Tasman Resource Management Plan

Waimea Water Management and Augmentation (Lee Dam)

Policy Options Paper
(Including draft Plan changes based on preferred options)

Report EP13/02/14

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1. **Introduction**

There is insufficient water in the Waimea Water Management Zones to meet existing demand for abstractive water at a suitable security of supply or to meet future needs for irrigation, urban and industrial water supply.

The Council has interim water management provisions for the Waimea Plains that reflect the importance of investigating water augmentation options as a solution to the serious water shortage issues already experienced in the plains, as well as the need to address potential future water demands.

Water augmentation investigations were managed by the Waimea Water Augmentation Committee and have now almost been completed with the finding that a community augmentation dam on the Lee River is the most efficient and effective water augmentation option for the Waimea Plains.

1.1 **Purpose of Policy Paper**

This policy paper describes the issues arising in relation to the construction and operation of an augmentation dam as well as the issues arising if no dam is constructed. It provides a range of options for managing these issues, identifies a number of recommended options and provides the drafting instructions that would give effect to them.

1.2 **Statutory Framework**

The main relevant legislation is the Resource Management Act 1991 and its purpose is to promote sustainable management of natural and physical resources.

The sustainable management definition in Section 5(2) of the Act includes ‘managing the use, development and protection of natural and physical resources...’ People should be able to meet their needs as long as they do not compromise the life-supporting capacity of the earth’s ecosystems, nor the ability of others to meet their needs now and in the future.

The RMA contains restrictions on the taking and use of water, damming and diverting water, activities carried out in the beds of rivers, and management of water quality. It allows Council to manage and regulate these activities as well as the use and development of land.

The Council’s TRMP already contains provisions concerning water management, including policies recognizing the range of benefits arising from augmentation of water in water short areas.

There is also a National Policy Statement for Freshwater Management (NPSFM) 2011 developed under the RMA which the Council is required to give effect to. The objectives of the NPS include safe-guarding the life-supporting capacity, ecosystem processes and indigenous species in sustainably managing land, water use and contaminants.

This NPSFM requires Councils and their communities to identify management objectives for water in relation to both quality and quantity of freshwater and to set limits and allocation regimes that enable those objectives to be met. Over-allocation where it exists must be phased out to enable water management objectives to be met. The plan change must not be inconsistent with this the NPSFM.

This NPSFM also addresses the integrated management of resources, including managing the adverse effects of intensive land uses on water quality. It requires Councils
to improve the integrated management of freshwater and the use and development of land in catchments, including the interactions between land and water.

The Local Government Act is also relevant in relation to development of new infrastructure. The Council is responsible for a wide range of local services and infrastructure including roads and water reticulation, community and economic development, and town planning.

Councils have extensive discretion in relation to activities they undertake, as long as they have consulted their communities in making the decision. Any decisions to fund and construct a dam on the Lee River will be subject to the requirements of the LGA and are reflected in the Council’s Long Term Plan and Annual Plans. These planning processes are separate to but aligned with any decisions in relation to water management in the Waimea plains.

Council will work with the Waimea Water Augmentation Committee, and consult with other interested parties, to refine the funding model and costs of the project through the Council’s annual and long term planning processes.

2. History of Management Options


In the two following summer seasons of 2000/2001 and 2002/2003 the Waimea Plains experienced severe droughts (23 and 6 year return periods respectively, based on averaged 7-day low flows experienced at Wairoa Gorge).

The 2000/2001 drought was the first significant drought since 1983, and the first time that users experienced serious rationing as per plan and water permit provisions.

The river flow, groundwater level, river bed level, water use and coastal well salinity information collected during these droughts contributed to a review of the groundwater model for the Waimea using more up-to-date data. This included more detailed computer modeling to better explain the groundwater and river flow interactions, especially during low flow conditions.

The revised modeling showed that, as the river flows drop, the connection between river flows and groundwater is much more critical than previously modeled. It is now evident that to maintain residual flows and an adequate security of water supply for water users during a drought there is much less water available for abstraction in the Waimea Plains system than previously understood.

The current and potential future pattern of water demand and use has significant implications for:

- security of supply for water users,
- the maintenance of minimum river and spring flows for instream values,
- coastal seawater intrusion risk.

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• meeting future water demand including for urban and industrial development
• enabling productive use of land including both irrigated and currently un-irrigated land.

2.1 TRMP Provisions - Water Allocation

Prior to 2001, water management in the Waimea Plains had been guided by (informal) water management plans that had been prepared before the RMA was enacted. The first of these was prepared in 1986 when restrictions on the issuing of new water permits in the form of allocation limits were first introduced in some water management zones of the Waimea Plains. By the time of the 1996 plan, the plains water resources were fully allocated.

The Council reviewed and updated those provisions according to RMA process and principles for the Plan change in 2001. Some of the new provisions included soil based application rates for irrigation and different rationing and flow management provisions for the Waimea River as well as allocation limits and measures to prevent further allocation of water.

The first (informal, pre RMA) water management provisions in 1986 aimed at maintenance of a 225 l/sec low flow upstream of the Appleby Bridge. This flow was an arbitrarily adopted limit and based only on the previously lowest flow recorded and level of authorised use in the Waimea River at that time. It had no consideration of any other water body values and uses.

The proposed changes to the TRMP Plan in 2001 sought to maintain a 500 l/sec low flow and introduced a new rationing regime that would have maintained higher flows in the river for longer periods.

After experiencing the 2001/01 drought, and in view of the impacts on water users and on the river uses and values under the previous pattern of water allocation and use and in the absence of any other action, the resolution of a suitable minimum flow for the Waimea would have been a complex and challenging problem.

Furthermore, under drought conditions, there is not enough water to satisfy both abstractive demand to a reasonable security of supply and needs of instream uses under the previous regime, let alone in terms of (the proposed) increased minimum flow regime. Investigations into flow regimes that would protect the instream uses and values (principally native and trout fisheries and swimming) of the Waimea River indicated that flows in excess of 800 l/sec are the minimum required to maintain all of those instream values.

In preparing the proposed Plan changes in 2001 various allocation scenarios were calculated for different drought situations. These scenarios did not allow for sufficient water to meet the needs of instream uses and values, but they did provide a good overview of the relationship of current allocation limits on river flows under various drought frequencies. They show that the extent of over-allocation is significant in relation to the previously adopted minimum flow regimes and water supply falls far short of desirable security of supply objectives if the need for higher minimum flows is also accounted for.

Decisions about water management were then put on hold pending the outcome of investigations by the Waimea Water Augmentation Committee. The Plan was amended in 2007 to include an interim management regime that allowed time for these investigations to be completed.
2.2 TRMP Provisions - Water Quality

Part VI of the Plan contains policies and rules to manage the effects of contaminant discharges. It acknowledges adverse effects arising from non-point sources such as nutrient leaching from land uses, including the elevated nitrates in the Waimea Plains, but addresses these issues through non-regulatory methods.

The NPSFM requires that adverse cumulative effects arising from the use of water and land are avoided, and that when making plan changes, decisions about water and land use and development are integrated.

In providing for augmented water supplies for abstractive use in the Waimea Plains, there is potential for substantially increasing the intensity and productivity of land use through irrigation, especially horticultural land uses.

2.3 Water Augmentation in the Waimea Plains

The Waimea Water Augmentation Committee (WWAC) was set up in 2004 to find a solution for water users and to provide a sustainable water resource over the long term. The purpose of the committee was to examine water augmentation options that would ensure security of supply for the Waimea Plains at least for the next 50 - 100 years. Its work built on previous water studies including the Tasman Regional Water Study.

Scoping of solutions included consideration of the range of augmentation options in various locations, and potential impacts on significant values associated with both the Waimea River and possible dam sites.

WWAC, which involved a wide range of stakeholders including the Council, rural irrigators, urban water users, industry, environmental, recreational, and cultural interests, has now identified a preferred water augmentation dam site on the Lee River.

WWAC investigations show that a water storage dam on the Lee River offering secure water supplies for a 1 in 60 drought return period and providing for both urban growth and increased horticultural production for the next 50 to 100 years is both feasible and the most efficient and effective way of meeting existing and future water demand.

Sufficient storage can be provided to allow for greatly improved flows in the Waimea River at Appleby than is possible under current allocation provisions. Current expectation is that design details for a storage dam will aim at providing 1100 litres per second as a minimum flow to meet instream and recreational values as well as meet current and future abstractive demand with a good security of supply.

Sufficient information has been collected by WWAC to support the lodging of resource consent applications for a dam and associated activities on the Lee River.

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3 Fenemor, A; Lilburne, L; Young, R; Green, S. 2013 (draft). Assessing Water Quality Risks & Responses for Increased Irrigation in the Waimea Basin. Draft report to the Waimea Water Augmentation Committee.


5 M King (Chair), D Cassidy (Delta), K Maling (Waimea East Irrigation Company), D Easton (UCA), J Raine (Golden Hills/Hope), B Thomas (Iwi), Cr T King, (TDC) P Thompson (TDC), N Deans (Fish and Game Council), Phil Ruffell (NCC) Deputy Mayor Ali Boswijk (NCC) ( M Rodd and J Gould (Department of Conservation)

6 The WWAC have commissioned a wide range of investigations and the resulting reports can be found on the web at [Lee Valley Dam Reports and Document Library](#).
3. **Relationship of Maori and their Culture and Traditions**

As part of the feasibility studies into the augmentation options for the plans, a cultural impact study was commissioned.

This CIA was done in relation to the possible construction of the proposed Lee Dam but not in relation to the wider water management issues facing the Waimea plains.

3.1 **Kaitiakitanga**

Through the relationship with nga kaitiaki atua the manawhenua iwi have a duty or obligation to their ancestors, those living and those future generations to come to take care of and protect places of cultural significance, natural resources and other taonga (collectively nga taonga tuku iho) in Tasman-Nelson.

Kaitiakitanga can be defined as the responsibilities and customs used by kaitiaki to take care of nga taonga tuku iho (or the treasures passed down). This included a system of resource management practices, rules and techniques for managing natural resources.

These were both practical and spiritual in nature and included such concepts as tapu and rahui. Tangata Whenua believe that these kaitiaki responsibilities and obligations still exist, they still have relevance and they still have a right to practice them. They believe that they should be carried out by kaitiaki using tikanga (customs), kawa (correct way of doing things) and mātauranga Maori (traditional knowledge) that have been developed and passed down through the generations. These things have been passed down through our oral tradition as well as through waiata, karakia and whakatauki. The practices associated with kaitiakitanga are also closely linked with mana and tino rangatiratanga (or self-determination).

The primary purpose of the RMA is of sustainable management, accords closely with the philosophical viewpoint of Maori. Kaitiakitanga has twin outcomes in conservation and sustainable use, where the two are compatible rather than irreconcilable.

3.2 **Consultation**

Iwi have been involved in the water augmentation studies as a member of WWAC since the beginning. Consultation with iwi began at an early stage of the project. Barney Thomas was appointed as a Tangata Whenua representative on the Waimea Water Augmentation Committee. When the detailed brief was developed by the WWAC a cultural impact assessment was included as a key component of the feasibility study rather than something “tacked on later”. As stated above MIRMAK was engaged to carry out a Cultural Impact Assessment via Ngāti Rarua Atiawa Iwi Trust (acting on behalf of MIRMAK) in June 2005.

3.3 **Iwi Waimea Issues**

The iwi cultural impact report describes a number of concerns with both the existing state of the Waimea water resources and the potential impact of the dam. The report recognises the benefits of the dam but notes the need to ensure that adverse effects of the dam and more intensive land uses enabled by the dam do not create other problems.

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7 Cultural Impact Assessment for Waimea Water Augmentation Component 3 for Tonkin and Taylor  report 22032.003 May 2006
Many of the concerns identified by iwi have been addressed in other reports commissioned by WWAC, including the mitigation and management options paper. Further consultation with iwi is required on the detail of the Plan change now proposed to manage water in the presence and absence of the dam.

4. **Summary of Key Issues**

Water supply in the Waimea Plains water management zones does not meet current and likely future demand with an acceptable security of supply while also meeting the needs of instream uses and values.

The Plan currently contains interim water management provisions that were added to the plan to enable augmentation options to be explored before resolving any flow or allocation provisions. This "status quo" is therefore not a viable option. The Plan change must accommodate two scenarios – one where there is a dam and one without augmentation and consider any necessary transition arrangements.

The decision on whether to proceed with the dam is still to be made and is linked to critical funding decisions. This decision on whether to proceed with the dam is not part of the Plan preparation process, but is integrally linked.

Transitional water management provisions will apply where a positive decision to proceed with the dam has been made to allow time for construction and operation of the dam.

The alternative water management regime will apply if there is a negative decision by Council to proceed with the dam (most likely an annual plan decision in relation to setting a targeted rate in the area to be benefitted by the augmented flows) by 1 July 2015.

**Summary of Key Issues and Options**

<table>
<thead>
<tr>
<th>Issue</th>
<th>Dam</th>
<th>No Dam</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. <strong>MEETING WATER DEMAND</strong></td>
<td>There is insufficient water in the Waimea water management zones to meet existing demand at a reasonable security of supply let alone potential future demand or the needs of instream river values and uses. A range of possible augmentation options has been explored by WWAC and previous Regional Water Studies An augmentation dam on the Lee River has been identified as the most effective means of meeting water demand. This project has already been identified as a significant issue in the Council’s Long term Plan and Council has already supported feasibility studies into the dam proposal.</td>
<td>Limited augmentation options for individual land owners/water users. Limited potential for meeting existing needs of economic, cultural and social values including intensive land uses, instream values and growth and development associated with adequate water supply to meet range of demands. Implications for both use of productive land including impacts on economic development (less high value crops/land use, productive</td>
</tr>
</tbody>
</table>
Ownership and management, construction costs, and payment options for the dam are considerations that will be part of the LTP and Annual Planning process.

| Options | A range of potential augmentation options exist and a dam on the Lee River is the best option identified to meet water demand for the next 50 – 100 years.  
The dam could be explicitly provided for in the Plan or not.  
Council can integrate its approach across both the LTP and Plan making it clear that it supports this augmentation concept and considers all adverse effects can be sufficiently mitigated.  
If not, the Plan remains silent about the opportunity provided by the Lee River dam and planning is less integrated across council functions. | Do Nothing.  
Engineering department to review options to meet future community water demand.  
Options include smaller dams or storage reservoirs in the Plains or re-allocation of available water.  
Next possible augmentation scheme more costly than Lee Dam  
Options for other abstractive demand addressed by individual land owners (limited, costly and likely insignificant potential).  
Provisions to address over-allocation will be necessary. |
|---|---|---|
| Preferred Option | The Council recognises a community water augmentation dam on the Lee River in the Plan as the best option to meet existing and future water demand. | More sophisticated but restrictive drought management provisions by Council for abstractive users  
Review options for meeting community water demand when current allocations no longer sufficient (10 – 20 years)  
Case by case assessment of private augmentation options.  
Management of current over-allocation  
Monitor land use changes and subdivision. |
| 2 Effects of a Dam (Land Use) | The dam provides for range of economic, cultural and social benefits including intensive productive land uses, instream values and growth and development.  
Some effects of a dam are likely to be | N/a |
significant, including during construction and on-going operation and maintenance.

Decision making guidance is needed for dealing with ‘more than minor’ adverse effects especially managing risks, amenity, effects of land disturbance and construction, public access, landscape, indigenous forest and bio-diversity, iwi values, incompatible land uses, landscape and amenity, quarrying and roading.

Other issues include effect of land ownership and subdivision/survey (to be addressed by voluntary agreements under the Public Works Act and Local Government Act).

<table>
<thead>
<tr>
<th>2A. PLAN MECHANISMS</th>
<th>A dam of the nature and scale envisioned by this project is a very significant infrastructure development and a major project for the Council and community.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No explicit policy framework in the Plan to support this significant infrastructure.</td>
</tr>
<tr>
<td></td>
<td>The LTP identifies this water supply security as a key issue and the Lee Valley Dam as a priority project.</td>
</tr>
<tr>
<td></td>
<td>The Plan (TRMP) could be amended to include specific decision-making framework to provide for this infrastructure and integrate with the LTP objectives.</td>
</tr>
<tr>
<td></td>
<td>The dam company will be responsible for consents applications, ownership and management of the dam. Water allocation will continue to be managed through the TRMP.</td>
</tr>
<tr>
<td></td>
<td>There is a need to consider other methods for integrating the provisions of the LTP and also providing some certainty for an infrastructure project of this size and significance for the region while still ensuring proper management of adverse effects.</td>
</tr>
<tr>
<td></td>
<td>The resource consents process can address the management of adverse effects through the detail of consent conditions.</td>
</tr>
<tr>
<td>Options</td>
<td>New targeted policy framework (Chapter 15 infrastructure)</td>
</tr>
<tr>
<td></td>
<td>Land Use Zone (and policies)</td>
</tr>
<tr>
<td></td>
<td>Special Area</td>
</tr>
<tr>
<td></td>
<td>Water Management Zone</td>
</tr>
<tr>
<td></td>
<td>Structure Plan</td>
</tr>
<tr>
<td></td>
<td>Do Nothing – consent processed as per plan provisions</td>
</tr>
<tr>
<td></td>
<td>(Designation is not supported by Council because the management of the project is proposed to be via a community-owned dam company).</td>
</tr>
</tbody>
</table>

N/a
Creating a new zone or special area to provide site specific rules would make it easier to get consent but would also need a policy framework to support it.

| Preferred Option | Introduce a new Chapter 15 (Strategic Infrastructure) policy framework for Lee dam plus a special area to identify preferred site (and protect against incompatible land uses – transitional and long term). |

3. **PROTECTION OF AUGMENTATION SITE**

   Incompatible land uses may need to be regulated in the interim so that the dam proposal is not adversely affected.

   Current land uses are restricted to forestry and conservation land. The topography is difficult and land use options are limited.

   The option to construct a dam on the Lee could be maintained into the future by spatial identification of the site on the TRMP planning maps, and/or restricting incompatible land uses i.e. protecting the dam site from any land use or development that would prevent construction of a dam in the future or make more difficult.

   Current land uses are restricted to forestry and conservation land. The topography is difficult and land use options are limited. The risk of compromising the site is limited but signaling the potential for an augmentation dam at this site provides certainty for the community and for landowners.

