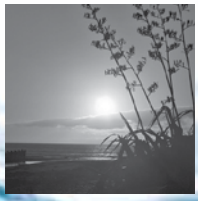
Kapiti Coast

Option Selection Report



4th March 2010

Prepared for Kapiti Coast District Council by CH2M Beca

Project Sponsor	Kevin Jefferies
Project Manager	Phillip Stroud
Report Editor	Greg Pollock
Graphics	Nikita Bazalo
Contributors	Doug Stirrat; Kirsten Mandeno; Alastair McNabb; Andrew Watson; Louis Ferreira; Greg Pollock; Charlotte Crack; Lesley Hopkins; Phillip Stroud; Sean Mallon; Peter Knight; Travis Wood
Acknowledgements	Technical Advisory Group
Approved for release by	Andrew Watson

Revision #	Prepared By	Description	Date
A	Beca	Option Selection Criteria 2A - Draft	5 Feb 2010
B	Beca	Option Selection Report - Draft	19 Feb 2010
C	Beca	Option Selection Report	4 March 2010
D			

Contents

1 Introduction

The per capita consumption of water, and population growth, combined with limited success to date in significantly reducing peak water demand, means that the summer water demand has severely stretched the Kāpiti Coast District's bulk water supply. The existing supply at Waikanae is under pressure, both in terms of overall quantity and water taste and other quality issues from the supplementary bores. Kāpiti Coast District Council (Council) is therefore embarking on a process to identify the most suitable option for providing water to meet its communities' needs for the next 50 years. Formally, this project is titled the *"Water Supply Capacity Review and Options for Supplementary Supply Project"* (the Project).

The initial stage of the Project included identifying potential water supply options from a review of previous investigations for water supply solutions and taking them through an initial coarse screening. Much of the information was historical and so the resulting *"Preliminary Status Report"* also identified information gaps and where updates of specific data was required. The primary purpose of the Report was for Councillors to make preliminary decisions on the range of options that should be considered as well as provide background information to ensure the public was informed and able to fully participate in the option selection process that was the next step of the Project. The Preliminary Status Report recommended that 31 of the 40 options indentified be carried forward to Stage Two of the project and the report was adopted by Council on 17 December 2009.

The next step of the Project was to define the methodology that will be used in order to select the preferred options for short-listing.

For this project, Council has committed to consulting the community in relation to identifying criteria to apply to option selection. The aim being to gain guidance from the community in terms of the criteria that should be used to make a decision in the first instance, and then applying those criteria to the options that can feasibly solve the water supply problem.

1.1 Purpose of this Report

The purpose of this report is to:

- Describe the methodology to be used to evaluate options;
- Summarise the public and stakeholder consultation undertaken to date in relation to the option selection criteria;
- Describe the multi-criteria assessment process used to evaluate the list of options;
- Provide an analysis of the results of the options; and,
- Recommend a short-list of options to carry forward to Stage Three of the Project.

1.2 Background

Council's normal water supply is based on a run-of-river system on the Waikanae River. For dry summer periods this supply is supplemented by a borefield in Waikanae. Water from the borefield whilst meeting the drinking water standards has been criticised by some consumers for its taste and hardness. The existing water supply system for the Waikanae, Paraparaumu and Raumati (WPR) area that is sourced from the Waikanae River and borefield is nearing capacity for the demands placed on it by the existing population. The Development Management Strategy and recent Plan Changes have introduced significant changes for new development in terms of water demand management, to ensure consistency with Council strategy. However, overall per capita demand for existing and projected population continues to place pressure on the system. Options for a more extensive water conservation programme are being reviewed by Council Officers in parallel with this water supply project. Council has been actively considering additional water sources and options for improving the security of supply from existing sources since the early 1990s. Following various unsuccessful attempts to resolve water supply concerns, the Council developed a Sustainable Water Management Strategy in 2003. In 2003 it proceeded with investment in the Waikanae Borefield within a very tight consent timeline, alongside a water conservation programme which has started to show that conservation measures are an important part of the water management regime. However, projections show that even with further conservation improvements, additional supply will be needed soon.

The overall philosophy has been further reinforced by the adoption of the 2009 LTCCP, which states;

"The district has historically been a heavy water consumer in comparison with other Councils. The Council's 2003 Sustainable Water Use Strategy has a 50 year focus and is concerned with reducing demand for water and providing a supply within a 'reasonable water use' standard. Implementation of the strategy will assure the long term sustainability of our region's water resources and ensure adequate infrastructure capacity to fit new population demand – within reasonable water use targets."

The level of service targets as defined in the 2009 LTCCP for water supply capacity and reliability are that;

Peak water consumption of no more than 400 litres per person per day (L/person/day) plus an allowance for leakage by 2012/13 at all times:

- 250 L/person/day for essential use
- 150 L/person/day for non-essential use
- Plus leakage or unaccounted for water

(assumed at 90 L/person/day)

The standards are adopted as targets and will guide the amount of investment there will be in new supply and water storage in an area. For example, the recent water plans (each supply's management plan) take this standard into account. The standards will also guide the demand management programme.

