dam Project is given context compared to the other alternatives. The following table 14.2.6 demonstrates the compliance of each of the alternatives against specific parameters of risks, benefits, disbenefits and strategic fit.

Table 15.2.6 – Outlining the Capital Cost per (\$'000/m3) of Daily Supply



WAIMEA DAM PROJECT REPORT

Option compliance analysis

Green – Low risk/compliant Orange – medium risk/marginally compliant Red – high risk/not compliant

Option	Daily Flow (m ³ /day)	Risks				Benefits					Disbenefits			Strategic Fit			
		Consentability	Constructability	Operability	Land/Access	Regional	Urban	River Flows	Irrigators	Wider District	Harvesting Impact on others	Economic Opportunity	Cost	Meets Growth Demands	NPS- FWM Obligations	LTP 2015-2025 Objectives	Council Vision
Waimea Community Dam	37,000	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
River Storage	4,000	Green	Green	Green	Green	Red	Green	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red
	13,000	Green	Green	Green	Green	Red	Green	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red
	20,000	Green	Green	Green	Green	Red	Green	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red
	31,000	Green	Green	Green	Green	Red	Green	Red	Red	Red	Red	Red	Red	Green	Red	Red	Yellow
Motueka Aquifer	5,900	Green	Green	Green	Green	Red	Green	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red
	13,000	Green	Green	Green	Green	Red	Green	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red
Teapot Valley Dam	30,000	Green	Green	Green	Green	Red	Green	Green	Red	Red	Red	Red	Green	Red	Red	Red	Yellow
	4,000	Green	Green	Green	Green	Red	Green	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red

Note – this is taken from a presentation to Council 27th July 2017

- 15.3.7 It is recommended that before any decision is made regarding the dam project that one or two of these key alternatives be further assessed to confirm the scope and estimates in the context of the required deliverables. It is recommended that the two Riverside Pond options comprising the 500,000m³ storage and the 800,000m³ storage be assessed further.
- 15.3.8 In addition it is recommended that other considerations also be given further detail and explanation in the report for 28 August 2018. These comprise;
 - Unaccounted for water
 - Domestic water conservation measures - tanks
 - Nelson City Council position servicing Nelson South and industrial area

Not progressing with Waimea Community Dam Project

Funding

- 15.4 The project will lose \$59.12 million funding (loan, grant or equity) from agencies other than Council ratepayers;
 - CIIL loan funding - \$22.12 million to WIL,
 - CIIL loan funding - \$10.0 million to Council
 - Waimea Irrigators Ltd equity funding - \$15.0 million
 - Ministry for the Environment grant funding - \$7.0 million
 - Nelson City Council equity funding - \$5.0 million



WAIMEA DAM PROJECT REPORT

Determine Alternative Water Augmentation Option

15.5 An alternative water augmentation options will need to be determined and initiated. The steps are likely to be;

- Review alternatives for urban water (may need to consider river flow and irrigator solutions as well);
- Undertake more detailed assessments;
- Risk profile of alternatives;
- Timing of alternatives
- Assessment need for land purchase (PWA)
- Acquiring consent(s)
- Detailed design
- Procurement
- Timing (potentially five years to commissioning)

15.6 Given the lead times to undertake all these steps it is likely to take at least 5 years to commission any alternative.

15.7 In the meantime to the community will be subject to the 'no dam' TRMP requirements.

Council's role as the regulatory authority

15.8 There are the following implications of not progressing with water augmentation;

- a) Council would be expected to withdraw the current plan change 67 which seeks to delay the implementation of the 'no dam' provisions of the TRMP by one year (1 November 2018 to 1 November 2019).
- b) Council would have to release the decisions on the 329 water permits on the Waimea Plains on the basis of the 'no dam' TRMP provisions and following the results of the bona fide reviews. This will result in reductions in pre-plan change allocations as shown in the following table.

Percentage of permits affected (number of permits affected)	Percentage of reduction in current allocation
4% (14)	100%
13% (43)	50%-99%
34% (112)	20%-49%
27% (88)	1%-19%
22% (72)	No change

However, overall the bona fide review only managed to reduce over-allocation by 27.2% and the reduction target from the 2013 allocations required in the TRMP is 42%. If Council were



WAIMEA DAM PROJECT REPORT

to manage the water system to achieve the 800 l/sec minimum flow, permits would have to be cut back by this amount.