<table>
<thead>
<tr>
<th>Options</th>
<th>Do nothing</th>
<th>Protect against incompatible land uses.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do nothing</td>
<td>Protect against incompatible land uses and subdivision. Identify site for future dam use on planning maps with no planning restrictions</td>
<td></td>
</tr>
</tbody>
</table>

| Preferred Option | Protect against incompatible land uses by inserting the Lee Valley Community Dam site as a ‘water augmentation special area’ in the Plan and developing land-use controls in Chapters 18. Rules may limit such activities as residential development or building activities that cannot be relocated at the time of dam construction. |

| Preferred Option | Protect long term use of site for future augmentation dam. |

4. **DAM BREAK RISK**

   The size of the dam is significant and the dam is in the highest Potential Impact Category (PIC ‘High’) which triggers the highest design standards for the dam itself. Detailed reports on hazards and risk management are contained in the WWAC reports.

   Design standards require provision for the maximum probable flood and for a Maximum Design Earthquake (MDE) of between 1 in
<table>
<thead>
<tr>
<th>Options</th>
<th>Recommended Option</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rely on existing damming provisions in the Plan and Building Act</td>
<td>No Plan change – but see proposed Chapter 15 policy</td>
</tr>
<tr>
<td>Provide high level policy direction for risk management and best practice in design and construction.</td>
<td></td>
</tr>
<tr>
<td>Address specific design and operational risk management through consent conditions</td>
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</tr>
</tbody>
</table>

### 5. SERVICE AREA (AND DAM FUNDING)

Investigations have found the most economic and environmentally acceptable system augmentation scheme will rely on water release from the dam augmenting river flows during periods of low river flow. From here the water will infiltrate into the three river-connected aquifers to replenish depleted storage. The water resources benefitting are the LCA, UCA and AGUA aquifers and the Waimea and Wairoa rivers.

While some properties will have direct enhanced access to water, others will have indirect access through existing schemes such as WEIC and Redwoods Valley. Urban takes will most likely be from existing and new well fields where groundwater levels are augmented.

The areas where water (ground and surface) can be used are much greater than the areas replenished from rivers. This is because existing and new reticulation systems to service adjacent land are also expected.

Funding issues are to be resolved separately through Council annual and long term planning processes, but they will be relevant to landowner expectations about access to water, payment for dam construction and maintenance and allocation provisions.

At present, the Council intends for all existing and potential water users (landowners in the affected zones) will be required to pay for the dam. Without this community approach to augmentation, the dam is unlikely to proceed.

The proposal is for costs to be initially met via a rate based on an equivalent irrigable land area within water management zones benefitting from the augmented river flows, including where there is existing reticulation.

There is also currently unirrigated land adjacent to these aquifers but which may be irrigated by N/a
reticulated water supplies from the service area, including Wai-iti Valley and Redwoods Valley. Funding by these water users is likely to be via Water Supply Agreements (WSA) with the dam company and this will be linked to water permit provisions.

### Options

- Ensure legal and practical connections between rates, water permits and WSAs
- The alternative of not having a connection between water allocation and funding will undermine the likelihood of the dam being constructed and result in a risk of ‘free-riders’ who use augmented water but don’t pay for it

### Preferred Option

Water policies and rules recognise benefits to land owners and water users, and make necessary connections between Plan provisions, and mechanisms used to ensure water users contribute to the augmented supply through the proposed rates and WSAs (or whatever funding mechanism) is eventually adopted.

### 6. River Management Objectives and Minimum Flow Regimes

Increased flows mean a wide range of river values can be provided for.

The natural (unpumped) Mean Annual Low Flow for the Waimea River is 1300l/sec and for the Lee River below the dam it is 470l/sec

Higher flows during droughts in the Lee, Wairoa (below the confluence) and the Waimea Rivers can be provided to meet the needs of a wide range of uses and values (incl environmental social, economic and cultural values).

The dam design accommodates sufficient water to meet existing irrigation and predicted future irrigation and community supply demand as well as sufficient water to maintain a minimum flow of 1100l/sec in the Waimea R at Appleby.

Some uses and values of the Waimea River will be significantly enhanced.

No minimum flows are possible that meet needs of all uses and values, i.e. a trade off is required between; provision of enough water for recreational activities, especially swimming, fish habitat, (for native fish and trout), quality fishing experiences and security of supply for existing abstractive users and costs to production regimes.

Costs of cutbacks and rationing abstractive users have been assessed

Irrespective of the trade-off, neither instream nor abstractive values can be fully provided for under any the allocation regime.

There is no ability to meet increased or future new demand.

The risk of seawater intrusion in dry years is significant.

A Waimea River Park management plan was developed by the council and community in 2010 recognising the amenity and recreational benefits of the land adjacent to the Waimea River. The development of this park and its location near Richmond mean that
| Options | The natural annual flow is 1300l/sec. The proposed dam has been designed to provide a minimum flow of 1100 l/sec in the Waimea River at Appleby and for the Lee River below the dam it is 470l/sec | The same minimum flow options exist for the no dam scenario, however the costs of maintaining any low flow are much more significant (for all uses and values, depending on which flow). For the Waimea, a crucial value in relation to flow needs is maintenance of adult brown trout habitat which is also a proxy for the health of native fish and other aquatic life. Options for 100%, (1300l/sec) down to 70% (500l/sec) of brown trout habitat have been examined. A reduction to 500 l/sec would cause a decline in instream values. Minimum flows and flow sharing to minimise the length of time the flow is at a minimum (long periods of low flow have greater adverse effects than the same flow for shorter periods) |
| Preferred Option | To maintain 1,100 l/sec as a minimum flow for the Waimea River at Appleby and 510l/sec below the dam on the Lee River Amend Plan to reflect new/improved river values being provided for | To maintain a minimum flow of 800l/sec at Appleby Amend management objectives |

### 7. VARIABLE FLOW REGIMES

A large dam will impact on the natural flow regime during high flows and floods with beneficial impacts for flood management and potentially adverse effects on sediment and gravel movement, flushing of periphyton, bed armouring.

| Options | Rules and/or policies for managing flows from the dam |
| Preferred Option | Policies to guide decisions/conditions on resource consents Matters included in rules to address these effects |

### 8. LARGE SCALE LAND DISTURBANCE FOR DAM CONSTRUCTION

Temporary adverse effects on water quality and downstream water bodies.

Adverse amenity and landscape effects

Temporary traffic and noise effects during construction, with higher than present traffic after construction.

<p>| | N/a |</p>
<table>
<thead>
<tr>
<th>Options</th>
<th>See Issue 1 above. Policy framework to assist in imposing appropriate consent conditions to mitigate or remedy adverse effects.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preferred Option</td>
<td>No changes to land disturbance rules. Chapter 15 policy framework to guide decision making</td>
</tr>
</tbody>
</table>

### 9. MANAGING EFFECTS OF A DAM -
- Habitat
- Ecology
- Water Quality

A large dam causes both potential adverse and beneficial effects on river ecology. Beneficial effects include the lake habitat created by the dam and mitigation of flood impacts. Adverse effects may include fish passage and water quality. Changes to bed composition and change to mobility of bed material may also affect aquatic ecology.

Water quality can be adversely affected, especially in the early stages as biological material breaks down under the stored water. Water quality of the reservoir can be affected, including through thermal stratification, de-oxygenation and potential release of nutrients.

<table>
<thead>
<tr>
<th>Options</th>
<th>Relevant activities are all discretionary activities and require resource consents. Effects can be managed through conditions on consents and within current policy framework, supported by new policy in chapter 15</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preferred Option</td>
<td>No changes to chapter 31 rules. Changes to policy as for other issues</td>
</tr>
</tbody>
</table>

### 10. RESERVOIR MANAGEMENT (PUBLIC ACCESS)

People may expect public access and recreation opportunities given public funding for and ownership of the dam. TRMP river and lake margin policies currently support public access to rivers and lakes (provision and enhancement).

The dam will provide increased flows to the Lee, Wairoa and Waimea Rivers so that a number of existing recreational, amenity and other in-stream values are all enhanced.

Private land around reservoir –there is a risk of incompatible land uses, and landowner expectations do not include public access across private land.

Topography and access constraints (including road conditions, land ownership and costs) may limit options.

Lake level may rise and fall significantly and regularly during summer. The reservoir margin will not be attractive at all times.

Mountain bikers are currently interested in reforming mountain bike access into the Lee, and while this project is not dependent on the Dam proceeding expectations may be amended to accommodate the dam construction.

<table>
<thead>
<tr>
<th></th>
<th>Current access, difficult topography and property ownership limits public use of the Lee River and nearby public land. No changes are proposed to address these issues. Private mountain bike interests may negotiate separately with DoC/landowners for access at some time in the future.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Options</td>
<td>Preferred Option</td>
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<tr>
<td>---------</td>
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</tr>
<tr>
<td>Current policy approach remains applicable – details of potential public access can be resolved through the consent process. (uncertain as to outcome and costs/opportunities)</td>
<td>More targeted policy as above to clarify expectations and account for risks/opportunities.</td>
</tr>
</tbody>
</table>

**11. GRAVEL MANAGEMENT**

The dam creates a barrier to movement of sediment and gravel. The Waimea River has been identified as having a degrading bed.

The effects of the dam on river stability are a matter for discretion in the Chapter 28 rules.

The Lee River above the dam site is a minor source of gravel to the Waimea River.

<table>
<thead>
<tr>
<th>Options</th>
<th>Preferred Option</th>
</tr>
</thead>
<tbody>
<tr>
<td>Management can be considered through existing policy and managed by future consents conditions.</td>
<td>No plan change necessary</td>
</tr>
</tbody>
</table>

**12. WATER PERMITS DUE FOR EXPIRY (TRANSITIONAL PROVISIONS)**

Plan provisions need to include water management provisions that will apply until the dam is operational.

Permits to take water in the Waimea Water Management Zones are due for expiry 2016 – 2017. Applications that renew these are controlled activities.

An end date for transitional provisions may be required in case the dam is not operational as expected.

<table>
<thead>
<tr>
<th>Options</th>
<th>Preferred Option</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transitional provisions can reflect the current ‘interim provisions’ for minimum flows/rationing etc. The existing pattern of water use is provided for but restrictions on new or increased uses continue to apply until there is a decision about the dam. Transitional provisions (and consent conditions) to allow for a period of time where the dam is not yet operational and provide for interim minimum flows and rationing. The alternative is for the proposed new flow regime to apply to any renewed permits.</td>
<td>Allow for transitional provisions that manage the time until a decision is made about whether to proceed with the dam. Also provide for transitional provisions to allow for new allocation regime developed and new provisions to apply when consents renewed.</td>
</tr>
</tbody>
</table>
### 13. WATER ALLOCATION REGIME

- **Water management zones**
- **Allocation limits and security of supply**
- **Soil/crop type application rates**
- **Waiting lists and reservation for water**
- **Site-to-site transfers**
- **Efficient water use**
- **Bore construction and relocation**

<p>| The augmented water supply enables a much more flexible, less restrictive water allocation regime. The location and quantity of water changes with a dam. The three main aquifers of the Waimea plains (UCA, LCA and AGUC) as well as the rivers will all have more water in during summer months. New Water Management Zones are proposed to manage the allocation of this water. An allocation limit for each of the new zones has been calculated based on dam capacity and a security of supply that meets full demand in at least a one in 50 year drought without rationing. (Includes water for all irrigable land within affected zones as well as new irrigation demand in adjacent water short zones to be met by reticulation. Existing and potential future urban demand (to 100 years) can be met. Amendments are made to the adjacent zones to update hydrogeological information. Water storage and flow calculations have accounted for impacts of climate change. Future community water demand can be provided for by financial commitment by the Councils (both Nelson City and Tasman) to dam – so there is little need for reservation as well. Provide for site to site transfer of allocations for when the augmented water resource is fully allocated. There may be less incentive for efficient use of allocated water – this may impact on water quality. Higher groundwater levels and increased river flows enable a less restrictive approach to managing construction of new bores. | Over-allocation will need to be addressed. The existing pattern of allocation means low security of supply for all permit holders irrespective of what minimum flow regime is adopted. Rationing provisions likely to be severe depending on which minimum flow regime is adopted. Allocation limits can be reduced and amounts allocated to permit holders can also be reduced on a pro rata or some other basis to improve security of supply for permit holders. (Reduces the number of people with access to water). Existing allocations can be adopted but this is at a reduced security of supply for all permit holders and does not resolve the over-allocation. Measures to require more efficient use/allocation of water incl crop and soil type allocation. Site to site transfer of allocations has been previously been restricted so that the total amount of water used does not increase. It is likely that this limitation will need to continue. Better drought management provisions may be needed to allow for movement of available water to where there is greatest need. Cease take minimum flows (complete cessation of water takes) will be required during drought to prevent seawater intrusion and maintain minimal habitat for aquatic organisms. |</p>
<table>
<thead>
<tr>
<th>Options</th>
<th>Preferred Options</th>
<th>14. WATER QUALITY EFFECTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Allocation limits for the new zones as above. Less (or more) security of supply could be provided for (but Council and WWAC already support the design supply standard.) Provisions for site to site transfers of allocations within the relevant water management zones. No restrictions on water being used outside the water management zones or end uses of the water, or Reserve some proportion of water for irrigation use within the zone (reflects that properties in the zone are to be rated because of water augmentation service being provided. Reservation will maintain long term access to irrigation of land within the zones that have access to augmented water. Allocation through water permits can reflect the water users investment into a more secure water supply but use of water based on soil type (to help ensure efficient use of allocated water and assist in managing water quality effects). Or allocation can be on the basis of crop/soil types.</td>
<td>Allocation limit based on dam storage and security of supply allowing for full use of allocated water for droughts up to a 1 in 60 year return frequency. No restriction on end use or out-of-zone use. Allocation based on amount of investment – but rate of use dictated by site specific characteristics and efficient water use. Liberal site to site transfer provisions (but subject to conditions)</td>
<td>In addition to the management of water quality from the dam, the more intensive irrigation enabled by the dam may have adverse effects on ground water and on groundwater fed springs including Neiman and Pearl Creeks and the lower Waimea River. Water quality in the remaining part of the Waimea and Wairoa Rivers is more likely to be improved. Water Management Objectives are required to be specified; water quality must also be managed to meet these objectives. The median nitrate-nitrogen concentration of the sampled bores in 2005 was: 3.2 g/m³ in the Appleby Gravel</td>
</tr>
<tr>
<td>No allocation limits – no new consents. (Uncertainty about level of over-allocation with no limits) Re-introduce previous allocation limits and place moratorium on new consents and more stringent bona fide provisions – sinking lid. Decrease allocation limits from previous – and reduce existing consents on pro-rata basis. Divide allocations into A and B permits – two classes of security (more and less secure portions). Alternative drought management provisions to maximize efficient use of available water. (DWTF/WUC water use rostering during droughts) Reduce allocations according to crop type/soil type Allocation for community water supply</td>
<td>Reduce allocation limits to sustainable limits, Reduce allocations of water over time to new limits, Allocate on the basis of crop and soil types, Stringent bona fide reviews. Shorter duration water permits.</td>
<td>There are currently few existing proposals to manage groundwater quality apart from advocacy and advice. Existing contamination originates from historic sources and current land uses. Concentrations have decreased in some aquifers, but shallow aquifers and the springs at Neiman and Pearl Creeks and Borks Creek all have elevated levels of</td>
</tr>
</tbody>
</table>
Unconfined Aquifer,  
- 8.1 in the Hope Aquifers,  
- 12.0 in the Upper Confined Aquifer, and  
- 11.5 in the Lower Confined Aquifer.

These values compare with the Drinking Water Standard of 11.3 and 3.2 for toxicity to aquatic life in spring-fed streams. This contamination originates from historic sources and current land uses but concentrations have generally been decreasing over time.

However, land use intensification may cause continued breaches of desirable water quality limits.

Management of the adverse water quality effects arising from land use intensification will be mainly through water permits to downstream water users, especially irrigation uses.

Options

- Maintenance of water quality at existing levels – or improvements sought in ground and surface water.
- Water quality improvements could be sought for the Springs.
- Efficient use of irrigation water as well as careful nutrient management through the use of tools such as Overseer.
- Continued monitoring of groundwater.
- Engineered solutions such as dilution of nitrate concentrations

Preferred Options

- Improvement of water quality in the Wairoa and the Waimea above Challies.
- Maintenance of water quality at existing levels in the spring fed creeks at Neiman, Pearl and Borks Creeks.
- Irrigation and nutrient management at a property level. (Conditions of consent upon permit renewal).
- Monitoring trends in water quality

15. Resource Consent Expiry Dates

The resource consent costs for activities involved in the construction and on-going operation of the dam are likely to be significant. Land use and Building Consents are not constrained by duration, but water and river bed activities (such as the dam structure) are.

The decision for duration of the permit for the dam structure is guided by Part IV (schedule 28A)

There is no similar guidance for either the damming or the discharge consents in Parts V or VI.

Management of existing land uses to reduce nitrate contamination in groundwater and in the spring fed creeks.

Irrigation and nutrient management at the property level.

Status quo – not manage water quality effects on groundwater arising from intensive land use.

Improvement of water quality in the groundwater and spring fed creeks.

Irrigation and nutrient management at a property level. (Conditions of consent upon permit renewal)

Monitoring trends in water quality.

If the dam does not proceed, Council must manage the significant over allocation and provide management targets.
It is recommended that bona-fide reviews will not be required for water permit holders and water permits within the zone do not lapse or cannot be cancelled if unused. Water permit holders in this zone have invested in the dam and transfers of allocations between them are encouraged, although these continue to be subject to consent approval under the TRMP.

Longer durations for consents in these managed catchments are likely to be sought to reflect the augmented supply and nature (permanence and significance) of the associated infrastructure.

Relevant matters that would need to be taken into account are the degree to which the dam provides a secure augmented water resource environment. Additionally the Council has also adopted measures to maintain natural water flows through minimum (environmental) flows and rationing.

Furthermore, where current demand within the zone is low, both full demand coupled with a dry year scenario needs to be tested.

<table>
<thead>
<tr>
<th>Options</th>
<th>Preferred Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use the same 15-18 year terms for water takes and leave all other consent durations as discretionary matter</td>
<td>Continue with same 15-18 year durations</td>
</tr>
<tr>
<td>Link water permits to take with dam consent durations and provide decision making framework for duration of other consents.</td>
<td>Reduce durations to enable more frequent review and meeting target allocations by (say 2030/31)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Preferred Options</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>Link water permits to take with dam consent durations Provide decision-making guidance for durations of other water take, use, damming and diversion consents.</td>
<td>Prevent other dams in the main stem of adjacent and connected rivers Or not</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Preferred Option</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prohibit dams in adjacent main stem rivers if Lee dam is to be constructed</td>
<td>N/a (any applications considered as discretionary activities)</td>
</tr>
</tbody>
</table>

The construction of the Lee Dam will have a range of adverse effects including loss of habitat and recreational opportunity, and changes to flood flow regimes.