Project Objective

Council's overall objective in terms of water management is: *"to secure water supply for the whole district for the long term by both investing in additional supply and consumption conservation (demand management). To meet the objective to provide a secure supply into the future for the district, options are to be developed, investigated and implemented for additional supply capacity in the Waikanae, Paraparaumu and Raumati area, and longer term for the wider district. All options are to be considered. All issues relating to public perception about aesthetic values are to be responded to."*

A key part of Council's Water Management Programme relates to water conservation. Council is focused on developing water conservation measures that are practical for the community, to assist in achieving a reduction in per capita or per household usage.

1.3 Context for Decision Making

The Preliminary Status Report (December 2009) sets out the policy context for making a decision on water supply for the WPR area. In terms of setting some context for this report, there are two key items that are noted. These relate to whether options are 'in-catchment' or 'out-of-catchment' solutions, and secondly the relationship between water supply options and water conservation.

1.3.1 In-Catchment and Out-of-Catchment Water Sources

The 'Water Matters' strategy is a particularly important document, as this summarises Council policy position in relation to both water supply and water conservation. This document also captures the views of tāngata whenua and the wider community in relation to sustainable water management.

The analysis framework set out in the report aims to provide an objective basis for evaluating options and producing a recommended short-list. However, there are a number of other matters Council must consider when making a decision on the short-list, and these matters are addressed in this report.

The first is that the 'Water Matters' strategy contains a number of principles, including:

> As an initial principle, the development of water supply systems will focus on catchment based solutions, provided that there will be assessment of the risks and costs of in-catchment options at each development stage against the potential (if any) for cross catchment and/or regional solutions to reduce immediate risks to security of supply.
>
> The comparative risk analysis will be undertaken in conjunction with iwi and with explicit reference to impacts on the mauri of waterways, risks to the mauri, food sources and ecosystem health and iwi perspectives on the mixing of waters.

Some of the original 40 options identified relate to providing an integrated district wide water supply. This idea is not new, and has been considered in the Water Matters document. Identifying district wide solutions raises particular issues and concerns for tāngata whenua. While the merits of such an approach are debatable from a supply security and system design perspective, there is a signal from a number of sectors of the community that local or catchment based infrastructure provision is preferred. The implications of moving to a district wide rating base in the coming years is also likely to affect community perception on this issue. The Water Matters strategy does note that:

> *"Council will, in conjunction with the community and iwi, seek to have a district wide discussion of the strategic implications and district wide costs and benefits, and the spiritual impacts of a district wide vision for the water supply system. This discussion will take place once the work on catchment capacities and development opportunities is completed."*

Until this debate occurs, discussion of out-of-catchment options for any area shall also consider risks to:

- iwi partnerships; and,
- community processes.

On this basis, the final analysis and recommendations are framed according to whether they are 'in-catchment' or 'out-of-catchment' solutions. In particular, the ranked list of 'out-of-catchment' solutions are identified and specific risks associated with these are discussed.

Action: Council should now discuss the potential short-list with tāngata whenua and the community on the basis of whether 'out-of-catchment' solutions may be progressed through the next stage to allow comparison with 'in-catchment' solutions.

A second key issue in contextual terms is the use of water across the District. While the District has a number of excellent water sources, and a face value there is not a water shortage, there are many competing demands for water.

Allocation is a vexed issue in terms of the Resource Management Act (RMA) process. A key issue for Kapiti Coast District is balancing the various uses of water. These uses can be economic – such as for irrigation, industry and the like. In the Otaki area there is significant horticultural industry and protecting the future potential of that sector to grow will in large part relate to the resource available (specifically land and water). Water use also involves environmental and cultural values. The natural river systems have intrinsic and spiritual value, and abstracting water from rivers may affect these values, particularly where larger volumes are involved which can affect the river itself. While use of urban supplies is clearly a legitimate use of water, it does not necessarily follow that for Kapiti Coast it is the most important. The Preliminary Status Report noted that there are many options for securing additional water supply for the District.

1.3.2 Water Supply versus Water Conservation

Council's 'Water Matters' strategy commits to reducing peak daily consumption to 400 L/person/day by the year 2013. This target, plus an allowance for unaccounted for water of 90 L/person/day, is the basis of the 2060 planning figure for demand of 26,000 m^3/day for the WPR water supply area (using a medium population projection).

In reality, what this means is that a continued focus on water conservation measures is needed so that the target of 400 L/person/day (plus unaccounted for water) can be achieved. Progress is being made, but it is a significant challenge for this community to achieve.

The focus of the Water Supply Capacity Review and Options for Supplementary Supply Project is on the supply side, rather than the water conservation/demand management side. The latter is being delivered by an in-house team within Council. However, as investigations on supply have progressed it is clear that conservation and supply are intricately linked, and so the next stage of the Project will explore further, how to optimise Councils approach to water management.

The various options developed to date are focused on "new" water sources. However, as a result of discussion within Council and dialogue with the Technical Advisory Group (TAG) since the adoption of the Preliminary Status Report (December 2009), it has been decided to include an additonal option, 'Greywater Recycling' (option # 41). Greywater recycling is designed to reduce demand on the WPR water supply system at a household level.