- c) To give effect to the National Policy Statement for Freshwater Management, the Council would be expected to move to resolve any inconsistency around minimum flow by way of a plan change. Given the 800 l/sec standard is only 63% of the Mean Annual Low Flow (MALF), the Council may come under pressure to change the TRMP to ensure compliance with the NPS-FW. There may be other drivers for a plan change also which will come with significant litigation risk either way.
- d) Implementation of the new permit allocations, together with the new rationing restrictions which will come in earlier than in the past, will severely impact on water users in the event of a dry summer. Based on past trends, water users will be subject to 50% cuts for between 5 and 104 days each year (av. 28 days/year). This would impact the smaller more vulnerable extractors
- e) The Council will likely have to allocate more resources to monitoring and enforcement as water abstractors seek to optimise use of scarce water over summer. There is an existing history of over-takes during restrictions, and this will only increase. Council will have to take enforcement action to ensure compliance.

Council's role as Community Water Supplier

15.9 The challenges of not having the dam as a water augmentation solution is summarised as follows. These would apply until at least a water augmentation solution is commissioned;

- f) The Council, as community water supply authority, during restriction will have to achieve a 25% cut based on the previous 8 years usage rates, at the same time other permit holders are under 50% restrictions (which will occur every 9 years out of 10). The Council will have to impose restrictions on consumers in order for it to comply (Water Bylaw currently undergoing consultation). Because actual growth in water demand, actual reductions will need to be higher for customers in order to achieve the 25% reduction at Stage 3. In the worst case scenario, when there are cease take directions, the residential areas of Richmond, Brightwater and Mapua would potentially face its own "Cape Town" situation and the most likely outcome is that people will collect water from tankers.
- g) Urban development would be confined to the 2013 residential zoning envelope in Richmond, Brightwater, and Mapua. Until Council commissions a water augmentation solution it will not be able to plan for future growth. Land that has a deferred zoning for water services (including the recently advertised land Brightwater) will not be able to be developed in the absence of sufficient water.
- h) Council will not be able to connect any new industry that uses more than 15m³ of water per day.
- i) The Council will likely have to allocate more resources to monitoring and enforcement of water use during periods of rationing. There is an existing history of over-takes during restrictions, and this will only increase. Council will have to take enforcement action to ensure compliance.

**WAIMEA DAM PROJECT REPORT**

- j) Council will have to find an alternative supply option to cope with the risk of restrictions as well as catering for increased urban demand.
- k) Council will have to reconsider the supply of water to Nelson City (Nelson South and the Industrial Area) as provided for in the current Supply Agreement if it meant a denial of water to Tasman residents.

16 Options for the Project

16. It is possible that Council may be invoked to make a decision to end the project at the next Full Council meeting on 9 August 2018. Given the duration, cost and significance of the project, we have legal advice on the implications of making a decision without having full information and considering advice on the issues. The advice from Simpson Grierson is outlined below.
- i. *Consideration should be framed around first principles. These are set out in the principles in section 14 of the Local Government Act (LGA), the decision-making requirements of sections 76 to 82, and the prudential financial management requirements of section 101.*
 - ii. *The first principle in section 14(1)(a) is to conduct the Council's business in an open, transparent and democratically accountable way and give effect to identified priorities and desired outcomes in an efficient and effective manner. Through successive consultations, the Council has set a course towards a water augmentation scheme to achieve certain objectives. Those objectives remain and the Council's response to the pricing development should be guided by efficient and effective delivery. In a similar vein, section 101(1) requires the Council to manage its general financial dealings prudently and in a manner that promotes the current and future interests of the community.*
 - iii. *The fundamental decision-making obligations in section 76 are to identify and assess the reasonably practicable options for achieving the objective of a decision and to consider the views and preferences of interested and affected persons (in proportion to the significance). In the present case, the objective of the decision properly before the Council now is to determine how to respond to changed pricing information. In the context of the history of this matter, this has at least medium significance, suggesting a material level of compliance is appropriate. It certainly does not lend itself to an opportunist, reactive decision that could be irreversible and costly to the overall attainment of the desired outcomes.*
 - iv. *The Council must make decisions about its response to the pricing information based on officer reports outlining options, implications and views of affected parties (to the extent they can be obtained). That could reasonably be achieved by 28 August 2018, but not by 9 August.*
 - v. *If the Council were to make a decision to terminate the project on 9 August 2018 (without full information and considered advice on the issues), that decision would be open to judicial review as a breach of the Council's statutory decision-making obligations. A precipitate decision, against the background of years of engagement and decision-making, would also appear irrational which would be both a breach of statutory and common law obligations.*



Report to Full Council Meeting - 9 August 2018

WAIMEA DAM PROJECT REPORT

17 Attachments

Nil