These adverse effects could be offset by limiting any other damming opportunities on the main stem of the Wairoa River and the remainder of the Roding River main stem within TDC boundaries.

<table>
<thead>
<tr>
<th>Options</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Prevent other dams in the main stem of adjacent and connected rivers</td>
<td>Prohibit dams in adjacent main stem rivers if Lee dam is to be constructed</td>
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</table>

16 OTHER MAIN STEM DAMS IN UPPER CATCHMENTS

The construction of the Lee Dam will have a range of adverse effects including loss of habitat and recreational opportunity, and changes to flood flow regimes.

These adverse effects could be offset by limiting any other damming opportunities on the main stem of the Wairoa River and the remainder of the Roding River main stem within TDC boundaries.
Discussion about Issues and Options

5. Meeting Water Demand

The drought experiences in the early 2000s showed that existing water users have a very low security of supply (lower than the Council’s stated security of supply standard of 35% reduction in a ten year drought). The extent and frequency of rationing needed to maintain even minimal amounts of water in the Waimea River at that time had a significant adverse effect on irrigated production.10

A moratorium on new water permits over most of the plains has been in place since the 1980s and there is currently significant unmet demand for irrigation of un-irrigated land. In addition, continued growth in urban water demand is also forecast.

Table 1: Present and Potential Future Water Demand11

<table>
<thead>
<tr>
<th>Existing Use</th>
<th>Ha Equivalent</th>
<th>Future potential*</th>
<th>Ha Equivalent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Irrigation</td>
<td>3800</td>
<td>Waimea irrigation</td>
<td>1500</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Future reticulated irrigation</td>
<td>550</td>
</tr>
<tr>
<td>Urban Supply</td>
<td>620</td>
<td>Future TDC Urban supply</td>
<td>780</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Future Regional Use incl NCC urban supply</td>
<td>515</td>
</tr>
<tr>
<td>Totals</td>
<td>4420</td>
<td></td>
<td>3345</td>
</tr>
</tbody>
</table>

*There is also potential demand for water outside these areas, although the additional costs of reticulation from the proposed augmented water supplies may influence rate of uptake/demand.

A review of the hydrology showed that the expected security of supply for the existing users was not being met by the allocation regime already proposed (in 2001) and that security of supply (35% cut in a 10 year drought and >50% in a 25 year drought like 2000/2001) was unacceptable to most water users.

During the 2001/2002 droughts, the Waimea River was dry in places and sea water intrusion was a significant risk to water supplies and the freshwater ecosystems at the connected coastal springs at Neiman and Pearl Creeks.

For better provision for instream values and potential future values of the river there is approximately a 50% over-allocation (for a minimum flow of 800l/sec) and in order to provide the same 1100l/sec minimum flow as the dam there would be 70% over-allocation.

The current extent of the irrigated area is approximately 3800 ha. Along with improved security of supply for existing users, with augmentation, a further approx 2000 ha could also be irrigated, including through potential reticulation to the lower Wai-iti Valley.

The potential financial consequences of the water augmentation scheme not proceeding have been assessed12 under Waimea River minimum flows of 1100 l/sec or 800 l/sec.

10 Northington Partners January 2010 Financial and Economic Assessment of Water Augmentation in the Waimea Catchment
11 Financial and Economic Assessment of Water Augmentation in the Waimea catchment; Northington Partners January 2010
12 Ibid
For a 25-year drought equivalent to weather conditions during the summers of 1982/83 or 2000/01, and assuming a minimum flow of 1100/l/sec (and assuming water restrictions imposed on current land uses and irrigated area), that year’s loss could be $14–19m, or 45–65% of annual earnings.

For an average year, the loss could be $4.4–5.8m, or 15–20% of annual earnings. With ‘cease-take’ provisions included, losses would be even greater and some perennial irrigated land uses (e.g. glass houses, apples, kiwifruit) are likely to become non-viable. These numbers are based on maintaining a flow of 1100 l/sec at Appleby, and will be less, but still significant, with an 800 l/sec flow. (The number of days of rationing required to maintain any flow are significant because of the way the river interacts with groundwater and the rapid decline in flows during dry periods.)

With a lower minimum flow of 800 l/sec, because of the extreme level of water restrictions required\(^\text{13}\), the losses are unlikely to be significantly less than these estimates. There has been no assessment of costs to the existing irrigators associated with a 500 l/sec flow regime. However, the increased rationing and allocation on the basis of crop and soil type will significantly impact users even at this flow (see also section 19.2).

There would also be significant effects on both industrial users and urban/community water users (via restrictions on TDC’s reticulated water supply).

Any allocation regime in these circumstances (with no water augmentation) will not be able to fully meet demand for secure water supplies for existing irrigation, industry or community users nor will it meet potential future demand for water, including for presently unirrigated land or urban development.

The actual impact on landowners depends on timing of any drought and the type of crop being irrigated and the length of time restrictions would be in place. Droughts in successive years also have significant adverse effects on crop production in following years.

The allocation regime in the absence of a dam will require more frequent rationing and cutbacks depending on which low flow is to be maintained.

### 5.1 Plan Change

The decision to proceed with construction of the dam will be made in a separate process where council considers the infrastructure, operational and maintenance costs as well as how those costs are to be met by the water users, ratepayers of Tasman generally and the landowners in the affected Waimea water management zones in particular.

However, the Plan can be amended to reflect the highly significant benefits of an augmentation dam on the Plains and provide for a water management regime when such a dam is constructed.

The land use provisions in Part II, as well as water management provisions in Part V and provisions that manage activities in the beds of rivers and lakes in Part IV can all be amended to provide for a decision making framework that recognise the benefits of such a dam. The framework would also and gives guidance to decision makers, through the resource consent process, on how to manage adverse effects appropriately and effectively.

\(^{13}\) Northington Partners January 2010 Financial and Economic Assessment of Water Augmentation in the Waimea Catchment Appendix 1
This plan change provides water users and the community information about the costs associated with not having an augmented water supply. Not only does the existing security of supply remain below accepted levels, it will become significantly worse as council manages abstraction to meet minimum flow needs to avoid environmental damage (including through seawater intrusion as well to aquatic ecosystems). In addition, neither new irrigation nor urban development can be provided for. Council will eventually need to address future water demand as a result of urban development and the next viable option will be more expensive than the Lee dam.

### 5.2 Potential Augmentation Options

Augmentation options considered by WWAC and previous regional water studies included a piped water supply from the Nelson lakes\(^ {14}\) but were quickly focused on augmentation dams in the catchment as the most cost effective augmentation method to meet all water needs.

Some 18 sites were originally identified\(^ {15}\) and WWAC consulted widely on the most suitable sites. After intensive site evaluation, a site on the Lee River was identified as being the preferred site.

This proposed water augmentation scheme would have a security of supply sufficient to meet water demand without water rationing in a drought with a return period of 60 years.\(^ {16}\)

Note that this return period is calculated based on accumulated annual river flow into the storage, and differs from the return period of natural (eg 7-day average) river flows, so that for example the return period for the 1982–83 water year was 33 years whereas based on the minimum 7-day flow at Wairoa Gorge it was 21.7 years\(^ {17}\). Comparative return periods for 2000-01 are 65 years based on storage and 22.7 years based on 7-day averaged flow. Return period based on accumulated storage better reflects the return period of irrigation demand.

Based on the 50 years of river flow data (1958–2008) upon which the proposed reservoir is sized, the worst drought year was 2000-01 and would have required release of 12 m\(^ 3\) of the 13 m\(^ 3\) of water stored. No water rationing would have been required had the Lee Dam been in operation for that 50 year period.

### 5.3 Climate Change

Climate change modeling\(^ {18}\) for 2040 and 2090 suggests a potential increase in annual catchment precipitation in the range 0-5% counteracted by increased temperatures, evapo-transpiration and increased summer drought risk.

This forecast would mean greater restrictions during droughts for water users without a dam.

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16 Tonkin and Taylor 2010, Waimea Water Augmentation Phase 2 – Lee Valley Dam Feasibility Investigations; Summary Report. Page 14
A dam allows advantage to be taken of the increased precipitation. The risk of climate change impact on scheme operation is low. The design drought security of 60 years for a dam means minimal climate change effect on the scheme.

5.4 Hydro-Generation Potential

There is potential for conjunctive use of the dam for hydro-electric power generation. This potential is only expected to be modest. A present the proposed dam design and operation has not included this opportunity, but it remains a possibility.

While hydro-generation does not significantly change the nature and scale of the dam, it would have an impact on the flow regime of the river(s).

Any adverse water flow effects would be considered as part of assessment of applications that affect the flow regime of the river.

Any future application for hydro-generation would be considered as a Discretionary activity under the current TRMP rules, and no change to these provisions is considered necessary as a result of the Lee Valley Community Dam proposal.

5.5 Land Use Policies

Currently the minimum lot size for new subdivision is 12ha. However, the Waimea Plains is already highly fragmented and a large number of lots are below this 12ha threshold.

5.5.1 Without Dam

The consequences of insufficient water (low security of supply) to meet irrigation demand should there be no water augmentation are not just in relation to loss of production from irrigated land.

In the without dam scenario, intensive land use and high value crops become more risky as security of water supply is reduced. So, despite policies and rules aimed at protecting the productive potential of the very limited high quality land in the District, the lack of sufficient water will create pressure for further subdivision and unproductive capitalisation of land. It is unlikely that there would be an immediate demand for further subdivision. However, a series of low water years may lead to changes in land uses, including change to lower water use crops.

5.5.2 With Dam

There may also be an impact on subdivision demand with a dam. It is possible that greater water supply with a dam may allow higher productivity on less land, thus precipitating a demand for smaller lots. However, given that there are a large number of variables in predicting future trends for land use activities and subdivision demands, it is unrealistic to propose changes to the land use and subdivision policies for the Plains at this time.

The rural land policies are currently being reviewed as a district wide project.

The Council intends to adopt careful monitoring of land use changes and review land use provisions if necessary.
5.6 **Without Dam – Water Management**

In the event that the dam is not proceeded with, the water management provisions will need to be replaced with more definitive provisions that manage the over-allocation issues and protect the life-supporting capacity of the Waimea River. As noted above, the costs for existing water users in relation to rationing and cut-backs in permit allocations are significant.

The opportunity costs for future water users are also significant, especially for urban development and for new irrigation or currently dry land.

The current water management provisions were adopted by Council in 2007 as a temporary measure that provided time to consider augmentation options. The augmentation option assessment work has been done, and developed to the point that supports resource consent applications for a dam on the Lee River. Delaying the review to a later date (up to 2021) is possible as the Plan states it must be done within ten years of the operative date (which was not until February 2011) or when an augmentation scheme is in operation.

Not having the provisions in place (especially in relation to recognizing the Lee Dam) would potentially compromise opportunities for government funding assistance.

Water permits in the affected Water Management Zones are due for renewal in 2016 - 2017. The Plan requires amending before this time to provide certainty for water permit holders and others with an interest in how the Waimea water and land resources are to be managed – either with a dam or without.

5.7 **Options, Costs and Benefits**

5.7a. **The Plan is amended to identify the Lee River as the most suitable and appropriate site for providing for water augmentation in the Waimea Plains** (see also section 7).

This reflects the existing commitment by Council towards water augmentation and is also supported in the Council’s Long Term Plan, including in relation to water supply for communities. It supports applications for government funding. There are no significant costs.

Or

5.7b. **The Plan is not amended to identify the Lee River augmentation scheme as the preferred option for the Waimea Plains.**

This does not provide for integrated management across all Council functions and duties. It reduces opportunity for public input into decision making about the dam. There are no significant benefits.

5.7c. **The Plan is amended to update and replace the interim water management provisions for the Waimea plains for both the with and without dam scenarios.**

This supports Council’s identification of the Lee Community Augmentation Dam as a priority project and clarifies the costs of not proceeding with an augmentation scheme as proposed. It provides for integrated management across all Council functions and duties, including in relation to water supply for communities. There are no significant costs.

5.7d. **Not amending the Plan to replace the interim provisions is not a valid option as the current Plan provisions commit the Council to review.** The review may be delayed - but not beyond 2021. A delay may result in a lack of integration in water management
provisions, management of community water supply and decisions about water augmentation. There are no significant benefits.

**Preferred Option**

5.7a. The Plan is amended to identify the Lee River dam site as the most suitable and appropriate site for providing for water augmentation in the Waimea Plains. AND

5.7c. The Plan is amended to update and replace the interim water management provisions for the Waimea Plains to provide a decision-making framework both with a dam on the Lee River and without a dam.


Having identified the Lee Dam as the preferred augmentation option, choices are available as to the mechanisms that can be used to recognise and provide for the Dam.

There is often a difficulty in using the resource consent process for large-scale activities. The tests of Section 104D relating to resource consent assessment for non-complying activities (which many large scale infrastructure projects or network activities would be) would not always be satisfied by many larger works and projects.

This is because the environmental effects of the activity may be more than minor, and the work or project may be contrary to the objectives and policies of the plan. Normally such significant infrastructure projects are identified and provide for by designations which provide for these works and projects, and network utility operations, by recognising that they:

- are often essential services
- are often limited to specific sites
- may have more than minor effects and
- may not be provided for by plan policies.

A range of activities will be carried out in the construction and maintenance of the proposed Lee Dam. They range from land disturbance, indigenous forest removal, building structures, building and upgrading roads etc. The dam itself will also have a range of adverse effects, including effects on important river values in the Lee, and Waimea Rivers.

Many of the activities will have more than adverse effects and some may be non-complying under present rules.

Resource consent applications for non-complying activities can be granted if effects are minor or, as in the case with this dam, the activity will not be contrary to objectives and policies.

A designation rather than resource consent for the dam as a land use is possible. Either council or some other entity could be the requiring authority for such a designation. However, the Council does not wish to be a requiring authority for this dam as this would create a financial responsibility for both land and works that Council alone is not able to accept. The Council expects that the ownership and management of the dam will be by a dam company representing community and water user interests. This company is not likely to seek to become a requiring authority.
The Council does however wish to provide supportive land use planning provisions that would enable a dam to proceed, provided adverse effects are appropriately managed. This would apply to provide support and clarity for relevant consents necessary, and regardless of the absence of any requirement.

The Council intends that the Plan provides for a decision-making framework that enables the construction and operation of the Lee Valley Community Dam. It also intends to protect the dam site in the Lee Valley for an augmentation dam and to manage land uses that might adversely affect it.

One method for enabling the dam is to introduce a change to the Plan. A plan change would set a policy and rule framework that recognises the significant benefits of the dam while managing the environmental effects. The plan change process includes public consultation.

While there is no guarantee of the outcome for the dam company (the resource consent applicant), the process followed so far by the Council in supporting the WWAC and carrying out the investigations and studies with extensive public input and consultation, suggests that an augmentation scheme is generally supported by the community.

Normally an outline plan is provided with a designation to provide greater flexibility, by allowing the requiring authorities to address aspects of final design after the notice of requirement hearing.

In this case, WWAC has conducted a number of investigations and studies covering dam design and construction and potential adverse effects arising from the dam. All of the information gathered by WWAC has been publicly available and will support consent applications. This information will also be used to support the Plan change.

The WWAC work and the plan change proposal will help ensure environmental protection, by allowing the Council and community to comment on and provide measures to control the effects of the dam and associated water management.

The plan change process requires Council to consider the various policy approaches and options available to it.

6.1 Options, Costs and Benefits

6.1a New Chapter 15 - Strategic Infrastructure

A new Chapter 15 to provide guidance in relation to the dam as large scale and strategic infrastructure.

The proposal fits within broader TRMP policy programme to provide for strategic infrastructure by acknowledging the benefits of while managing effects.

Currently the Plan does not explicitly recognise either the benefits and necessity for, or impacts of significant infrastructure.

New Chapter 15 policies can recognise the benefits of water augmentation infrastructure at the dam location and that these benefits need to be weighed against environmental, cultural and social impacts.

A new Chapter 15 focussed initially on the Lee Valley Community Dam can create the necessary policy framework consistent with the present Plan approach and will allow
issues, objectives, policies, implementation methods, and explanations to be set out in one location in the Plan in a format that is consistent with other Plan provisions.

The creation of objectives and policies (in the absence of a designation) is a critical component of providing for a favourable planning environment for the dam construction.

Any Chapter 15 provisions will be Lee Valley Community Dam specific at this time to limit scope of application and therefore potential for appeal. The advantages of this approach include:

- Allowing for future expansion of this Chapter to cover other strategic infrastructure such as NPS on Electricity Transmission; and upcoming RMA amendments expected to require greater recognition and provision for infrastructure.
- Providing weight to decision making where activity status is Discretionary or more stringent.
- Allowing for non-complying activities to proceed where they are consistent with policies supporting strategic infrastructure.
- Allowing recognition of longer timeframes for consents as being suitable for major projects with significant regional/national benefit.
- Providing the policy support structure for creating a new Zone (see 6.1b) or Special Area (see 6.1c) where a community water supply dam might be signalled or the option to develop is protected (see section 7). (However a new land use zone is not also necessary to enable the dam to be constructed).
- Allowing for future expansion of this Chapter to cover other strategic infrastructure such as NPS on Electricity Transmission; and upcoming RMA amendments which are expected to require greater recognition and provision for infrastructure.

The potential benefits of augmentation dams in relation to water management are generally acknowledged Chapter 30.3. Identifying the specific benefits of the proposed Lee community augmentation dam in Chapter 15 and an acknowledgement of the adverse effects that it and its construction may cause will complement and complete this.

A new Chapter 15 can be introduced to guide decisions made for consents in all parts of the Plan. It does not need to be supported by new ad hoc zones or areas and does not require changes to the existing rules. This approach is targeted and does not set precedents for managing effects of other large scale infrastructure in other parts of the district.

6.1b Special Zone under the RMA

A special or spot zone could be applied over the location of the dam and its impoundment footprint, in place of all current zones. Zoning (or use of other sets of rules such as special areas) is a method to achieve the objectives and policies of a plan by geographically delineating those areas where certain effects are acceptable or not acceptable, or where certain management tools are to be applied. Zoning must be appropriate in reflecting current uses, and appropriate to achieve the purpose of the RMA and objectives and policies of the plan.