1.4 Options

The following table lists all 32 options, and includes an option 'status' up to the completion of this report. Those options that are recommended for short-listing in this report are identified, however there is specific analysis and detailed recommendations relating to the short-list in Section 8.

At the inception of the Water Supply Capacity Review and Options for Supplementary Supply Project there were a total of 40 options tabled. As a result of the evaluation process presented in the Preliminary Status Report (December 2009) nine options were eliminated due to fatal flaws that related to either yield, technical or cost issues. As a result 31 options were carried forward to Stage Two. Stage Two sees the addition of one further option, taking the overall total of options to 41. As noted above, nine options have previously been eliminated bringing the number of options considered in this report to 32.

Due to the information gathering that has been an integral part of Stage Two a further 12 options have been eliminated, again due to either yield, technical or cost issues. This means that at the conclusion of Stage Two, 20 options have been evaluated, and from these 20, a short-list has been recommended. Information pertaining to the twelve eliminated options is in Appendix 3.

Short-Listed

IC = In-catchment OC = Out-of-catchment

#	Option Name	Type
2	Ōtaki River Gorge (OC)	Run of River
3	Ōtaki River Gorge Transfer (OC)	Run of River
4	Ōtaki Wellfield and Pipeline (OC)	Run of River
12	Kapakapanui Dam (IC)	Dam
13	Ngātiawa Dam (IC)	Dam
18	Lower Maungakotukutuku Dam (IC)	Dam
20	** GWRC Whakatikei Dam (OC)	Dam
23	Extend Waikanae Borefield (IC)	Groundwater
27	Aquifer Storage & Recovery (IC)	Groundwater
29	Groundwater River Recharge (IC)	Groundwater
38	Waikanae Borefield and Storage (IC)	Other
39	Kāpiti District Ōtaki River Scheme (OC)	District Wide

** *While GWRC Whakatikei Dam (Option 20) is considered a possible option, the timing for the dam may not correspond with when a new water supply is required for the Kāpiti Coast. To ensure that this option as a viable option is not removed unnecessarily it is suggested that Council progress correspondence with Greater Wellington to determine whether a water supply option involving the Whakatikei Dam has potential to meet Council's needs with respect to timing and cost.*

Not Short-Listed

#	Option Name	Type
6	Akatarawa River Transfer	Run of River
11	Waikanae WTP Dam	Dam
16	Reikorangi Dam/Cambridge Farm	Dam
19	Low-low Maungakotukutuku Dam	Dam
21	Storage Ponds - West	Dam
22	Storage Ponds - East	Dam
26	Deep groundwater	Groundwater
40	Kāpiti District Integrated Water Supply (Ōtaki Gorge)	District Wide

Eliminated

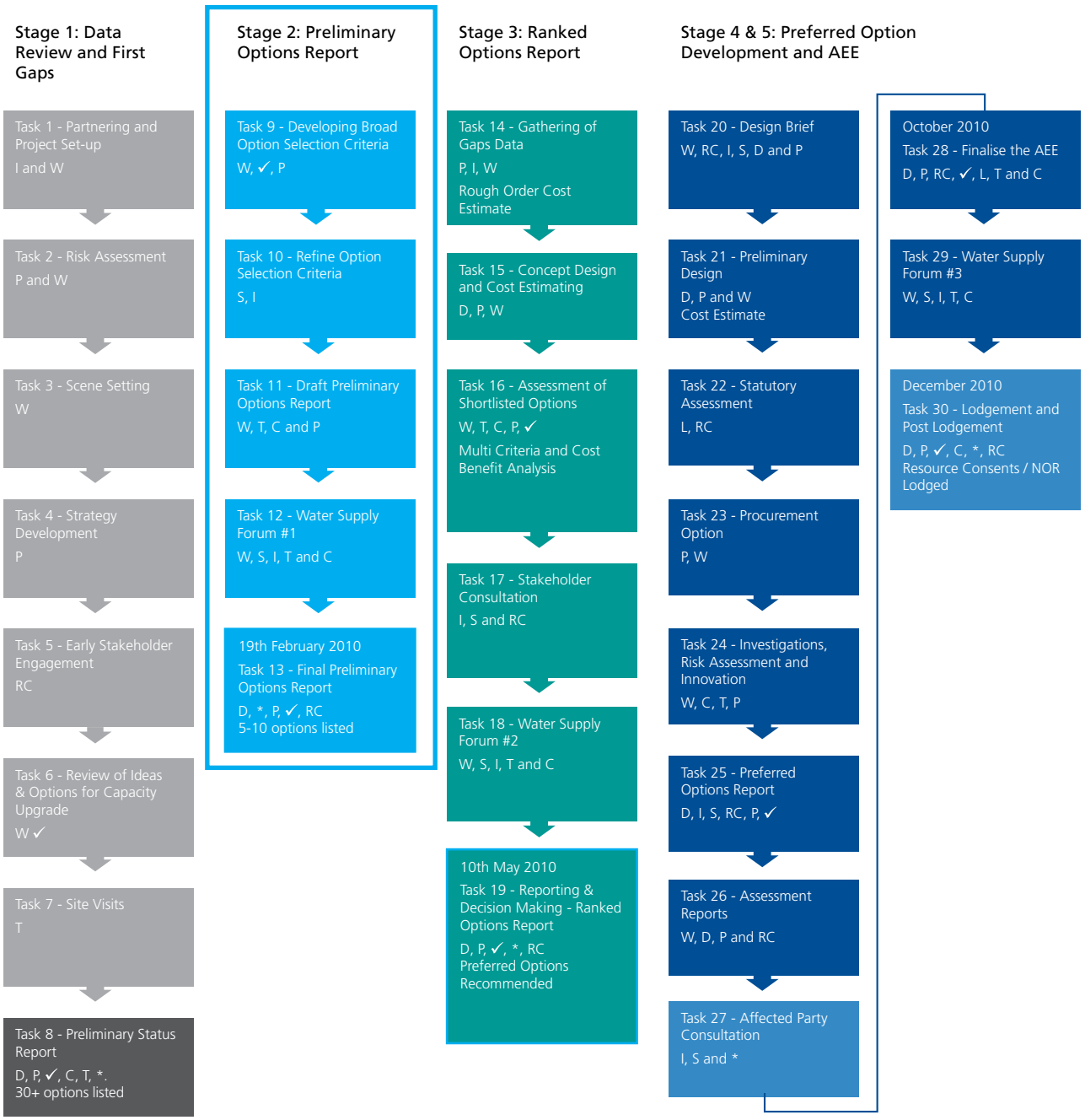
#	Option Name	Type
1	Waitohu Stream	Run of River
5	Mangaone Stream	Run of River
7	Whakatikei River Transfer to Maungakotukutuku Stream	Run of River
8	Waitohu Dam	Dam
9	Mangaone Dam	Dam
10	Combined Storage Dam in the Waikanae River	Dam
14	Upper Ngātiawa Dam	Dam
15	Rangiora Dam	Dam
24	Eastern Waikanae Borefield	Groundwater
31	River Recycle	Groundwater
37	Non-potable reticulation network ("Purple" or "dual" pipe system)	Other
41	Grey Water Recycling	Other