The Council must also ensure that zoning achieves integrated management of the effects of the use, development, or protection of the land or water and that it controls the potential effects of the use, development, or protection of the land. A new land use zone must be supported by objectives and policies that will guide decisions on consents (conditions to manage adverse effects).
While there have been numerous Environment Court cases dealing with zoning, most have related to the appropriateness of a certain zone, or rules that the zone triggers. Few cases have challenged zoning as a tool for use in RMA plans, and none have found that zoning, as a tool or method, is inappropriate within the context of the RMA. But what is also clear from case law is that zoning is a technique or method to achieve the objectives and policies of a plan, and is not an outcome in itself.

The creation of a special purpose land use Zone (or Area – see below) to allow for the construction of the Lee Dam is a slight departure from the existing format and layout of the Plan as it will allow for just one specific use – it could anticipate that resource consents for similar activities as for the current Rural 2 and Conservation Zones would be required, but specify different performance standards.

The disadvantages of this approach, despite being focussed in the Lee Valley, are:

- The management of similar effects is duplicated in other parts of the Plan but may be seen as treating some activities differently from others (i.e. procedural fairness). Policies would need to accompany the zone to justify different treatment of similar effects.
- It sets a precedent for managing adverse effects that might be sought for other activities in other areas. The same performance standards may not always be appropriate for all large scale infrastructure activities in all locations.
- It may affect land values well ahead of anticipated activity occurring.
- Regional rules relating to the majority of effects arising from the activity still apply as per Parts IV-VI of the Plan.

Some of the disadvantages of the zone approach can be countered with the advantages of the zone, i.e. provides a less complex framework for the specific land use activity of community water augmentation infrastructure, and clear indication of Council’s intent (refer to the cost benefit analysis of the various policy options attached).

6.1c Special Area

A special area (rather than a zone) defines the location and extent of an area that like a zone, is a method to implement policies to protect a location, and is subject to additional or different performance standards for particular activities or because of particular circumstances.

The underlying zone (and District wide) rules would still apply unless a rule expressly states other rules do not apply.

Rules would generally be as per the existing underlying zone, but with specific consenting activity status put in for specified activities within the Special Area rules (Chapter 18). A special area fits the framework of Plan, and its associated policies would be located elsewhere (in Chapter 15).

This option has the advantage that the zone rules are not directly amended, but the specific requirements arising from the policy reason for protection of the dam location covered are set out distinct from the zones. This addresses the question that the Plan does not fairly manage comparable effects - i.e. activities with similar effects would normally have similar activity status in different locations.

19 (eg. Garnett v Tasman District Council).
As with the zoning approach, a robust policy framework can be developed to justify why effects may be managed differently within different parts of the District. In this situation, it is the special characteristics of the dam site that are worthy of protection for a dam infrastructure of district significance.

There is a risk that unanticipated dam activities get caught by other rules. Chapter 18 provisions would need to have careful attention paid to drafting of rules to correctly cross reference where rules no longer apply.

6.1d New Water Management Zones

In the event of a dam, the nature of the water resources (quantity and location) will be changed.

The recharge of groundwater from the river is a key mechanism for providing access to the augmented water from the Lee Dam. A “with dam scenario” will require a different pattern of water management zones than exists currently. The way in which water is allocated from this augmented flow will need to be reflected in the water management policies and rules of chapter 30.

These new zones will not address related land use issues, and will not be adequate on their own to provide for the construction of the dam. This management option is further addressed in section 17 and 19.

6.1e Structure Plan

A structure plan is a variation of the option of a special zone or special area. It could define the location and areal extent of the dam impoundment and could embrace all the land use matters addressed by any relevant Zone, or Special Area.

As with any ad hoc zone or special area, using a structure plan approach can allow matters of detail to be included that may not otherwise be if generic district wide rules are used instead. This mechanism can contain all land use policies, objectives and rules within one area of the Plan.

A structure plan specific to the Lee dam will limit ability for more general zone or policy provisions to have unintended consequences in other parts of the District.

However, structure plans used in this way would be a new concept in the Plan. They have been used in other district plans to provide a complete set of rules and zones for specified locations which may be developed over an extended timeframe.

Structure plans can sit either within the Plan with associated rules or outside the Plan where they do not have the status of a rule, but can be referred to in decision-making through section 104 of the Resource Management Act, 1991.

6.1f Do Nothing

Existing plan provisions – objectives, policies and rules could be used to manage effects of the dam. It would reduce the costs of the plan change, and confine the public input to resource consent processes (instead of both plan and consent processes).

However, there is a risk to the dam project as some of the activities may non-complying. Without stronger policy guidance, non-complying status may be a significant barrier to the dam.
Non-complying activities would need to show either they had only minor effects or are “not contrary to plan objectives and policies”. Only a small proportion of the activities are non-complying, but it is uncertain that effects are minor in relation to removal of indigenous vegetation. The current policies are not supportive for this activity.

An applicant is reliant on Plan provisions and conditions of consent for the life of dam. Extensive consent conditions can be cumbersome for large on-going projects such as these.

This option does not recognise the significant amount of research and investigation into options for water management in this location or the level of Council and community support for this as the preferred solution to water shortage issues in the Plains.

These options are types of planning methods to achieve the objective. They have largely technical differences. Chapter 15 and the Special Area method are considered to provide the best combination of plan provisions.

### Preferred Options

| 6.1a. | New Chapter 15 objectives and policies to support Lee Dam Augmentation Scheme. |
| 6.1c | New water augmentation infrastructure Special Area. |

### 7. Protection of Augmentation Site

Incompatible land uses may need to be regulated in the interim so that any dam proposal is not adversely affected. The protections could align with decision making for the dam in the short term, and fall away if there is a decision not to proceed with the dam.

A special area to identify the location as per option 6.1.2c – which will link with the chapter 15 policies as per option 6.1.2a above

The opportunity to develop the dam could be maintained into the future i.e. protecting the dam site from any land use or development that would prevent construction of a dam in the future or make more difficult.

The existence of dam sites for augmentation schemes of this significance are a very scarce resource. Topography, location, land use, extent of capitalisation, land ownership, soil types and geology all influence the suitability of a site for significant water storage.

A site can become compromised through a range of activities that result in over-capitalisation, structures, buildings, including the risk of reverse sensitivities arising from adjacent land, that reduce future opportunities to build large dams.

Protecting the ability of future generations’ ability to provide for water in a water short area is part of the sustainable use, development and protection of resources (RMA section 5) and the efficient use and development of natural and physical resources (RMA section 7).

### 7.1 Options, Costs and Benefits

7.1a Provide for long term protection of the dam site by creating a water augmentation special area. It would be similar to the quarry protection area.
This recognises the scarcity of suitable sites for community scale water augmentation. It may affect aspirations of current landowners and impact on land value. (Aspirations can be both negatively or positively affected).

7.1b Provide for protection of dam site in the short term only if there is a decision to proceed with construction.

If the decision is not to construct the dam, other land uses may be undertaken that prevent future generations from using this scarce resource (augmentation site).

**Preferred Option**

7.1a Provide for long term protection of the site.

8. **Dam Break Risk**

The risk and consequences of a dam break has been investigated and reported on. The dam has been assigned a “high” potential impact classification.

This classification of high reflects the significant numbers of dwellings and people that would be affected should the dam fail. This high classification requires the highest level of design and performance of the dam. In addition, the design specifications include consideration of extreme flooding in the catchment and maximum design earthquakes.

The risk of the dam actually failing is considered remote. The purpose and significance of carrying out dam breach analyses for any proposed dam to help assessment of downstream hazard potential which in turn guides the setting of standards to adopt for dam design, construction, operation and maintenance. The analyses are hypothetical and not related to the chance of a break actually occurring.

The Council is required to consider the effect of low probability but high potential impact. The key point guiding decisions is in ensuring the probability is indeed very small. The means of achieving this is generally through consent conditions that require adherence to industry design and construction best practice (Specified in the New Zealand Dam Safety Guidelines NZSOLD 2000).

**8.1 Options, Costs and Benefits**

Ensure the dam is built to the highest necessary standards.

Requires no specific plan changes, but covered by general policy direction

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Waimea Water Augmentation Phase 2 – Lee Valley Dam Feasibility Investigations Summary Tonkin and Taylor report 24727.800 and Lee Valley Dam Feasibility Investigations Geotechnical investigation report Tonkin & Taylor 2009 24727.204
Preferred Approach
Ensure policy framework enables appropriate conditions to guide design and construction.

9. Water Augmentation, Funding and Management

Investigations have found the most economic and environmentally acceptable system augmentation scheme will rely on water releases from the dam to augmenting river flows during periods of low river flow. From here the water will infiltrate into the three river-connected aquifers to replenish depleted storage. The aquifers benefitting are the LCA, UCA and AGUA.

Modeling and hydraulic data has defined the areas where higher groundwater levels are likely arising from augmented water flows from the dam\(^2\).\(^1\)

While most properties overlying the augmented aquifers or adjacent to rivers will have direct enhanced access to water, other existing and future users can have indirect access through existing schemes such as WEIC and Redwoods Valley schemes. These existing and new reticulation systems can service adjacent land and take advantage of the augmented water.

Urban takes will most likely be from existing and new well fields where groundwater levels are augmented.

This includes the Wai-iti Valley, Redwoods Valley and potentially Rabbit Island. If new reticulation is required for these areas costs to water users will be higher than if existing schemes are extended (such as the WEIC and Redwoods Valley).

Plan policy will need to be clear on how it interfaces with the operational planning and implementation of the scheme by a water augmentation entity.

The water augmentation dam company will manage the water releases from the Lee Dam and these will be addressed by the dam consent conditions. Decisions about flow releases can be largely informed by weather conditions and irrigation demand but they will also be guided by flow requirements downstream. The flow requirements are to be specified in the Plan (see sections 10 and 11).

Downstream taking and use of the water will be the responsibility of individual water users who will each need to hold a water permit for their specific water allocation.

Without specific Plan provisions, there is little to distinguish what water is being taken – augmented water or natural flow. Water policy and scheme planning therefore seek to avoid ‘free-riders’ – non-members benefitting from flow releases – for the social and economic wellbeing of all water users.

The way in which this is to be done will be related to the ownership and management of the dam and linking the cost/funding mechanisms with Plan rules for water take and use. Note that the ownership and maintenance envisaged for this dam will differ to that of the similar but smaller Kainui Community Dam for the Wai-iti.

\(^{21}\) GNS Science Consultancy 2007 Hong T; Groundwater-river interaction modeling for a water augmentation feasibility study, Waimea Plains, Nelson Report 2006/200
The nature of the scheme governance model affects the policy and rules required in the Plan.

Two issues will require resolution. One is in relation to funding the community dam and the other in relation to access to and allocation of water. The funding issues are to be resolved separately through the annual and long term planning processes, but they will be relevant to landowner expectations and plan provisions for access to water and provisions will need to integrate with the water allocation measures.

The water allocation regime will ensure that only water users contributing to the costs of constructing the Lee Community Augmentation dam either through rates or Water Supply Agreements can apply for water permits to take water in the augmented zones.

**Shares and Dam Company Management**

At present the intention is that landowners and water permit holders in the Waimea catchment are able to be shareholders in the dam company and hold shares (A shares). Shares will be allocated/bought in relation to the equivalent irrigable area (i.e an A share will be equivalent to 300m³ per hectare per week).

Shares will enable share holders to be part of the dam company and contribute to management decisions.

The amount of shares to be allocated is to be limited to the equivalent of 7765 ha (based on the new allocation limit of 3852l/sec).

In addition, others are able to be shareholders and have B shares which are not linked to a water permit. B shares are expected to be held by organizations such as Council, Fish and Game, iwi and Doc and represent the instream and community benefits of the dam.

**Construction Costs and Funding**

At this stage, landowners with irrigated and potentially irrigable land in water management zones where there will be increased access to water are to be rated by a targeted rate to fund the capital costs of the dam. This will be an amount equivalent to the irrigable area and is intended to be 300m³ per hectare per week.

This is because the TDC will fund the dam company’s loan for funding the construction of the dam (and associated consent costs) through a Council grant, which will in turn be recouped from consumptive users through the targeted rates.

Additionally, existing and potential new water users outside the augmented zones (including council community reticulated water supplies and reticulation to land outside the rated areas) will be able to access the additional water made available by the dam. Their contribution to the construction costs is expected to be through Water Supply Agreements that will be available from the dam company.

Funding sources will include provision for 30% of the costs to be met by the public generally to reflect the instream and community benefits of the augmentation dam, especially a secure water supply and improved instream values of the Waimea River. Government funding is also being sought.

**Operational Costs and Funding**

It is expected that water permit holders will pay the operating costs of the dam through a Water Supply Agreement that will be required as part of being an A share holder.
There is a need to make sure that funding intentions align with Plan rules. They will need to require permit holders to hold a relevant water access agreement or have rated properties for the equivalent amounts.

Catchments above the dam (Lee, Roding and Upper Wairoa) also benefit from the augmented flows as the significance to Waimea River low flows from these rivers is less with an augmented flow and there can be reduced rationing. The irrigation demand in these areas is currently negligible. Although some 60ha is potentially irrigable, the topography and fragmented land ownership makes irrigation for higher value crops very unlikely and pastoral irrigation is also unlikely. Industrial use is unlikely.

9.1 Options, Costs and Benefits

The proposed regime reflects the Council’s desire to ensure all owners of irrigable land and water users taking from the augmented water supplies contribute equitably towards the costs of the more secure supply of water. Any alternative may result in ‘free-riders’ who take advantage of the water augmentation benefits without paying. This is especially so as the dam is unlikely to proceed unless all existing and potential future users of the augmented water contribute equivalent funding to the construction and operation of the dam.

The plan provisions align with the dam company and funding/governance structures adopted for the ownership and management of the dam.

There is as a consequence limited scope for Council, other than to adopt an allocation regime based on the funding mechanisms to be used for the construction and maintenance of the dam. At present these include both targeted rates and Water Supply Agreements.

Preferred Option

Water permits are linked to targeted rates and water supply agreements to ensure all existing and potential users of the augmented water supplies contribute equitably to the construction and operation of the Lee Community Augmentation Dam

10. River Management Objectives and Minimum Flow Regimes

10.1 With Dam

The natural (unpumped) Mean Annual Low Flow for the Waimea River (at Appleby) is 1300l/sec and for the Lee River it is 470 l/sec at the dam site.

The potential for maintaining higher flows in the Waimea with an augmentation dam on the Lee River mean a wide range of river values in the Lee, Waimea and part of the Wairoa rivers can be provided for.

The design of the dam as provided by WWAC shows flows of 1100l/sec can be maintained in the Waimea River at Appleby and higher flows during droughts in the Lee, Wairoa (below the confluence) and the Waimea Rivers will meet a wider range of uses and values (incl social, economic and cultural) than is currently possible. In particular,
trout habitat can be significantly improved and the range of other instream recreational and cultural values of the Waimea can also be improved with this minimum flow.

For the Lee River between the dam and the Roding confluence, a minimum flow can be based on the natural 7-day mean annual low flow (MALF) of 0.51 m³/s.

Habitat modeling found that a minimum flow of 0.32 m³/s would retain 70% of the yearling to adult brown trout habitat available at the natural MALF, while a minimum flow of 0.38 m³/s would retain 80%. If a minimum flow lower than the flow recommended by the report of 0.51 m³/s were adopted, the Cawthron report commented that the minimum flow during the winter spawning and egg incubation season (May to November) should be set higher (0.35 m³/s for 70% habitat retention, or 0.41 m³/s for 80% compared with MALF). The recommended minimum flows for brown trout provide sufficient habitat to protect native fish as well as enhance amenity and recreational opportunities.

Information to be tabled on the extent to which the various existing and potential uses and values can be provided for under the with dam scenario

10.2 Without Dam

However, without a dam, not all of the river management objectives possible with a dam will be able to be provided for. This is particularly relevant for the Waimea River as abstraction will affect this river the most.

In setting flow regimes to allow for abstraction as well as instream values, the most flow dependant critical instream values should be identified and flow decisions made with a focus on managing these values.

In the Waimea, Cawthron studies determined that there have been no rare or endangered species in the Waimea River although dwarf galaxias have been found further up the catchment. Trout in the Waimea River provide a valuable recreational resource and although not known for the size of its trout, the river does attract considerable numbers of anglers due to its proximity to the Nelson and Richmond urban areas. Trout, especially adult trout have the highest flow requirements (with the possible exception of torrent fish and benthic invertebrates).

The NPSFM has three relevant objectives that must be given effect to by the Plan:

(i) Life supporting capacity, ecosystem processes and indigenous species are safeguarded
(ii) Further over-allocation of water is avoided, and existing over-allocation is phased out
(iii) Efficient allocation and use of water

The NPSFM further requires the choosing of water management objectives and the setting of limits that enable the objectives to be met. Note that the NPSFM also refers to the integrated management of water – quality and quantity – as well as effects of land use on water resources.

In setting water management objectives, and devising the appropriate allocation and river flow regime to meet them for the Waimea River, some trade-offs will be necessary.

Provision of sufficient flow for adult trout passage is the most flow demanding value. Provision for whitebait habitat (whitebait comprise a range of indigenous fish species) is the next most flow demanding. The protection of freshwater quality from effects of seawater intrusion will also require a minimum flow of at least 500 l/sec. The high aquatic ecosystem values of the springs at Neiman and Pearl Creek are also subject to the effects of abstraction from the Waimea River and would need to be supported by flows of at least 500 l/sec in the Waimea River.

However, the 500 l/sec might not account for effects of sea-level rise. A higher flow will be needed to combat sea water intrusion arising with higher sea levels. A minimum flow of 800 l/sec will provide for this potential future environmental effect.

Also relevant is the community developed Waimea River Park Management Plan was developed by the Council and community in 2010. It recognises the amenity and recreational benefits of the land adjacent to the Waimea River. The development of this Park and its location near Richmond mean that recreational use of the river is expected to increase over time and the community value for the instream values of the river is also higher.

Whatever the minimum flow is to be, it is likely that rationing will have a more significant impact on water users than historically, as protecting water quality from seawater and safeguarding life-supporting capacity and ecosystems will require a more rigorous approach to maintain the minimum flow, including cease take flows rather than flow sharing at these very low flows.

When the Chapter Part V (Water) of the Plan was first notified in November 2001, the minimum flow in the Waimea River was raised to 500 litres per second from the 225 l/sec historical (March 1983) minimum first set in the 1986 Waimea Water Management Plan. This higher flow was an estimate at that time of the minimum flow needed to “provide reasonable levels of instream habitat for most species of native fish and for juvenile trout in the three reaches, and better, although far from optimal, levels of habitat for adult trout and fast-water native fish species”.

The 500 l/sec flow was at that time the estimated ‘natural’ 50 year low flow at Challies Island, just above the Appleby Bridge (TDC, 1999). That report also stated that to ensure free passage of trout throughout the entire Wairoa-Waimea main stem, a minimum flow of at least 650 l/sec would be required.

Note that a range of parties contested the proposed minimum flow and that submissions on this issue have not been heard or the decisions about the appropriate minimum flow made. The selection of minimum flow will have a direct impact on the rationing regime required for managing effects of the abstractive takes on the river flow. See section 19 for rationing impact details.

Cawthron’s findings for the WWAC work in relation to river flows for the Waimea from Phase 1 were:

- **Instream residual flow requirements at Appleby:**
  - 1300 l/s (environmental benchmark)
  - 800 l/s (minimum flow equivalent to retaining 80% of the adult brown trout habitat)
  - 500 l/s (minimum flow equivalent to retaining 70% of the adult brown trout habitat).

Maintaining a minimum flow of 1100 l/sec in the Waimea River at Appleby Bridge (up from the previous requirement of 225 l/sec) is estimated by Cawthron to improve adult trout numbers by approximately 25% with accompanying benefits for other instream values and ecosystem health.

Also relevant to consideration of what minimum flow is to be established is the river behaviour in a drought and the connections with the adjacent aquifers. The storage capacity of the aquifers in the Plains is relatively low and quickly depleted once dry weather starts and there is widespread irrigation. Pumping from the aquifers can continue as the river flow decreases. However, even if irrigation from groundwater ceases, water will still continue to leave the river and replenish the aquifers, and river flows will continue to drop.

The potential improvement in trout habitat in the Lee River (reported by Cawthron) will only have marginal effects on the catchment’s level of angling amenity as the main benefits are below Wairoa Gorge.

**10.3 Options, Costs and Benefits**

**10.2a With Dam (as above)**

An augmentation dam allows for the wide range of values that the connected rivers and groundwater have to be fully provided for until a drought frequency of 50 years. This is a very high security of supply. Costs are related to the costs of constructing the dam and there are some adverse effects of a dam that can be mitigated or reduced through consent conditions.

**10.2b Without Dam**

To manage the water abstraction during periods of low flow in the Waimea River so that 800l/sec is maintained at Appleby. This will impact on rationing. Maintenance of this flow will require earlier rationing and may include a cessation of takes.

Without a dam, there is no flow regime that will meet the needs of either water users or instream values. At current allocation and flow management, existing users’ security of supply is inadequate, and the river will be dry in droughts that exceed a one in ten year frequency. If minimum flows are maintained, users’ security of supply is greatly diminished. Instream values can only be minimally protected.

**Preferred Option**

**With Dam**
- Maintain the flow in the Waimea River at Appleby at 1100 l/sec
- Maintain the flow in the Lee below the dam at 510 l/sec

**Without Dam**
- Maintain the flow in the Waimea River at Appleby at 800 l/sec
11. Variable Flow Regimes

A large dam will impact on the natural flow regime during high flows and floods with beneficial impacts for flood management and potentially adverse effects on sediment and gravel movement, flushing of periphyton (algae), and bed armouring and/or possibly incising/deepening of the channel. Bed armouring may encourage periphyton proliferation, by offering more stable substrate and reduced abrasion by fine sediments during flood events. Armouring can also reduce the availability of gravels suitable for trout spawning. However, the coarser substrate size and greater substrate stability may be beneficial for benthic invertebrate production, as long as they are not smothered by excessive periphyton growth. The effects of the dam on river flows, especially the smaller freshes and flood flows, will be greatest in the Lee R downstream of the dam, depending on the timing of rain events and how full the reservoir is at the time.

Modeling shows the effects are greatest after dry periods in February – March when the river is likely to reduce to a prolonged low flow while the dam refills. Flows modeled for the 1973 drought showed the flow was at a minimum from late April to early July.

Prolonged low flows will lead to development of nuisance growths of periphyton (algae) or exacerbate existing growths. Excessive periphyton can reduce invertebrate diversity and diversity of the periphyton itself. It can also decrease amenity for swimming and recreational activities in and near the river. Prolonged low flows will also interfere with fish migration.

Releasing water from the dam at times when there is naturally high inflow could provide for flushing of excessive periphyton and mitigate adverse effects on migrating fish. Hydraulic modeling can predict the flushing flows required to mobilize particles on the stream bed. Although sediment transport occurs at practically all flows, as flows increase the amount and size of sediment that is transported also increase. For the Lee, flows of about 3m³/sec are required to initiate flushing of fine sediment and periphyton. However, flows of 4.5 – 5m³/s were predicted to suspend sediment up to the size of coarse sand and fine gravel and flush periphyton from at least some of the bed given the scouring effect of the fine sediment.

The management of flows from the dam to provide augmented flows as well as allowing reduced flows when flows are high from other tributaries while at the same time reducing adverse effects on habitat and fish will be complex and necessarily adaptive to flow, storage and rain conditions at any time. Rapidly rising river levels may also cause safety issues for downstream users. These effects are best dealt with through consent conditions.

The effects on the Wairoa River below the confluence with the Lee and the Waimea River are likely to be largely positive as there will be higher minimum flows, especially during summer months. Overall the increased flow will have beneficial effects on productivity by increasing the overall area of wetted habitat.

The Plan currently has policies relating to management of adverse effects of damming water, particularly:

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25 Issues and Mitigation Options Associated with Water Storage in the Lee River, Cawthron, 2006, report no 1223
26 Issues and Mitigation Options Associated with Water Storage in the Lee River, Cawthron, 2006, report no 1223 – pages 6-7
To avoid, remedy or mitigate the adverse effects of water damming either by itself or cumulatively with other dams, including adverse effects on:
(a) the flow regime or water levels in rivers, lakes and wetlands;
(b) passage of fish and eels;
(c) other water users;
(d) aquatic ecosystems and riparian habitat;
(e) water quality;
(f) groundwater recharge; and
(g) adverse effects of dam failure on (a) to (f) above.

The policy is a little vague in relation to the extent that effects are to be managed, although this is affected by the nature, scale, location etc of the dam and downstream water values. In considering applications to dam water, these effects must be accounted for.

This policy does not provide particularly clear direction for managing variable flow regimes to manage periphyton, sediment and gravel movement below a dam

11.1 Options, Costs and Benefits

11.1a More policy direction for flow management

Some improvement to the existing damming policy could be made to improve its scope and address flow management more comprehensively.

There are no significant costs although it does increase the plan change scope very slightly.

11.1b Leave Plan as is

Damming activities at this scale are discretionary activities and this effect would be addressed anyway, but without a comprehensive policy framework.

Preferred Option

11.1a Improve existing damming policy Chapter 30 for integrated flow management from dams.

12. Large Scale Land Disturbance

The construction of the proposed dam on the Lee River will involve large scale land disturbance, including activities in the bed of the river while the dam is being constructed.

A range of consents will be required to address the construction activities. They will include contaminant discharge consents as it is possible that at times, sedimentation of water will occur and at levels that may exceed permitted activity standards for sediment discharges into water. The soils and geology in the construction area mean that sediment control will not be as significant a challenge as they would in other areas of the district.

Some of the required disturbances will be carried out in the river bed itself and will also need consent.
Sediment and Erosion Control Guidelines are currently being drafted for Tasman\textsuperscript{27}. They are based on widely accepted and applied good practice material developed elsewhere in NZ and adapted to Tasman conditions. A key aspect of the Guidelines is that they require a proactive approach to the management of erosion and sedimentation to assist in ascertaining the types of measures likely to be required and also the design capacity (standard of performance) for given storm events.

Most of the land disturbance activities associated with the dam will be discretionary activities and will be subject to performance standards in conditions.

Any land disturbance consents will be restricted discretionary and decision making and conditions will be guided by relevant policy. The land disturbance policies in Chapter 12 are quite high level and do not provide detail as to how the potentially significant land disturbance effects associated with a large infrastructure like the dam are to be addressed. This includes the design storm events and the level to which adverse effects are to be avoided or mitigated.

Also related to land disturbance management is the effect of sedimentation on water quality. The Lee River has high water quality and is highly valued for swimming and other recreation. It is a tributary of the Waimea River, which is also highly valued for recreation and its river amenity. Its proximity to Richmond and Nelson make it very visible.

Rather than new policies to add to the general land disturbance policies in Chapter 12 and the general water quality policies in chapter 30, existing (unchanged) policies could sit alongside the recommended new infrastructure policies in Chapter 15.

The adverse effects of significant infrastructure are recognised and the need for mitigation measures can be clearly signaled. The direction provided by Chapter 15 will enable adverse effects to be addressed and appropriately managed for any land use consents that will be necessary.

### 12.1 Options, Costs and Benefits

12.1a Amend land disturbance rules to specifically provide for the Lee Dam Construction works, including performance standards and design criteria for erosion and sediment control measures.

12.1b Leave land disturbance policy and rules as is (they will be more comprehensively reviewed at a later date) and provide targeted policy direction through the proposed Chapter 15.

This can include reference to best practice design for erosion and sediment control which forms the basis of the guideline land disturbance document for Tasman noted above.

### Preferred Option

12.1b No changes to land disturbance rules. (They will be more comprehensively reviewed at a later date). Infrastructure policy in Chapter 15 to identify management approach.

A large dam causes potentially adverse effects on river ecology, including on fish passage and habitat for birds. It also can cause adverse effects on human uses and values, including effects on mauri and wahi tapu, recreational activities such as swimming and the amenity and character of the river.

Water quality can be adversely affected. The longer water is stored in a dam, the more its quality can be affected, including through thermal stratification, de-oxygenation and potential release of nutrients.

A dam can also result in beneficial effects on the above uses and values and a wide range of reports commissioned by WWAC have explored these effects and how they may be managed.

These reports have considered the effects of the dam and the reservoir on the Lee River and further downstream in the Wairoa and Waimea Rivers – in terms of the aquatic environment and the terrestrial values of the land itself. The effects include those on:

- Indigenous vegetation and terrestrial ecology including plants, bats, birds, weeds and pests
- Effects on fish habitat and passage including indigenous species and trout
- Potential changes to water quality within the dam
- Effects of flow changes on aquatic habitat

WWAC and stakeholders including iwi have also investigated mitigation options for the range of potentially adverse effects identified.

Some of the measures identified to manage adverse effects are mitigation and others offset the adverse effect by creating or adding value elsewhere in compensation. Mitigation and off-set approaches incorporate best practice principles.

13.1 Options, Costs and Benefits

There is a potentially wide range of options available to mitigate or off-set adverse effects. There is a cost associated with most of these measures, however, and as a reflection of the community approach to the investigation and design work by WWAC, the mitigation measures are recognised as necessary and are reflected in the costing for the dam.

13.1a It is recommended that given the complexity and detail already provided by WWAC reports, the need for mitigation and offsets is addressed at a policy level, with details of actual measures covered through the resource consent process.

28 Tonkin & Taylor: 2009 Lee Dam Feasibility Study; Terrestrial Ecology Effects Assessment, Report Number 24727.400/401
29 Cawthron 2009: Aquatic Ecology: Mitigation and Management options Associated with Water Storage in the Proposed Lee Reservoir; Report 1701
31 Ibid page 14
13.1b The alternative is for the Plan to be more prescriptive about the nature and extent of mitigation and off-sets.

<table>
<thead>
<tr>
<th>Preferred Option</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>13.1a</strong> Address mitigation and compensation at a policy level and allow for conditions on consents to specify detail.</td>
</tr>
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</table>

14. **Reservoir Management (Public Access)**

The dam will limit public access along the bed of the upper Lee River – noting however that the current access is difficult, limited to foot travel and is infrequently used.

There is currently difficult and limited public access via the unformed legal ‘paper’ road bounding the river bed currently. However, access along this will effectively be terminated by the dam.

Current access for tramping and hunting into the upper Lee Valley from the west is dependent on agreement with land owners and managers, and does not currently represent a long-term solution to recreational access to the western side of the Mount Richmond Forest Park. The Lee dam proposal does not represent an important impediment to organisations seeking a long-term solution to access.

There are no proposals by Council to alter public access in the absence of a dam.

With a dam, however, public access and recreation opportunities may be expected by people given the public funding for and ownership of the dam. Existing Council policy promotes public access to lakes and rivers (provision and enhancement).

The new reservoir may be seen to present a new recreation opportunity, although it will be predominantly located on private land with no public vehicular access. Existing access is difficult and upgrade to public road status will be expensive and is not provided for in the dam costing.

Landowners of the privately owned land around the dam will be concerned about impacts on their own rights and expectations and incompatibility between recreational users and forest activities. Any proposal would need to recognise the private land status of several important properties. Costs of providing public access will also be a barrier in this terrain.

Opening the reservoir for casual canoe and kayak use over a confined period of weeks in the early summer could be considered. Limited jet and power boating opportunities could arise on the reservoir and this may have value for waterskiing, although the size and shape of the reservoir (narrow and elongated) will be a handicap. Access by powered craft would require a launching facility, whereas kayaks and canoes can be carried to the shore. Should a quality recreational fishery result, angling access could be of value.

While these could be provided for with little conflict if managed well, in most years the rise and fall in the reservoir level may make it less attractive for recreation. Reservoir levels may vary by up to 6 metres in most years and up to 12 metres in a dry year.

The net adverse recreation effect of the proposal on the existing recreation setting, without mitigation, will be to limit public access along the bed of the upper Lee River –
noting that the current access option is difficult, limited to foot travel and is infrequently used\textsuperscript{32}.

The key mitigating effect on recreational values is the improvement in fish habitat in the lower Waimea River and the increase in adult trout numbers there, along with minor positive effects on jet boating and kayaking. There may be improvement to swimming values with increased summer low flows.

This may be considered to be a fair balance, and other developments for recreation will represent an enhancement to the net level of recreation amenity in the area.

In any event there are access issues for private landowners both during construction of the dam and in the longer term. Options are being negotiated between WWAC and the landowners and rely on agreement by the parties.

14.1 Options, Costs and Benefits

14.1a Policy support for public access to the Lee Dam reservoir

This option does not reflect the actual constraints, costs and limitations of providing access to the reservoir.

14.1b No strong policy support for public recreational access to the reservoir

This recognises that the mitigation effects of the dam on recreational uses of the Lee and Waimea through provision of more reliable flows, especially minimum flows, will off-set any negative impacts on public access along the Lee River.

Access can be provided to the dam itself.

There is a potential to develop walking access beyond the dam along the reservoir, but this will depend on private landowners.

Preferred Option

14.1b Policy to reflect that public access to reservoir is not a key requirement to off-set effects on public access to Lee River.

Access to the dam structure can be provided for.

15. Gravel Management

The Waimea River is identified in Part IV of the Plan as having a degrading bed. Gravel extraction from the river is strictly limited.

A dam has the effect of creating a barrier and reducing the flow of gravel downstream.

The effects of the dam on gravel movement from the Lee to the Waimea have not been examined in detail. However, a study into the sedimentation rates behind the dam has

\textsuperscript{32} Rob Greenaway and Associates; Upper Lee River Waimea Water Augmentation Assessment of Effects on Recreation December 2009
been carried out\textsuperscript{33} and combined with the findings in a separate study into gravel supply in similar rivers\textsuperscript{34} the gravel supply from the Lee into the Waimea has been estimated at 145-360 m\textsuperscript{3}/yr.

An assessment of the significance of this gravel source to the Waimea has also been carried out and found to be a minor contributor to the stability of the Waimea River. The creation of a barrier in the Lee River will have minor impact on the bed levels and stability of the Waimea River (E Verstappen pers comm.)

The construction of the dam will need a range of consents including for the construction of a structure in the bed of the river. It is a discretionary activity governed chiefly by policies in Part IV of the Plan. A matter to be considered will be the impact on downstream river stability. As noted above, the effect of the dam will be minor on downstream river stability and consent would not be withheld on that basis.

Once there is a dam— in fact or by virtue of a resource consent, the extraction of gravel and other material from the bed of the river for the construction of the dam, while non-complying will be guided by policies that recognise the effect of barriers on the movement of gravel downstream.

15.1 Options
No Action needed.

A decision about whether the dam construction will proceed is contingent on a decision by Council to impose a rate on affected properties. This decision is expected to be as part of the annual planning process and will be made by 1 July 2015. Any Plan changes will need to manage access to water until a decision about whether to proceed with the dam has been made.

Water permits in Waimea water management zones are due for renewal in 2016-2017

The Waimea water management zone water permits would be due for renewal as controlled activities. The current Plan provisions are merely interim provisions that allow for the status quo (as at 2007) to continue until augmentation options were examined. (This is what guided renewal of permits for the Delta Zone in 2011).

Decisions for renewal of water permits will need to be better guided for both dam and without dam eventualities.

If the decision is made to proceed with the dam, water permits will need to reflect that there will be a period of time when the dam is under construction and that maintenance of minimum flows in the river will continue to be an issue. Despite a decision to commence construction, the dam might not be subsequently constructed or finished or might not operate as planned. These eventualities could be provided for and ensure that if the dam is not operating by a defined date, a plan review would become necessary.

\textsuperscript{33} NIWA Hicks DM 2009: Analysis of Suspended Sediment Data from Upper Lee River, Nelson. Client report Number CHC2009-179
\textsuperscript{34} Landcare Research, L.R. Basher LR 2006; Management of gravel extraction by Nelson City Council Landcare Research Contract Report: LC0506/137
WWAC hope the dam company will be in a position to apply for resource consents for the dam by end of 2013 with construction starting in 2015/16. This requires a “go” or “no go” decision by Council about funding for the dam through its annual planning process by 1 July 2015 at the latest.

Under this timeframe a dam should be operational by end of 2018.

### 16.1 Options, Costs and Benefits

**16.1a** Provide for transitional provisions that allows renewal of existing permits subject to conditions that will apply:

- when the dam is operating,
- transitional provisions that manage minimum flows in the Waimea River so that the current status quo continues until the dam is operational (transitional period until 1 January 2020)
- provisions that apply in the event the dam does not proceed (decision date or by 1 July 2015 whichever is sooner).
- transitional provisions that apply until a decision is made about whether the dam will proceed (decision date or by 1 July 2015 whichever is sooner).

The main risk is that decision making or construction of the dam is delayed for an unspecified time. This could be caused by climatic events, global influences or adverse events in the District.

The timing issue can be resolved by including a (liberal) time limit with the transitional provisions until the dam is operational (such as 1 January 2020.) This option means the status quo (roll over the interim provisions) approach to water management will continue to 2020.