2 Overall Project Methodology

There is a clear methodology for the entire project, from option identification, evaluating, consenting through to design and construction. The steps set out here involve a number of unknown elements at this early stage. In terms of timeframes, there are two key milestone dates. The first is that provided the community engagement process is successful, it is anticipated that a preferred option will emerge from the option evaluation process by June 2010. The second is that by October 2010 resource consent documentation will be completed in draft form to enable consideration by Council for lodgment with Greater Wellington Regional Council and Council's planning team.

The following diagram provides a summary of the key steps and outcomes along the way. Working with key stakeholders, iwi and others in the community is a critical part of the process. The approach is therefore more focused on the "process" than what the outcome might be. This is because Council is taking the approach that the community combined with technical input from specialists will guide the process towards the best decision for this community.

The recommendations in this report identify a need for specific consultation with iwi in relation to the short-list of options. In particular, those options that are out-of-catchment solutions. In addition, in order to confirm the final short-list, further discussion with Greater Wellington is recommended to confirm whether the possibility of Kāpiti Coast District Council participating in and influencing the timing of, the Whakatikei dam exists.



Legend

T - Technical Advisory Group
C - Challenge Team
P - PCG Meeting / Sign-off
✓ - Formal Council / Committee Endorsement
L - Legal Input Recommended
D - Deliverable/Milestone
RC - GW / KCDC Resource Consent Staff Involvement
W - Project Team Workshop
* - Public Communication
I - Iwi Consultation
S - Stakeholder Consultation Required
☐ - Stage of the project

Figure 1: Methodology flow chart

3 Option Selection Methodology

3.1 Approach

There are many different tools that can be used to assist decision makers in reaching the best decision where there are a complex range of variables. In this instance, the Council is the decision maker, and the variables include a wide range of economic, social, cultural and environmental issues that arise when considering the future water supply for the district. Council will make this decision working in partnership with local iwi. Council will be informed by officers and technical advisors, as well as the various stakeholders and the wider community.

Whatever tool is chosen to assist Council, it must allow consideration to be given to the broad issues identified by Council and its community as being important. Council has adopted sustainable development as a basic building block of the Community Plan (LTCCP) and the Water Matters strategy. Sustainable development is a way of ensuring the continued social, cultural, economic and environmental wellbeing of the community. In particular, it is important to note that one of the key drivers in Council's Water Matters strategy is water conservation. This driver is key in the option selection process.

The Preliminary Status Report identified 31 options that could provide a long term solution for water supply for the district. The report also noted that within these 31 options, there were numerous 'combination' options that could be explored. At this early stage of the project, it is considered that each of these options could contribute to the future water supply solution for Kāpiti Coast. Since the Preliminary Status Report identified the 31 options, further investigative work has been carried out. This may result in some of these options being discounted due to 'fatal flaws' having been identified. This is discussed later in this report.

Each option has been investigated to varying degrees in previous studies. However, in order to reach the best decision, it is necessary to progressively increase the level of investigation and design. In order to be cost effective, Council is aiming to short-list up to eight options; so that only those options that are likely to best meet the community's requirements are investigated in detail. The cost and time involved in taking each of the 31 options to a fine-grained level of design and investigation would be prohibitive.