The current triggers and rationing regime for water permit holders will continue till then. Consent conditions imposed upon renewal in 2016/17 will have two sets of conditions – one set will essentially be a roll over of existing conditions and one set linked to the commencement of operation of the dam.

The water management provisions to apply until the decision date (1 July 2015) will also need to be provided. It is considered that the best option will be to roll over the interim provisions until then. Essentially this means that no new permits will be granted and the existing rationing and flow management provisions apply.

The impact of the continuation of the existing status quo really relates to the likelihood of drought between now and 2020.

The roll over option favours abstractive users over instream values and sea water intrusion management.

**16.1b** The main alternatives relate to dates selected for the transitional provisions before operation of the dam commences and the date for the “go” “no go” decision.

**16.1c** With the with dam scenario, the Plan could just provide for the new operating regime in consent renewals.
This poses significant risks for water users as the new flow regimes possible with the dam would result in significant costs if applied before the water is available.

16.1d In the with dam scenario, consents being renewed in 2016/17 could be allocated water in two quantities.

They could be allocated less water (based on crop and soil type) with rationing triggers to apply to that total until the dam is built. Once the dam is built, the second quantity (as per the allocation regime adopted below) could apply.

Preferred Option

16.1a Include transitional provisions to enable management under with dam and without dam scenarios, including provisions that apply until a decision is made as given.

17. Water Management - WITH a Dam

The water allocation regimes will be different under the “with a dam” or “without a” dam” scenarios.

The detail and effect of these provisions, particularly for the “without dam” scenario, will depend on the water management objectives and the minimum flow regimes need to support them selected under section 10.

17.1 Water Management Zones

As described above, water will be released from the dam to contribute to river flows downstream. The dam changes the location and quantity of water resources in the plains and the way in which water is to be allocated.

Modeling shows that water will enter the adjacent Upper Confined, Lower Confined and Appleby Gravels Unconfined Aquifers to boost groundwater availability below the Wairoa River gorge as well as increase surface water flows in the rivers below the dam.

The Hope and Eastern Hills Zone is to be amended to define the Eastern Hills separately and develop an allocation limit for the new Hope Zone.

Other zones where there is likely to be no change to groundwater levels include the Redwood Zone (similar low water availability to the Wai-iti), hill margins of the Golden Hills Zone (with a variable low yielding aquifer), and the Waimea Islands Zone.

New zones have been developed to account for the water resource changes including a new water management zone, the Appleby Gravel Zone, that includes the Waimea and Wairoa Rivers, and all or parts of the previous Waimea West, Reservoir, and Delta Zones and parts of the Golden Hills Zone with reliable groundwater during dry summers.
17.1.1 Options Costs and Benefits

17.1.1a New water management zones to reflect the changed pattern of water availability. There are no significant costs.

17.1.1b Not changing the zones means added complexity and does not reflect the actual water resource. There are no significant benefits.

Preferred Option

17.1.1a Amend water management zones to reflect new pattern of water resources.

17.2 Allocation Limits and Security of Supply

The Lee Valley Community Dam will provide a total allocation of 3852 l/sec. It enables irrigation of an equivalent 7765 ha.

The dam design has been calculated to meet existing and potential future irrigation and urban water demands with a security of supply resulting in no significant rationing up to a 50 year drought. (cf. the standard security of supply of a 35% reduction in allocated water in a 10 year drought).

The LCA will have limited additional groundwater storage as a result of increased river flows, but there will be sufficient to meet irrigation needs in that zone. Management of takes from the LCA will still need consideration of the ongoing low level seawater intrusion risk. One way of ensuring this is to prevent new bores in the coastal margin of this zone (similar to how the coastal margin of the Delta Zone is currently managed).

The Redwoods Zone and the newly defined Hope Zone are fully allocated and the limits reflect existing use.

The 3852 l/sec enables full irrigation of the irrigable land within the new water management zones and through reticulation to adjacent zones (including the Hope, Redwood and Eastern Hills Zones).

Table 2 apportions the 3852 l/sec across three zones – the UCA, LCA and the new Appleby Gravels Zone. The limits will also enable takes in the Upper Catchments Zone, but an equal amount is to be deducted from the Appleby Gravels Zone when any water is allocated in that Zone.

Table 2: Water Allocation Limits for New Waimea Water Management Zones

<table>
<thead>
<tr>
<th>Water Management Zone</th>
<th>Allocation Limit (l/sec)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upper Confined Aquifer</td>
<td>200</td>
</tr>
<tr>
<td>Lower Confined Aquifer</td>
<td>250</td>
</tr>
<tr>
<td>Appleby Gravels</td>
<td>3320</td>
</tr>
<tr>
<td>Upper Catchments</td>
<td>(a)</td>
</tr>
<tr>
<td>Total</td>
<td>3852</td>
</tr>
</tbody>
</table>
### 17.2.1 Options, Costs and Benefits

#### 17.2.1a The sustainable limits for each aquifer, providing a 50-year security of supply are as specified in Table 2. The total augmented water supply has been allocated across the aquifers according to modeling of groundwater response as well as irrigation demand and bore yield. The numbers might be adjusted slightly but not significantly.

These limits are sustainable, enable water management objectives for the rivers and groundwater to be met and provide for a very high security of supply.

### Preferred Option

#### 17.2.1a The sustainable limits for each aquifer, providing a 50-year security of supply are as specified in Table 2.

### 17.3 Efficient Water Use

There are multiple drivers for the Lee Dam scheme and associated water users to demonstrate good practice water and land use. Funding from Government’s Irrigation Acceleration Fund is conditional on mitigating any impacts on water quality. In turn, the NPSFM requires that regional councils implement catchment based limits for both water quality and quantity.

Plan change provisions to enable the dam and the consequent intensification will also depend on how well the use of augmented water can be managed to prevent adverse water quality effects. Water use efficiency and contaminant leaching rates are linked (see section 18).

#### 17.3.1 Soil/Crop Allocation

In 2001 the Council had signaled a move towards allocation according to soil type in an effort to ensure more efficient allocation of water as well as efficient water use.

Implementation was delayed in the Waimea Plains with the interim management provisions for the Waimea zones while augmentation solutions were pursued. This was because the standard allocation rate adopted for irrigation of 350m$^3$/ha/wk provided a security of supply buffer for some users, especially for irrigators on land with higher moisture holding capacity.

Different soil types have differing ability to store water depending on depth of soil and soil moisture holding characteristics.
Efficient irrigation requires water to be applied at a rate and quantity that ideally results in no water being lost to groundwater below the irrigated crop. Efficient application also assists in protecting groundwater quality from leaching of nutrients (applied fertilizers) and chemicals (pesticides).

17.3.2 Options, Costs and Benefits

17.3.1a Allocation based on soil type.

17.3.1b The funding method to be adopted for the dam construction and operation has not been finalised but is likely to link to rates and to Water Supply Agreements based on equivalent units at 300m3 per hectare per week.

Water can be allocated on this basis through water permits, which allows landowners flexibility to change land uses.

Council policy normally seeks to allocate on the basis of soil type. Soil types dictate the maximum amount of water needed to sustain a wide range of crops on that soil type. It enables flexibility, but is also linked to efficient use (in part). Efficient water use is also dependant on applying water at a rate that meets crop type needs.

However, allocation based on the funding connection and equivalent rate reflects most accurately the investment made by water users.

It allows investors to manage their own water needs or (see the site to site transfer discussion below) move water to where there may be greater demand.

See also discussion under water quality below.

### Preferred Option

**17.3.1b** Allocation based on equivalent per hectare amount aligned with funding mechanisms.

### 17.4 Waiting Lists and Water Reservation

The amount of water available for allocation with the dam is expected to meet urban needs for at least the next 50 -100 years and existing and potential future irrigation over a significant area of the Waimea Plains (and adjacent areas).

There is less certainty about the potential demand for industrial uses (although some allowance for industrial use has been included in the reticulated community water supplies).

The more relaxed plan provisions (see below) recommended for site to site transfer also mean access to water is potentially easier – water can be transferred between users to meet demand.

An unmet demand for water is unlikely to result under the new provisions – at least in the short to medium term. With no unmet demand, there will be no waiting list developed. A waiting list will only result when all the allocatable water has been allocated and there are not opportunities for site to site transfers.
Waiting lists for water in fully allocated zones outside augmented areas will still be maintained by Council. However, a "short-cut" for those users would be to buy shares in scheme water and install a distribution system to deliver scheme water beyond the zone boundary.

17.4.1 Reservation

In relation to reservation of water, council has identified in the Plan three situations where reservation has been warranted:

1. **Reservation for Maori Perpetual Lease Land** (there is no MPLL such land in the Waimea Plains)

2. **Reservation for future community supply**

   The Council and Nelson City Council have estimated long term urban demand for towns and settlements in the Waimea Plains to about 50-100 years. Such an estimate is by its nature uncertain but Council has used conservative figures that tend to over-estimate growth. This demand will be met by water provided by the dam. The Councils (both TDC and NCC) will hold A shares in the dam company to reflect this future need for water and thus secure future access to water. In this situation the need to reserve unallocated water for future urban growth no longer becomes necessary.

3. **Reserving a proportion of allocatable water for irrigation of highly productive lands**

   Primary production in the Waimea catchment forms a vital component of the region’s economic and social wellbeing. This is reflected in the Council’s land use policies that seek to protect the productive values of high quality land.

   In addition, landowners of irrigable land in the zone of effect are expected to contribute (through rates) to the construction of the dam.

   The recommended plan provisions regarding site to site transfer and restrictions on changes in end use of water (see below) mean that end use of water is otherwise not controlled and water can be reticulated away from the plains or to other end uses (such as industry).

   The Council could consider reserving a specified proportion of allocatable water for irrigation purposes. It complements the policy framework protecting productive values of high quality land and recognises that landowners will make a mandatory contribution through rates to provide additional water for irrigation. It protects landowners’ long term access to water. The proportion to be reserved is a largely arbitrary decision. It will reflect the extent to which irrigated land use within the Plains is provided for in preference to movement to other areas or to other end uses.

   Note that given the already high percentage of water actually being used for irrigation and the uncertainty about alternative water uses, the risk of water moving away from the zone of effect may well not be great.

   The new allocation limit in the affected zones is enough water to irrigate 7765ha of land. The equivalent of 1295ha has been calculated for future urban use. Some 3800ha are currently irrigated or have permits to irrigate.
17.4.2 Options, Costs and Benefits

17.4.2a Reservation for irrigation end uses – say 50% of total allocatable amount.

This is an arbitrary number to reflect the rating obligation on landowners. It is approximately equal to what is already being irrigated. (The Council has reserved 30% of the allocatable water in the Motueka Central Plains for irrigation. There is no rating obligation on landowners there, however).

17.4.2b No reservation for irrigation end uses

The risk that water will be moved to non irrigation end uses in the short term is very low. It is more likely that there will be on-going demand for irrigation water. However, a reservation does complement the imposed rating on land owners and reflects the council’s desire to provide water for productive land uses on high quality land.

Preferred Option
17.4.2a Reservation for irrigation end uses of 50% of total allocatable amount.

17.5 Bona Fide Reviews and Site to Site Transfer

The Plan makes provision for renewals of water permits to be subject to ‘bona fide’ reviews, in which water allocations may be reduced by the Council if the permit is not and not likely to be fully exercised.

However, and as already adopted for the Wai-iti Water Augmentation Scheme, it is not considered reasonable to maintain this bona fide review provision (colloquially known as ‘use it or lose it’) for this augmentation proposal either.

Users should not be stripped of an asset (the water allocation) that they will be required to pay for.

Transfers of water permits pursuant to Section136 of the RMA would allow permit holders to buy or sell their allocations in the water resource, a way to recover their investment, and facilitates more efficient use of the resource. (This opportunity will arise once all the water is fully allocated.)

17.5.1 Options, Costs and Benefits

17.5.1a An option to facilitate transfers of water permit allocations from one point of take to another was examined for the Ministry for the Environment. In this option, the water permit could be divided into two parts: the ‘take’ portion allocates a rate of take subject to scheme supplying it, and specific bore or surface water characteristics at the point of take; and the ‘site’ portion which specifies where and how the water can be used. The latter could include matters considered under a property plan required to manage adverse effects on water quality (see section 18 below).

If permits are defined in two parts, transfers of take could be a Permitted Activity, subject to compliance with the conditions of the “site” portion of the permit (i.e. property plan). A

35 Sinner j, Fenemor AD 2007 Opportunities for separating the take and use of water in planning frameworks and resource consents. Consultancy report for the Sustainable Water Programme of Action MfE
transfer would take effect immediately once the Council was notified of the transfer for their consent register, rather than having to be approved through a consent process.

This option is potentially more bureaucratic as it requires two consents to be held. Administrative complexity is also increased.

17.5.1b An alternative option is for a single take and use water permit to continue to be required as has historically been the practice, but for each consent to have conditions clearly differentiated between the conditions relevant to that point of take and those which are able to be transferred to another point of take.

Essentially this identifies quantity of take to be transferrable but all other site specific conditions must be developed for each point of take including rate of take, application rate and site specific property management plan requirements.

Where the two points of take already exist and site specific information is also available through bore land use consent information for each site then transfers can be more easily accommodated by plan rules.

Where there is a transfer to a new point of take, the site specific characteristics, including bore yield and drawdown effects, and associated use conditions must be first determined.

Transfers of all or part of the quantity specified on a water permit could be permitted provided certain conditions are met – and limited to transfers between groundwater takes in augmented zones where both sites are already existing (i.e transfers between existing bores). Because transfers can only be permitted if the dam has been constructed, most permits in the relevant zones have already been updated according to the new provisions after consent renewals in 2016/17.

Takes from surface water have potential to cause more adverse effects and changing the location needs more careful consideration.

This may be a barrier to short-term transfers (formal sharing such as leases and exchanges) of water allocations among users, which might otherwise be advantageous during dry periods, and submitters' views are welcomed.

17.5.1c Transfers could one day be completed via a web-based platform at low to nil cost to users. This possibility could be developed in time for when the dam is operational.

**Preferred Option**

17.5.1b With a view to developing option 7.5.1c over time.

17.6 Bore Construction and Relocation

In order to align with site to site transfer provisions (see above) and to enable full use of the augmented water resulting through increased groundwater levels, existing bore separation requirements can be reviewed.

Limits on proximity of bores to each other and to surface water bodies are contained in TRMP Chapter 16. New bores are required to be set back at least 100m from adjacent rivers (as a measure to prevent adverse effects on flows within the river).
When a water augmentation project relies on natural distribution of water released from a
dam, such as in the Wai-ti and Lee Dam schemes, water users need flexibility to move
their points of water take (bores, wells or surface water pumps) to access the augmented
water flowing in the river.

The new water regime under the dam scenario means that bores can be located closer to
the river in order to take advantage of the augmented water supply. Conditions may need
to be applied on instantaneous rates of take to prevent adverse effects on the river.

The plan change needs to be clear when new rules apply in relation to implementation of
a community water augmentation scheme, as rules relating to accessing augmented
water (such as bore spacing rules) should only apply when augmented water is made
available.

17.6.1 Options, Costs and Benefits

17.6.1a Allow groundwater takes closer to the river.

(Associated water take consents will need to address effects of the water take on the river
flow)

17.6.1b Leave bore setbacks unamended.

Preferred Option
17.6.1a Allow groundwater takes closer to the river.

17.7 Rationing

A range of measures (trigger levels, flow regimes) can be adopted to deal with low flow
management. New minimum flows and triggers for rationing will be required for the
Waimea and Lee Rivers to take effect when the dam is commissioned and operational.

Total reservoir storage of the dam is 13 Mm$^3$ total storage. When it falls to 2.7 Mm$^3$, this
is equivalent to a 40 year drought based on inflows for storage$^{36}$.

Council would begin consultation with the water users and the dam company about
rationing water when the dam storage volume falls to 2.7 Mm$^3$. This level allows a week’s
consultation while a flow release of 1100 l/sec is ongoing, then 1 Mm$^3$ to ration out before
the dam is empty, leaving 1 Mm$^3$ residual storage.

While the Plan would require the maintenance of the environmental flows specified, it is
also possible that the water company through its operating regime of releases could have
in place its own supply arrangement with users, for example, water saving measures at an
earlier time than proposed here, thereby avoiding any need to ration water at all. It is
expected that the water permit regulating the management of flows from the dam would
address this detail.

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$^{36}$ Fenemor AD 2012. Proposed Changes to the Tasman Resource Management Plan for Implementing Community
Water Augmentation. Landcare Research contract report LC1101 for the Waimea Water Augmentation
Committee. 43p.
17.7.1  Options, Costs and Benefits

The trigger for consultation about rationing would be based on the reservoir volume being at about 2.7Mm$^3$ and which is equivalent to a 40 year drought. Consultation would be with water users and with the dam company managing flow releases from the dam. Council would need to work together with the dam company and water users to ensure efficient use is made of the decreasing water in storage while still maintaining river flows.

The existing sea water rationing triggers will not be needed as the higher river flows will mean sea water intrusion is a much lower risk, not likely until beyond a 60 year drought.

Section 329 water shortage direction will only be necessary if there is a drought that exceeds the specified flow management regime and the dam storage.

The Roding River minimum flow reflects the NCC water supply consent conditions (100 l/sec)

The Wai-iti minimum flows, secured by Wai-iti Dam flow releases, are unchanged.

**Preferred Option**

Introduce new low flow management provisions and rationing triggers based on dam reservoir storage volumes to apply when the dam is operational.

18. Water Quality

The NPSFM and good water management practice requires Council to establish freshwater objectives and set freshwater quality limits for water bodies that are integrated with water quantity management. This applies equally in the with and without dam scenarios and is relevant in this Plan change as there are existing water quality issues of concern as well as a result of the increased intensification of land use enabled by the dam.

One of the requirements for a Government contribution of funding towards new irrigation schemes is that the water quality impacts of increased irrigation be adequately investigated, and, if necessary, mitigated. In any case, to obtain resource consents for the project, an adequate assessment of the potential effects on water quality downstream of the irrigated areas, and mitigation of those effects is needed.

18.1 State of the River - Instream Values

Water quality throughout the middle and upper Waimea Catchment is currently good with relatively low concentrations of dissolved inorganic nitrogen, dissolved reactive phosphorus and faecal indicator bacteria (Hay & Young 2005; Young et al. 2010).

While water quality in the Wairoa and Waimea rivers below Wairoa Gorge is generally good, on about 25% of sampling occasions nitrogen concentrations exceeded guidelines for aquatic ecosystem health (Hay & Young 2005). Phosphorus concentrations exceeded guidelines in less than 10% of samples.