Therefore an initial short-list of options is to be identified. Further and detailed evaluations of the short-listed options will then occur as Stage Three of the project. This report focuses on the issues and values of importance to the community, and seeks to use these to guide the evaluation process. These issues and values have been defined over a number of years, through various consultation processes – including formal and informal forums – so Council has a good understanding of these issues and values.

Given the importance of the decision to the wider community, further consultation will be undertaken to test or verify the evaluation framework that is presented in this report to ensure it does reflect community issues and values accurately. This approach will provide the greatest likelihood that the final decision will gain buy-in from the community, and give the decision makers the confidence to make a verdict that reflects the community wishes.

3.2 Option Selection Tools

The aim of the evaluation framework is to select a short-list of options for water supply. This must be done as objectively as possible. For a project like this there is a reasonably complex set of drivers that need to be balanced when making key decisions, therefore, simplicity and transparency in decision-making are key. The community will be an important part of the evaluation process. For these reasons one particular decision-support tool is recommended. That is, Multi-Criteria Analysis.

3.3 What is Multi-Criteria Analysis?

Multi-Criteria Analysis (MCA) is a tool designed specifically for option selection in situations where there are multiple feasible options. MCA involves setting a list of success criteria and assigning weights to each criterion. The alternative options can be assessed and scored (typically by a representative panel of stakeholders and/or technical experts) against the criteria, with the assigned scores multiplied by the weightings, yielding a ranking of alternative options.

It can be used without explicit weighting of the criteria. However this reduces the transparency and validity of the ranking process. In relation to this project, it has been decided to apply weightings. In part because the community is actively involved in the process, and have expressed clear views during the current consultation about what they value most and what is important when determining the future water supply for the Kāpiti Coast.

3.3.1 General Methodology for MCA

The general approach to MCA involves a number of steps, all of which are designed to be simple and transparent. In summary, the steps are shown on the following page.

Multi-Criteria Analysis Methodology

Step 1	Establish the context for the decision	The context for this decision is well established, and outlined in the Preliminary Status Report. That is, the WPR area is running short of water based on the growth in peak daily demand, and in the next few years, could potentially run out of water.
Step 2	Identify the options	Previous and current investigations have identified 40 options to provide a solution for the WPR water supply. These have been narrowed down to the 31 options adopted by Council for analysis.
Step 3	Define the Values and associated Option Selection Criteria	The values that are most important to the stakeholder groups should be defined, and then Option Selection Criteria established to reflect those values.
Step 4	Assign weights for each criteria	Weighting the values and criterion ensures that while there are a multiple number of criterion being used for the evaluation, those of greatest significance have the greatest influence on the final result. Weights are defined using input from consultation meetings and a community survey.
Step 5	Scoring/Assessment	Using each of the agreed selection criteria, each option was evaluated in a technical workshop of experts.
Step 6	Examine the results	The assessment and allocation of weightings need to be examined by stakeholders. The Water Forum was used to inform this process. A check was performed for any obvious or common sense errors in the list.
Step 7	Perform a sensitivity analysis	In order to check the weightings provide a specific impact on the overall ranking process, a sensitivity analysis was undertaken to ensure that the MCA process is robust. This used different weighting scenarios to test how dynamic the final list of option was.
Step 8	Recommendation	It should be noted that MCA is only a decision support tool. Ultimately, the decision maker must determine whether the right decision has been reached. The report to Council which recommends a short-list was peer reviewed by the Technical Advisory Group, and was subject to a thorough community consultation process.

3.3.2 Step 1: Establishing the Context for the Decision

Setting clear objectives for the MCA process involves seeking answers to two key questions:

- What are the objectives for the project? and
- What is wanted from the option evaluation process?

Council's overall objective in terms of water management is:

> To secure water supply for the whole district for the long term by both investing in additional supply and consumption conservation (demand management).

The Preliminary Status Report noted that:

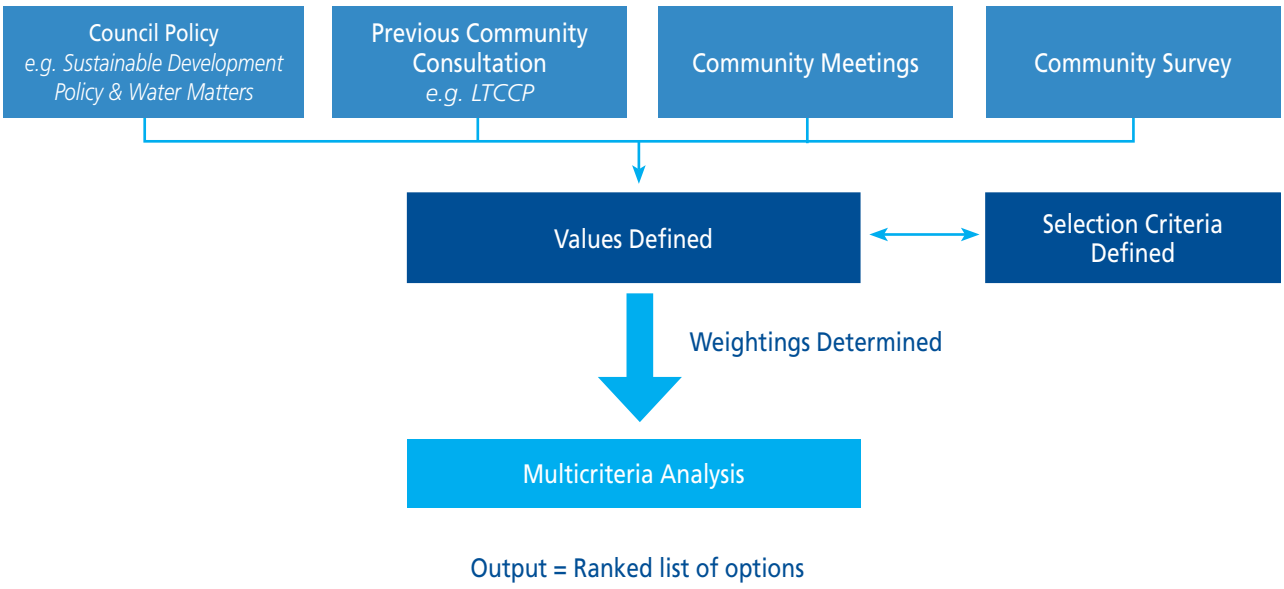
"To meet the objective to provide a secure supply into the future for the district, options are to be developed, investigated and implemented for additional supply capacity in the Waikanae, Paraparaumu and Raumati area, and longer term for the wider district. All options are to be considered. All issues relating to public perception about aesthetic values are to be responded to."

To ensure that the right approach is adopted for evaluating options, and ultimately to short-list five to eight options for detailed investigation, the objectives of the evaluation process should be clearly stated. The objectives for the option evaluation process are:

- To provide a transparent and robust process by which options are evaluated and a short-list of solutions developed.
- To eliminate those options where there is demonstrable fatal flaw relating to yield, cost or technical issues.
- To ensure that the option evaluation process is strongly guided by the values expressed by the community of the Kāpiti Coast district.
- To ensure that the final short-list includes a mix of options that Council can be confident could each be suitable to meet the water supply objectives.

3.3.3 Step 2: Identify the Options

A total of 41 options have been identified and 40 of these are included in the Preliminary Status Report (December 2009). Over the course of the option evaluation process, greywater systems was added as an additional option (option 41). A summary of the options that are considered to still be a feasible solution to the water supply issues at the conclusion stage two of the Project are included in Appendix 2. The 12 options that have been eliminated in Stage Two due to a fatal flaw (yield, technical or cost) are included in Appendix 3. The total number of options for evaluation at this stage is 20.



3.3.4 Step 3: Define the Values and Option Selection Criteria

Choosing appropriate option selection criteria for the Project requires consideration of the key values expressed by the community and Council, while also achieving the objectives referred to in section 3.3.2. Due to the significant level of previous work that has occurred, there are a number of "inputs" to defining the values and selection criterion. These are shown in the diagram above.

Option selection criteria in this instance has an important role to play in making a decision on the short-list of options to be evaluated in greater detail as part of the next stage of the project. While there are no "right" or "wrong" option selection criteria, there are some rules which are useful to follow. These rules have been developed over a number of years by practitioners who have been involved in Multi-Criteria Analysis (MCA). The characteristics of good evaluation criteria are (adapted from Keeney and Gregory, 2005) that they should be:

- unambiguous
- comprehensive
- concise
- direct and outcome focused
- measurable
- understandable
- practical
- sensitive to alternatives.

Each of the criterion used in this multi-criteria assessment has been checked, and where necessary improved, against these characteristics. This assessment is included in Appendix 6. In some instances, criteria has been identified in consultation with the community which cannot be adapted to meet these requirements. Specific reasons are provided in the tables in section 4.3 of this report for every instance where a criterion or issue is rejected.

The input received from the community throughout the project, will be used to guide the consenting, design, construction and operational phases of the project.

3.3.5 Step 4: Assigning Weights to the Values and Criteria

MCA techniques commonly apply numerical analysis to a performance matrix in two stages:

Weighting: a weighting is assigned to each criteria, so that the criterion may not make an equal contribution to the total score for each 'value.'

Scoring: Each option is evaluated against each criterion, and a score assigned based on the performance of the option against the criterion. This process is described in section 3.3.6.

The mathematical approach to the model is described later in section 3.4.

3.3.6 Step 5: Scoring and Assessment

The scoring of each option against the selection criteria has been an iterative process, informed by consultation and the development of additional technical information.

The scoring process was largely undertaken through a multi-disciplinary workshop process. This occurred on the 9th of February with a group of technical and specialist consultants. (see Appendix 7). Following this workshop, further opportunity for comment was provided to workshop attendees, where some changes were made to assessments through a peer review process. As a result, the social and cultural criteria were split, and this involved a further workshop to review the social and cultural criteria.