Together, nitrogen and phosphorus contribute to the growth of algae (slimes) and these were particularly noticeable in the Waimea River during the 2000-01 drought.
High water temperatures also occur during periods of low flow at such high levels that they stress or kill trout, native fish and invertebrates. Similarly, algae and limited flow discourage recreational uses of the river such as swimming, boating and picnicking.

Stream health in terms of macroinvertebrate diversity and abundance diminishes in the lower Waimea River particularly after periods of low warm river flow. Analysis by Hayes (1998) showed that macroinvertebrate habitat availability declines sharply at flows less than 1 m$^3$/sec (1000 l/sec). Research by Stark (1992) showed deterioration in macroinvertebrate communities from 1988 to the 1992 drought, with worms more dominant than mayflies that were prevalent earlier.

Fifteen species of fish have been recorded in the Waimea catchment including trout and 13 species of native fish (torrentfish, koura, inanga, bullies, smelt, longfin and shortfin eel). This includes the rare giant kōkopu and lamprey recorded in Pearl Creek. Apart from upland bullie and dwarf galaxias, all native species migrate to and from the sea. Trout also migrate up and down river.

Analysis by Hayes (1998) suggested that a minimum flow of at least 650 l/sec was needed for brown trout to move up the Waimea and Wairoa rivers as far as Clover Road. The state of the trout fishery is reflected in angling effort with declines reported from 2290 angler days in the Waimea catchment in 1996 to 980 in the dry year of 2001 (Unwin et al 1998, 2003).

The overall picture of aquatic life in the lower river is one where summer low flows and high water temperatures are limiting the health of the river and spring ecosystems, and their summertime use, in what is otherwise a diverse ecosystem and regionally important fishery.

### 18.2 Spring Fed Creeks

The spring-fed streams draining the lower Plains have elevated nitrate concentrations. A limited amount of sampling has been conducted in Pearl Creek, Neiman Creek and O’Connor Creek, but concentrations of nitrate-nitrogen in Neiman Creek of up to 15 mg/L have been observed, which is consistent with the concentrations which have been measured in the Hope and Upper Confined aquifers (Stewart et al. 2011).

High nitrate concentrations can stimulate periphyton growth leading to unsightly blooms that will potentially affect dissolved oxygen and pH, and reduce habitat quality. However, based on the ratios of nitrogen to phosphorus in the spring-fed streams it is likely that algal growth in these systems is limited by phosphorus rather than nitrogen (i.e. N:P ratios >15), and therefore increases in nitrogen concentrations are unlikely to result in increased growth or biomass of nuisance algae within the spring-fed streams.

High nitrate levels can also be toxic to aquatic health. Current populations of aquatic species in the springs have developed a tolerance to high nitrate over many decades.

There is also likely to be an impact on water quality in Neiman creek arising from run-off from riparian land.

### 18.3 Groundwater Water Quality

Monitoring of groundwater in the Waimea Plains east of the Waimea River since the 1970’s has shown elevated nitrate concentrations in many places (both in the confined and unconfined aquifers). This contamination includes historic sources of nitrate which has been decreasing over time. However, the continuing elevated nitrate concentrations may mask inputs occurring from current land uses.
There are elevated nitrate concentrations in the aquifers to be augmented by the dam in many places (both in the confined and unconfined aquifers).

The median nitrate-nitrogen concentration of the sampled bores in 2005 was:
- 3.2 g/m³ in the Appleby Gravel Unconfined Aquifer,
- 8.1 in the Hope Aquifers,
- 12.0 in the Upper Confined Aquifer, and
- 11.5 in the Lower Confined Aquifer.

These values compare with the Drinking Water Standard of 11.3 and 3.2 for toxicity to aquatic life in spring-fed streams. This contamination originates from historic sources and current land uses but concentrations have generally been decreasing over time.

### 18.4 Effects of Land Use Intensification on River Water Quality

A water quality report\(^{37}\) looking at the impact of land use intensification effects on water quality scopes the potential changes in nutrient levels affecting water bodies in the Waimea catchment after full implementation of the augmentation dam.

Any intensification of agriculture on the Waimea Plains that is associated with the Waimea Water Augmentation project is unlikely to affect the river directly because it generally loses water to groundwater as it flows across the Plains, at least as far downstream as Challies Island and in dry summers the SH60 bridge at Appleby. Since water draining from the Waimea Plains is unlikely to make its way into this reach of the Waimea River, we consider that there is a low risk of increasing contaminant concentrations in this reach of the river associated with water augmentation.

Further downstream in the Waimea River (downstream of the SH60 bridge), the river gains water from the underlying aquifers and therefore contaminants within the groundwater may contribute to elevated concentrations in the river. However, in all but extreme low flows, the groundwater contribution to river flow will be relatively small and therefore unlikely to increase contaminant concentrations dramatically. Most importantly, the flow releases of water from the Lee Dam with low levels of nutrients will reduce summer nutrient concentrations in the Lee-Wairoa-Waimea river reach.

### 18.4.1 Water Quality Issues of Concern\(^{38}\)

The main concerns with contaminant concentrations are within the spring-fed streams that drain the lower reaches of the Plain. Pearl Creek discharges from the unconfined aquifer gravels west of the Appleby Bridge while Neiman Creek on the eastern side discharges a mixture of waters from the unconfined and upper confined aquifers.

Nitrate contamination in the confined aquifers has been a recognized problem for many years and is caused both by historic land uses and by local runoff from stock and farming practices.

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\(^{37}\) Fenemor, A; Lilburne, L; Young, R; Green, S. 2013 (draft). Assessing Water Quality Risks & Responses for Increased Irrigation in the Waimea Basin. Draft report to the Waimea Water Augmentation Committee.

\(^{38}\) Fenemor, A; Lilburne, L; Young, R; Green, S. 2013 (draft). Assessing Water Quality Risks & Responses for Increased Irrigation in the Waimea Basin. Draft report to the Waimea Water Augmentation Committee.
Intensification of land use on the Waimea Plains associated with water augmentation may contribute to an increase in groundwater nitrate but the increase in nitrate concentrations may be less because of dilution from the increased irrigation drainage losses. Ironically the more efficiently irrigation is practiced, the less dilution is available. Thus there is a risk of an increase in nitrate concentrations in the spring-fed streams.

Increases in phosphorus, sediment and faecal bacteria concentrations are also possible as a result of land use intensification, although less likely because these contaminants are more easily controlled using good farm practices (e.g. stock exclusion from waterways) that Fenemor et al recommend should be mandatory as part of the scheme implementation.

High nitrate concentrations may stimulate periphyton growth leading to unsightly blooms that will potentially affect dissolved oxygen and pH, and reduce habitat quality. However, based on the ratios of nitrogen to phosphorus in the spring-fed streams it is likely that algal growth in these systems is limited by phosphorus rather than nitrogen (i.e. N:P ratios >15), and therefore increases in nitrogen concentrations are unlikely to result in increased growth or biomass of nuisance algae within the spring-fed streams.

Given the values in the Waimea River, spring-fed streams and Waimea Inlet, the following numeric objectives in Table 3 could be set to protect these values. It would be possible to convert these concentrations into loads, which could be ‘allocated’ as limits to land parcels throughout the catchment.

Current water quality meets most of these objectives most of the time. The main exception is the high concentrations of nitrate in the spring-fed streams, particularly Neiman and Pearl Creeks. Borck Creek has lower instream values but is also affected.

There is currently a risk of nitrate toxicity effects on sensitive species present in these streams.

These existing nitrate concentrations are a legacy of land use on the Waimea Plains from at least the 1940’s (Stewart et al. 2011).

There may be a considerable lag time for the effects of current land use to be felt on the spring-fed streams, and any effects of future land use may not become apparent for many decades.

Table 3: Numeric Objectives associated with Maintaining Various Values within the Waimea Catchment and Waimea Inlet.

<table>
<thead>
<tr>
<th>Waterbodies</th>
<th>Safe swimming</th>
<th>Safe drinking</th>
<th>Limited risk of nitrate toxicity</th>
<th>Control freshwater periphyton growth</th>
<th>Limit macroalgal blooms in the Waimea Inlet</th>
<th>Limit total N load from Waimea River and spring-fed streams less than 535 tonnes/year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Waimea River</td>
<td>Safe swimming</td>
<td>Safe drinking</td>
<td>Limited risk of nitrate toxicity</td>
<td>Control freshwater periphyton growth</td>
<td>Limit macroalgal blooms in the Waimea Inlet</td>
<td>Limit total N load from Waimea River and spring-fed streams less than 535 tonnes/year</td>
</tr>
<tr>
<td>95th percentile values of E. coli shall be &lt;260/100mL</td>
<td>N/A</td>
<td>Annual average NO$_3$-N shall be &lt;1.7 mgN/L</td>
<td>Dissolved reactive phosphorus concentrations &lt;0.026 mg/L</td>
<td>Total N load from Waimea River and spring-fed streams less than 535 tonnes/year</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spring-fed streams</td>
<td>N/A</td>
<td>N/A</td>
<td>Annual average NO$_3$-N</td>
<td>Dissolved reactive phosphorus</td>
<td>Total N load from Waimea River and spring-fed streams less than 535 tonnes/year</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Groundwater</td>
<td>Nitrate-nitrogen concentration</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>----------------</td>
<td>-------------</td>
<td>-------------------------------</td>
<td>----</td>
<td>----</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>N/A</td>
<td>&lt;11.3 mg/L</td>
<td>*</td>
<td>*</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>*</td>
<td>*</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Concentrations in groundwater need to be considered in relation to limits on the spring-fed streams

### 18.5 Gaps and Risks

There are existing concerns with Nitrate levels in groundwater and in the coastal spring fed creeks, especially Neiman and Pearl Creek. Some of the impact of the high nitrate in the springs may be limited by low phosphorus levels. Riparian management is also likely to affect water quality in Neiman Creek.

There are some gaps in understanding the relationship between phosphorus and nitrogen in the springs and the risk posed by land uses in the wider catchment.

The level of “good industry practice” currently adopted by land owners is also uncertain. The requirements for and costs of good industry practice have not been identified or quantified for either existing or potential new irrigators. The difference in nutrient losses between current land uses and potential intensification has been based on assumptions about industry practice which require further analysis. There is also a need to consider options for variable land management regulations according to location and sources of nutrients to the springs.

Because of these uncertainties and gaps, the possible options available for managing nutrient impacts from more intensive land uses have not yet been fully examined.

However, it is possible to indicate some of the likely management actions to address some of the known risks.

### 18.5.1 Options, Costs and Benefits

Management of the adverse water quality effects arising from land use intensification will be mostly through water permits to downstream water users, especially irrigation uses.

Given the influence of localised runoff and stock access especially at Neiman Creek, which has the highest nitrates, stock access and runoff from adjacent land uses into spring fed creeks including Borcks creek should be prevented.

The Council intends to require as a condition of consent for water take and irrigation use permits (including all those subject to renewal in 2016/17) the development of property irrigation and nutrient management plans based on good industry practices which maximise water use efficiency and minimise the loss of nutrients and other contaminants to groundwater – the nature of these requirements has not been specified as yet – and depending on current practice, may increase costs for some irrigators.

On-going monitoring to detect any trends will be established and council will work with land owners to manage riparian land around the springs.

Further, all of the possible options available for managing nutrient impacts have not yet been fully examined and further input from submitters is being sought on this issue.
The limits suggested in Table 3 could be adopted as management objectives, although exceptions could be made that reflect the current state of the water quality.

If the water quality deteriorates, Council could implement options to prevent further degradation. This includes the setting of per property load limits (effectively land use/management limits) for the contributing up-gradient areas. This is difficult to implement in retrospect as land use investments would already have been made. Engineering solutions such as diluting the water in the springs with water having lower nitrate levels can also be ways of managing nitrate toxicity.

Preferred Options

- Maintenance of water quality at current levels
- Irrigation and nutrient management plans as a condition of any permit to take and use water.
- Monitoring the quality in the spring fed creeks
- Riparian land management

19. Water Management WITHOUT a Dam

19.1 Allocation Limits and Rationing

Setting the allocation limits in the Waimea Plains is dependent on decisions made in relation to water management objectives for the Waimea River. The Council’s preferred objective is to maintain a flow of 800 l/sec in the Waimea River as discussed in section 10 above. Decisions made in relation to desired water management objectives will direct the selection of minimum flow at Appleby and this in turn will affect the users’ security of supply at the current allocations. Current allocations are shown in Table 4 below.

<table>
<thead>
<tr>
<th>Water Management Zones</th>
<th>Allocation Limits Initially Proposed in 2001</th>
<th>Current Water Allocations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reservoir</td>
<td>826</td>
<td>809</td>
</tr>
<tr>
<td>Upper Catchments (Wairoa, Lee and Roding Rivers)</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Waimea West</td>
<td>178</td>
<td>207</td>
</tr>
<tr>
<td>Hope and Eastern Hills</td>
<td>97</td>
<td>113</td>
</tr>
<tr>
<td>Golden Hills</td>
<td>113</td>
<td>113</td>
</tr>
<tr>
<td>Delta (additional controls in coastal margin)</td>
<td>1000</td>
<td>804</td>
</tr>
<tr>
<td>Upper Confined Aquifer</td>
<td>147</td>
<td>153</td>
</tr>
<tr>
<td>Lower Confined Aquifer</td>
<td>230</td>
<td>205</td>
</tr>
<tr>
<td>Redwood Valley</td>
<td>none</td>
<td>1.86</td>
</tr>
<tr>
<td>Total</td>
<td>2594</td>
<td>2418</td>
</tr>
</tbody>
</table>

Whatever the chosen flow regime, it is clear that existing allocation exceeds supply in dry years (see Table 5 below). The pattern of allocation is such that rationing will be
required much more often than the Council’s stated security of supply (35% cut in allocated water for a ten year drought) and the resource can be said to be over-allocated.

Besides not achieving the target security of supply for water users, neither has it been possible to maintain any minimum flow in the Waimea River during droughts of 27 year return period (2000-01) despite rationing cuts of up to 60% of allocations in some zones. At a minimum flow of 800 l/sec, it is estimated that current allocation limits would need to be cut by 50% to maintain the Council’s 10-year security of supply target.

The Figure below shows the actual and maximum levels of rationing reached for recent and historically dry summers. They are shown in comparison with the target (stepped solid line) and return period of the drought for that summer. It highlights that since 2000/2001, the first significant drought since 1982/83, the security of supply target has not been met in every year.

![Waimea Rationing Steps & Actual Maximum Cuts in Allocation](image)

**Figure 1: Waimea Zones Rationing Steps and Allocation Cuts**

The approximate cuts required are given in Table 5 but a starting point as the hydrological system isn’t linear (groundwater storage plays an important role for example in buffering river flows). They simply provide approximate numbers to include in this evaluation of alternative options, but are not yet robust enough to support some specific zonal allocation limits.

**Table 5: Level of Over-Allocation for Various Minimum Flow Regimes for a 10-Year Drought (estimated)**

<table>
<thead>
<tr>
<th>Level of Over-Allocation (estimated) based on a 10-Year Drought</th>
<th>Minimum River Flow (l/sec (@Appleby))</th>
</tr>
</thead>
<tbody>
<tr>
<td>22%</td>
<td>250</td>
</tr>
<tr>
<td>36%</td>
<td>500</td>
</tr>
</tbody>
</table>

The table below shows how the minimum number of days of rationing will be required (modeled on existing water use) to maintain the river flow at the minimum flows specified. These are minimum numbers of days because the modeling assumes that each rationing step lasts 2 weeks regardless of how fast low flows are falling at Appleby, and that rationing doesn’t ever go beyond 50%.

To maintain minimum flows of even 500 or 800 l/sec based on current levels of allocation across the Plains under ‘cease take’ rules, water users (other than community water supplies) could expect to be required to cease taking any water sometime every 2 years.

Table 6: Effects of Rationing on Abstractive Users

<table>
<thead>
<tr>
<th>Drought</th>
<th>Minimum River Flow at Appleby (l/sec)</th>
<th>Days with Rationing</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>All rationing</td>
<td>Days with</td>
<td>All</td>
<td>Days with</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>step 3 rationing</td>
<td>rationing</td>
<td>Step 3 rationing</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(50% reduction)</td>
<td>(50%</td>
<td>(50% reduction)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>reduction)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1982/83 (25 year)</td>
<td></td>
<td>79</td>
<td>21</td>
<td>114</td>
<td>26</td>
</tr>
<tr>
<td>2000/01 (27 year)</td>
<td></td>
<td>91</td>
<td>37</td>
<td>94</td>
<td>38</td>
</tr>
<tr>
<td>2004/05 (average year)</td>
<td></td>
<td>4</td>
<td>0</td>
<td>12</td>
<td>0</td>
</tr>
</tbody>
</table>

The figure below shows the approximate current level of supply security for existing water users. The two dashed lines represent differing assumptions about the extent of rationing which Council could impose. The higher dashed line assumes overall water restrictions would not exceed a cut of 70% while the lower line represents a ‘cease take’ scenario after the 3 stepped cuts in allocation used currently.
Figure 2: Drought Frequency and Security of Supply

Note that in order to maintain these flows at Appleby, triggers for rationing are set at Wairoa at Irvine’s (a site above all the abstractive takes).

The typical flow recession curve for the Waimea River and the drought frequency show the river flows fall quite rapidly. Allowing for a 2 week lead in for any rationing the following table also shows what the river flow at Irvine’s would be to initiate consultation about rationing.

Table 7: Triggers for Rationing to Maintain Various Minimum Flows

<table>
<thead>
<tr>
<th>Minimum Waimea River Flow (L/sec at Appleby)</th>
<th>Cease Take for Some End Uses (Water shortage directions issued as per policy 30.2.3.1) (L/sec at Irvine’s)</th>
<th>Step 1 Trigger for Rationing (L/sec at Irvine’s*)</th>
<th>Trigger for consultation (L/sec at Irvine’s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1100</td>
<td>2400</td>
<td>3200</td>
<td>4000</td>
</tr>
<tr>
<td>800</td>
<td>2300</td>
<td>3000</td>
<td>3500</td>
</tr>
<tr>
<td>500</td>
<td>2125</td>
<td>2900</td>
<td>3200</td>
</tr>
</tbody>
</table>

*Based on averaged historic WEIC take rates about 300 l/s with peaks at 500 – 600 l/s. (The consent authorises a peak take of 700 l/s)

A consultation trigger that allows a reasonable lead-in time for water users to implement those cutbacks means that the trigger for Step 1 rationing to maintain an 800 l/sec flow would have to be 3000 l/sec at Wairoa Gorge.