3.3.7 Step 6: Examine the Results

The results are examined with a number of overarching issues in mind. Firstly, there is a need to ensure that the in-catchment and out-of-catchment options are considered separately as per Council's Policy – 'Water Matters'. A separate series of recommendations in relation to each list is made. Secondly, the need for a mix of option types is considered to be prudent, given both the uncertainty around some water sources and the community desire for a mix of options to be considered. Finally, the short-list needs to be examined in terms of the risks posed by the different options from a range of perspectives. It is important to ensure the final short-list has a high chance of succeeding in terms of delivering a preferred option which can meet the design and capital cost requirements, as well as meeting the requirements of the RMA.

3.3.8 Step 7: Perform a Sensitivity Assessment

Weighting is a key part of the MCA process. It ensures that the most important criteria have the appropriate level of influence on the final ranking or result. In this instance, the criteria have been developed largely by consulting with the community in relation to values that are most important. Therefore, the weighting of criteria should reflect the relative importance of the values held by the wider community.

The sensitivity of the result to the weightings selected can be tested using the MCA tool to adjust the weightings to see what impact such adjustments make. This type of sensitivity analysis can be used to identify what are the most important criteria and perhaps to investigate these in more detail. The sensitivity analysis is discussed further in Section 7.

3.3.9 Step 8: Recommendations

A series of recommendations are made in section 8 of this report with reference to the results of the MCA model.

3.4 The MCA Model

This report clearly notes that the MCA model is a decision support tool. It does not make a decision in itself. Neither is it claimed to be a flawless tool. Given that there is variable information relating to each option and water source, a tool which compares options at a high level is required.

Multi-Criteria Analysis (MCA) is a valuable tool that is used in many contexts. It is commonly used in the assessment of multiple options in relation to infrastructure projects, and in particular it has been successful when entering a process under the RMA to assess the relative merits of options. It is particularly valuable where there are multiple and/or competing options. and where there are complex and inter-connected environmental, social, cultural and economic issues to be considered. MCA assists in making the unavoidable trade-offs between competing objectives more transparent. It provides a robust and transparent decision-making structure, making explicit the key considerations and the values attributed to them, and providing opportunities for stakeholder and community participation.

3.4.1 How the MCA Model Works

Each option is scored against each criterion within each of the seven values identified for this Project. Indepth information on the seven values can be found in section 6 of this report and Appendix 1.

The score assigned to a particular criterion may be 1, 5 or 10, depending on the agreed rating scale for that criterion. A score of 10 is more favourable than a score of 1. A two stage calculation is then applied; first at the level of the individual criteria and then at the level of the seven values.

At the first stage each score is multiplied by its respective criterion weighting to give a weighted score. These weighted scores are summed to give a total for the value. The criterion weighting is a percentage, where a higher percentage indicates a greater level of importance. The criteria weightings for a particular value add to 100%. This calculation is shown by the equation:

$$V1 = S1.1 \times W1.1 + S1.2 \times W1.2 + S1.3 \times W1.3 + \ldots. + S1.n \times W1.n$$

Where:

V1 = Total for value 1

S1.1 = Score for criteria 1.1

W1.1 = Weighting for criteria 1.1

$W1.1 + W1.2 + W1.3 + \ldots\ldots\ldots + W1.n = 100\%$

At the second stage each value total is multiplied by its respective value weighting to give a weighted total. These weighted totals are added to give an overall score for the option. The value weighting is a percentage, with the seven value weightings adding to 100%. This calculation is shown by the equation:

$$TA = V1 \times Y1 + V2 \times Y2 + V3 \times Y3 + \ldots. + V7 \times Y7$$

Where:

TA = Overall score for option A

V1 = Total for value 1

Y1 = Weighting for value 1

$Y1 + Y2 + Y3 + \ldots\ldots\ldots\ldots + Yn = 100\%$

Once the overall score has been calculated for each option, these overall scores can be compared to see which options are more favourable. The effects of changing the value and criteria weightings on the overall scores can also be explored (sensitivity analysis).

3.4.2 Limitations of the Model

There are also a number of limitations of the model. Some of these relate to the nature of the criteria used, others relate to the MCA technique itself. For completeness, it is noted that the limitations or weaknesses of the MCA model are:

- That some of the criteria relate to a particular effects occurring. This does not address the issue of probability of occurrence, and while some attempt is made to address this in the scoring (and notes that accompany this), there is not a fully detailed risk assessment embodied as part of the scoring and assessment process.
- A number of broader policy decisions have been included in the MCA framework where possible. Others have not. For example, the concept of 'economic development' arising from water use is difficult to capture in a criteria, and more difficult to judge in relation to different options. Clearly, economic development is an important driver for Council in resolving water supply. It is assumed however, that any option that can deliver the level of water supply required in future based on the design assumptions made will provide greater economic certainty to the community.
- Some of the criteria are specifically included in order to assess particular issues that arise with specific types of options. While this has been minimised, there is potential for bias against some options to occur. This largely relates to the dam options, and examination of the results indicates that this bias has not prevented the best dam options from an engineering perspective from being short-listed.
- There is a lack of information in relation to each option, meaning a consistent approach to scoring is needed. This is assisted by the description of scoring criteria and recorded key issues identified during the scoring process. These are included in appendices.
- Depending on the weighting applied, some criteria may have the effect of cancelling out, or creating a neutral result with another criteria. However, because of the weighting process, this does not cause significant concern.