This is a level where consultation about water rationing would be occurring every summer, and actual restrictions would be imposed on average every second summer. Water users can expect that in some summers a complete cessation of water takes will be required to maintain minimum river flows.

Northington partners\(^40\) have considered the costs of maintaining a minimum of 1100 l/sec flow under two scenarios:

A. **All permits have allocations reduced by 70%**
   In the worst case scenario (maintaining 1100 l/sec) allocations are reduced and would be sufficient to irrigate 705ha. Aggregate loss is estimated at $165m.

B. **Permit allocations are reduced but there is an increased frequency of rationing and cut-backs.**
   The impact is less immediately catastrophic, but at a 1 in 25 year drought is estimated between $14.4m - $19.1m. These estimated losses are between 45% and 65% of total earnings from irrigated land during a ‘normal’ year.

The rationing for an 800 l/sec flow was also modeled but costs weren’t specifically addressed in that report. However, given the number of days with rationing (Table 6), costs under the 800 l/sec flow at Appleby will also be significant for users. (Calculated from the above figures losses would be $10.3m - $13.6m under the increased rationing scenario).

\(^40\) Financial and Economic Assessment of Water Augmentation in the Waimea catchment; Northington Partners January 2010
19.1.1 Options, Costs and Benefits

There are four potential policy responses by the Council to the setting of the higher minimum flow of 800l/sec and the management of the over-allocation in the Plains. Although the effects on users are similar, and they impact heavily on summer water use, especially on irrigators:

19.1.1a No Allocation Limits - but given the stated over-allocation issues, adopt sinking lid to water allocation.

With no allocation limit specified, the progress towards more sustainable (both in terms of in-stream uses and the abstractive users) is unknown. The standard of security is uncertain and this approach leaves water users with poorly defined water allocation provisions rights. In addition, the NPSFM requires, not only the setting of water management objectives, it also requires the setting of limits.

However, the approach does reflect the current interim management approach and its consequences have already been apparent to water users. The NPSFM is not specific about what constitutes an allocation limit and the regime above does allow water users to gauge the impact of the allocation regime on their security of water supply.

19.1.1b Reduce Allocation Limits Across all Zones

Maintain the target security of supply stated in the Plan (a 35% cut in allocations during a 10 year drought) by evenly reducing allocation limits for each Waimea water management zone.

Reductions could be pro rata across all existing permits and the level of cutbacks would be 50% as shown in Table 5. The new allocation limit under this option would be 1203l/sec. Any reduction in any zone will contribute to moving closer to sustainable allocation.

A second allocation approach reduces allocations for each zone depending on its hydrological connection with the river. This is shown in Table 8 below.

Table 8: Allocation Limits Accounting for River Contribution

<table>
<thead>
<tr>
<th>Water Management Zones</th>
<th>New Allocation Limits</th>
<th>Current Water Allocations (sum of all the current permit allocations)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(l/sec)</td>
<td>River Contribution Factor</td>
</tr>
<tr>
<td>Reservoir</td>
<td>365</td>
<td>3</td>
</tr>
<tr>
<td>Upper Catchments (Wairoa, Lee and Roding Rivers)</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Waimea West</td>
<td>95</td>
<td>3</td>
</tr>
<tr>
<td>Hope and Eastern Hills</td>
<td>70</td>
<td>1</td>
</tr>
<tr>
<td>Golden Hills</td>
<td>70</td>
<td>2</td>
</tr>
<tr>
<td>Delta (additional controls in coastal margin)</td>
<td>370</td>
<td>3</td>
</tr>
</tbody>
</table>
The plan will allow renewals in the Redwoods zone (subject to bore yield) but no new takes.

This option will require allocations to be reduced significantly on current water permits across the Waimea basin. (This was one of the least popular options when considering how to manage over-allocation in the Wai-iti Zone prior to construction of the Kainui Community Dam).

19.1.1c Reduce Allocation Limits Across all Zones – Targeted Reductions

Council could consider a new allocation regime based on specified criteria (such as crop type for example, or security of supply at the point of take) to ensure existing significant investment is somewhat protected. It would essentially be picking winners based on current investment and economic benefit to the region.

19.1.1d Allocation Limits (sum of total water currently allocated in each zone see table 3) – but no new permits and early rationing.

This is mostly a status quo option but its impact depends on what river management objectives are adopted. Rationing can be very severe and security of supply is very low.

19.1.1e Staged Approach

Adopt staged approach to more sustainable allocation limits. Initial allocation (based on sum of total water allocated in each zone) to be reduced over time until new sustainable limits (those specified in 19.1.1b are reached. The allocation limit in Table 8 could be applied in a staged approach over the next two permit renewals – the first permit renewal in 2016/17 would concentrate on bona fide reviews and crop/soil allocations while the next review could include a more rigorous bona fide review as well as pro rate reductions across all the permits.

The options can allow for permit renewals but allocations are reduced to the extent necessary by the measures listed below.

Security of supply under either (d) or (e) is also immediately reduced by imposing earlier water rationing to maintain the higher 800l/sec minimum flow. No new permits could be sought, and any reductions in allocated water would not be re-allocated (until sustainable limit is reached in option (e))

Clearly, the ‘no dam’ scenario, with the projected increases in minimum flow to either 500 or 800 l/sec, would have a major effect on water users’ security of supply and would prevent any new water uses.

**Preferred Option**

19.1.1e Adopt staged approach to reducing allocations to the more sustainable limits given in Table 8 for each zone (as required to meet specified river objectives) by adopting “sinking lid” (see mechanisms in section 19.2 below)
Security of supply is gradually increased for remaining allocations but over two water permit durations.

### 19.2 Efficient Water Use, Soil/Crop Type Application Rates

#### Water and Allocation Reductions

In the absence of a dam, and in circumstances where over-allocation has occurred, it is important that the Council’s allocation regime is effective and efficient and that allocatable water is used efficiently. This is especially so during droughts when the amount of allocatable water is greatly reduced.

For any of the options permits to take and use allocatable water can also be subject to provision of irrigation management plans (consistent also with efficient use in the with dam scenario).

The interim allocation regime currently allows for 350m³/ha/week.

#### 19.2.1 Soil-Based Allocation

Allocation for irrigation can be on the basis of both crop and soil type. Some soils have better moisture holding capacity and require less than others to meet plant demand.

A soil type application rate is used routinely elsewhere in the District.

If the soil based regime is used, then any users irrigating soils that require less than 350 m³/ha/wk will have permit allocations reduced accordingly.

In practice, it means a landowner with Wakatu Soils for example, should only apply the required 27mm (270 m³/ha/wk). The “remaining” water is left in the river/groundwater and provides a ‘buffer’ both for the grower against any rationing and for environmental flows. The “extra” may also be used to irrigate a larger area of land than is used to calculate the amount authorised on the permit. In this case, the effects of rationing are immediate.

The impact of this regime is shown in Table 9 below.

**Table 9: Application Rates for Waimea Soils**

<table>
<thead>
<tr>
<th>Soil Types</th>
<th>Rate (cubic metres/ha/week)</th>
<th>Rate (millimetres/week)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Braeburn</td>
<td>250</td>
<td>25</td>
</tr>
<tr>
<td>Dovedale</td>
<td>300</td>
<td>30</td>
</tr>
<tr>
<td>Mapua</td>
<td>190</td>
<td>19</td>
</tr>
<tr>
<td>Waimea</td>
<td>300</td>
<td>30</td>
</tr>
<tr>
<td>Wakatu, Richmond</td>
<td>270</td>
<td>27</td>
</tr>
<tr>
<td>Riwaka, Māori, Sherry</td>
<td>300</td>
<td>30</td>
</tr>
<tr>
<td>Ranzau, Motupiko, Hau</td>
<td>350</td>
<td>35</td>
</tr>
</tbody>
</table>
19.2.2 Crop-Based Allocation

For efficient use of water, actual application of water should also account for the amount required by the crop. The amount required by crop can vary considerably as shown in Table 10 below.

### Table 10: Application Rates for Different Crops

<table>
<thead>
<tr>
<th>Crop Types</th>
<th>Rate (cubic metres/ha/week)</th>
<th>Rate (millimetres/week)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apples</td>
<td>350</td>
<td>35</td>
</tr>
<tr>
<td>Grapes</td>
<td>140</td>
<td>14</td>
</tr>
<tr>
<td>Kiwifruit</td>
<td>350</td>
<td>35</td>
</tr>
<tr>
<td>Berryfruit</td>
<td>290</td>
<td>29</td>
</tr>
<tr>
<td>Stonefruit</td>
<td>290</td>
<td>29</td>
</tr>
<tr>
<td>Market Gardening</td>
<td>350</td>
<td>35</td>
</tr>
<tr>
<td>Pasture</td>
<td>350</td>
<td>35</td>
</tr>
<tr>
<td>Any other</td>
<td>300</td>
<td>30</td>
</tr>
</tbody>
</table>

Water users are expected to use water efficiently and there is no compliance monitoring to ensure this occurs. As with soil types allocation it means a grape grower for example, only applies the required 19mm.

19.2.3 Options, Costs and Benefits

19.3a Allocation on the basis of both Soil Type and Crop Type

It is estimated that on the basis of crop and soil allocation it is likely that allocations will drop by 20 -30%. This is a ‘paper’ reduction and is reflected in new quantities on water permits. While the new allocation should reflect what is currently being used under efficient irrigation regimes, although in some cases the allocated water is used to irrigate additional land.

The effect of reducing the permit allocation to reflect crop type (as well as soil) is to expose all water users to rationing at the same time as everyone else. Grape growers for example no longer have a buffer against step 1 or 2 rationing. Where the ‘extra’ water is used to irrigate a larger land area, the effects of rationing are even more severe.

The other effect of crop based allocation (where water is fully allocated) is to reduce landowners’ opportunity for changing crop types from low demand to higher demand crops. Flexibility to meet market demand is reduced and this imposes constraints on landowners’ ability to maximise profits.

Council does not currently allocate based on the type of crop.

19.3b Drought Management that includes a Dry Weather Task Force

Council’s drought management regimes can be further developed and made more responsive through more streamlined administrative processes that allow for all water users to manage available water and demand within a water management zone.

The Dry Weather Task Force can continue to assist in managing cutbacks to maintain the 800l/sec minimum flow.
19.3c **Provisions to enable Water Sharing or Rostering during Low Flows**

Council may consider enabling “sharing” or “rostering” available water during low flow periods across water management zones. While this maximises the use of available water, and enables supply to meet most high value need, it will be difficult in practice to choose who should receive water across a zone. Rostering may be easier to manage equitably, although this places more pressure to use all available water.

This is potentially administratively complex, and relies on good water meter data management.

19.3d **Bona Fide Reviews**

The bona fide review and water permit transfer policy currently enables permit holders to transfer unused water permits to another site, in preference to having a reduction in allocation as part of a bona fide review.

A bona fide review was commonly referred to as a ‘use it or lose it’ approach to water management. Because water permits have an associated capital value (often reflected by higher land values where there is a permit) this policy has a risk of creating perverse incentives to waste water just to show a record of use and adversely affecting relationships between the council and water users.

However, a transfer of un-used water has the potential to increase total water use.

Given the over-allocation and resulting reduced security of supply in the Waimea water management zones, opportunities to transfer water from site to site could be reduced and greater reliance placed on bona fide reviews to assist in reducing the amount allocated. This will prove difficult in practice because of the perverse incentive but also because any water permit allocation becomes increasingly valuable as the total allocated is reduced and reductions become increasingly difficult to make.

19.3e **Permit Durations**

Permit durations could be reduced to enable a more rapid progress to the more sustainable allocation limits. A term of say 10 years may be more appropriate in this situation.

Every time a permit is renewed imposes administration and other costs on water users.

19.3f **Limit options for site to site transfer** so that there is no net increase in water used.

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**Preferred Option**

All of those listed in 19.3 expect for provisions for rostering during droughts. (Note that this does not prevent property owners from applying for changes to consent conditions that allow for allocation sharing between properties.)

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**19.3 Waiting Lists and Reservation for Water**

Waiting lists could continue to be maintained, although any prospect of water is remote given the need to reduce allocations under the above allocation limits. The administrative effort involved in the maintenance of the lists could be suspended until allocations are
reduced to more sustainable levels, however the waiting list provision linked with the allocation limit does provide for prohibited activity status for new allocations.

Options for provision of water to meet future community water demand are much more limited. Existing allocations are predicted to meet demand for the next 20 or so years.

While there is policy to reserve allocatable water for future urban use, where there is full (or over-allocation) reservation no longer becomes possible.

Existing policy already provides some direction:

**30.2.3.3** To recognise and provide for the existing and potential future water needs of communities by:

(a) taking into account the effects of future community growth on available or potentially available water supplies, within the limits of any applicable allocation limit, especially in the Waimea water management zones, and the Hau, Marahau and Moutere Surface Water zones when making decisions on resource consent applications for subdivision or Plan changes to zoning;

(b) assigning priority for available water to the water supply needs for the maintenance of public health during times of drought;

(c) reserving water within any allocation limit for future expected community growth;

(d) investigating and adopting, if appropriate, according to Policy 30.3.3.3, other options, including water augmentation, water use reduction, and water re-use and recycling, for ensuring water demand for future growth is able to be met.

(e) declining applications for subdivision or zoning change if sufficient reliable and potable water is not available;

(f) taking into account the potential effects of severe drought in the stated level of service objectives in the Council's asset management plan for water supply.

The nature and scale of the potential community water demand for the Waimea communities means this is a potentially significant issue for Council.

**19.4 Options, Costs and Benefits**

**19.4a Options include investigating alternative sources to meet this demand.**

Any decisions about alternative sources will need to be made through separate decisions making for asset management. The engineering department has already considered this in general terms only, and while construction of other augmentation (smaller) dams or storage ponds on flat land in the Plains are possible, they would need further investigation and are likely to be costly.

**19.4b Council could also purchase irrigated land with current water allocations.**

Depending on how allocation limits for allocatable water are set in 19.2, there may only be a small amount of land available, or security of supply may be unacceptably low for urban uses. Note that with a low flow of 800l/sec and an allocation limit of 1209 only about 770ha would have a water supply at the stated security of supply standard.
19.4c The RMA also enables the Council to allocate water or (in anticipating expiry of consents) re-allocate water to other activities.
This would enable Council to divide available allocations and essentially reserve water for community supply from within the existing allocation.

<table>
<thead>
<tr>
<th>Preferred Option</th>
</tr>
</thead>
<tbody>
<tr>
<td>19.4a</td>
</tr>
</tbody>
</table>

19.5 **Bore Construction and Relocation**
No changes to the water resource mean the bore location requirements can remain as they are currently.

20. **Expiry Dates for Resource Consents**

20.1 **Dam Consents**
The resource consent costs for activities involved in the construction and on-going operation of the dam are likely to be significant.

Land use and Building Consents are not constrained by a term of consent, but water and river bed activities (such as the dam structure) are.

The decision for duration of the permit for the dam structure is guided by Part IV (schedule 28A)

There is no similar guidance for either the damming or the discharge consents in Parts V or VI.

20.2 **Water Permits to Take Water**
The expiry dates for all permits in the relevant water management zones can be reviewed as part of this plan change to reflect the changed nature of water management in this zone.

20.3 **Common Expiry Dates**
The rationale and policy direction for common expiry dates has previously been the subject of some debate by consent applicants and industry groups, but at this stage the principle of common expiry dates is not the subject of the plan change.

A permit duration consistent with any infrastructure investment is a useful management option that acknowledges the investment as well as linking it to the cumulative resource effects.

Current Wai-iti Service Zone take consents all expire in 2016 and there is no date specified in the Plan for the next expiry date.
Longer durations for consents in these managed catchments are likely to be sought to reflect the augmented supply and nature (permanence and significance) of the associated infrastructure.

Relevant matters that would need to be taken into account are the degree to which the dam provides a secure augmented water resource environment. Additionally the Council has also adopted measures to maintain natural water flows through minimum (environmental) flows and rationing.

Furthermore, where actual water use within the zone is low, the effects of both full demand coupled with a dry year scenario needs to be tested.

### 20.4 Options, Costs and Benefits

#### 20.2a
A policy review could support the existing common expiry date regime, including greater detail about reasons for common expiry dates and the specified consent durations in Schedule 31A.

For example, common expiry dates are supported by the following reasons:

- Information about uses and values, data about river flows, cumulative effects of permitted and consented takes, groundwater - surface water interactions, etc. can change over time.
- Changes in use patterns, technology, and data over time drives the need to have good control over the combined effects of all takes (permitted and consented), and the ability to examine consented takes at periodic intervals.
- A common expiry date allows management of the cumulative effects of all the users on a consistent and equitable basis.
- If resource information has changed in the interim, everyone can be informed of possible changes to the water allocation regime before renewal processes start. This approach allows for consistent and integrated management of a connected resource (which could include both groundwater and surface water).
- The 15-18 year duration is a reasonable balance between managing risks of water takes on water resources and on providing good certainty for water users
- Longer durations where a take is supported by significant augmentation infrastructure

#### 20.2b
Include more guidance in Part V (such as given in Schedule 28A) for the setting of permit duration on damming and discharges from dams and other water permits where no expiry dates are specified. Maintain common expiry dates.

#### 20.2c
No changes

This leaves a potential gap or imposes unnecessary costs for water permits that are dependent on significant infrastructure.
21. **Other Dam Options**

The construction of the Lee Dam will have a range of adverse effects including loss of habitat and recreational opportunity, and changes to flood flow regimes.

These adverse effects could be offset by limiting any other damming opportunities on the main stem of the Wairoa River and the remainder of the Roding River main stem within TDC boundaries.

The feasibility studies identified a number of other options for dam sites in these eastern catchments. The upper Lee site was ranked most favourable and is the preferred site for Council and the WWAC. While the possibility of other parties seeking consent for dams to be constructed elsewhere is probably remote, prohibiting construction of dams elsewhere in these catchments does provide for comprehensive management.

The draft rule allows for smaller dams on tributaries and renewal of consents for the Lee Dam and changes to the Roding Dam for Nelson City.

### 21.1 Options, Costs and Benefits

**21.1a** The Council could clarify that if the Lee Dam is to be built as intended, there is sufficient water for the Waimea Basin including Nelson City over a 100 year planning horizon and the TRMP provides a strong signal that additional major dams in the catchment would not be able to obtain consent.

**21.1b** Or not.

### Preferred Option

**21.1a** That construction of other dams on the main stem of the Lee, Wairoa and Roding Rivers is a prohibited activity.