4 Consultation

4.1 Consultation Principles and Commitments for the Project

Consultation with iwi, stakeholders, the community and potentially affected parties forms a crucial part of the project. In developing the consultation methodology for the various stages of the project, Council has been guided by the Council's 'Consultation Policy' (December 2003) which sets out the Council's commitment to consultation with the people of the Kāpiti Coast, sections 82-90 of the Local Government Act (LGA) 2002 which outline the consultation requirements for local authorities, and the requirements of the (RMA). Of primary importance is the recognition that consultation is a two way process between project proponents and people with an interest in a project. Consultation facilitates understanding between parties, and provides a forum for sharing ideas and concerns. Effective consultation on the project should improve decisions.

The following bullet points outline a number of principles that help define the meaning of good consultation. These have been adopted for this project.

- Early - consult as soon as possible when the details of a proposal are less 'set in concrete' and you have more flexibility to make changes to address issues raised by interested and affected persons.
- Transparent - be open about what you want to achieve, what scope you may have to change certain aspects of your proposal, and why there might be elements that you may not be able to change.
- Open minded - keep your views open to the responses people make and the benefits that might arise from consultation.
- Two-way process - consultation is intended as an exchange of information and requires both you and those consulted to put forward their points of view and to listen to and consider other perspectives.
- Not a means to an end - while consultation is not an open-ended, never-ending process, it should not be seen merely as an item on a list of things to do that should be crossed off as soon as possible.
- Ongoing - it may be that consultation - or at least ongoing communication - will continue after your application has been lodged or even after a decision has been made.
- Agreement not necessary - consultation does not mean that all parties have to agree to a proposal, although it is expected that all parties will make a genuine effort. While agreement may not be reached on all issues, points of difference will become clearer or more specific.

For this project the Council has committed to:

- Adhere to the principles and requirements for consultation under the RMA, LGA, KCDC's 'Consultation Policy' and the principles defining good consultation set out above;
- Identify potentially affected or interested parties and stakeholders and invite them to participate in the consultation process;
- Recognise stakeholder and community knowledge and resources in the identification of matters to be considered in the development of the transportation plan;
- Involve stakeholders in the identification of issues and options involved within the area. Provide various opportunities for stakeholders to provide feedback;
- Receive, consider and respond to the feedback received by stakeholders with transparency and outline how such information has contributed to the decision making process; and,
- Provide the identified stakeholders with timely information regarding the proposed transportation plan and the proposed consultation process.

4.2 Consultation Activities

The consultation methodology for this stage of the Project has focused on understanding and confirming community values for water supply. These have then been used to inform the development of selection criteria for the short-listing of options. In addition to identifying the values of importance to the community, consultation sought to understand whether the community has any priority over the significance of these particular values. If a priority of the values was identified, then values would be weighted accordingly during the assessment of options. The values representing community feedback and the more detailed criteria developed from these will then be used to assess and rank the 32 water supply options. This will allow a short-list of options to be identified.

The issue of water supply for the District has high community awareness and a long history of debate. As a result, some of the community values around water supply, such as water quality and taste, are well understood and documented. In addition, Council has a partnership approach to resource management with iwi and has documented Māori world views and values in various documents, including the District Plan. The consultation for this project builds on that understanding.

The consultation for this stage of the project has involved several activities. These are:

- Consultation to identify community values – Undertaken in December 2009;
- Public consultation to rank the values – Undertaken in late January/early February 2010; and,
- A Water Forum with key stakeholders – Held in mid February 2010.

The outcomes of this consultation are summarised in the following section.

4.3 Consultation to Identify Community Values

In December 2009 a series of meetings were held to introduce the water supply capacity project and seek feedback on community values to inform the selection of options. Those invited to attend the meetings included identified interest groups and individuals/organisations that made submissions to the LTCCP on water related issues. The meetings were also open to the public.

The following meetings were held:

- Paekākāriki: 9 December 2009, 7pm at St Peters Hall.
- Raumati: 10 December 2009, 7pm at Valhalla.
- Ōtaki: 14 December 2009, 7pm at Dr. Gertrude Atmore Supper Room.
- Waikanae: 15 December 2009, 7pm at Senior Citizens Hall.
- Paraparaumu: 19 December 2009, 9:30am at the Community Centre, Ngahina Street.

A meeting was held at Whakarongotai Marae on 16 December to discuss iwi values and the Project with Ati Awa ki Whakarongotai and at around the same time a meeting was held with Ngā Hapū o Ōtaki.

A total of 39 people attended these meetings. In addition to those people who attended the meetings, a further 19 feedback forms and letters were received from people who were unable to attend the meetings.

The discussions at the December meetings assisted in the identification of key values for consideration when selecting a water supply option/s. In addition to obtaining input via consultation the values have also been informed by the following:

- The sustainable management framework set out in the Resource Management Act.
- The Sustainability Principles in the LTCCP. The LTCCP was developed after consultation with all communities on the Coast; and,
- The issues that were identified in previous water supply investigations for the Kāpiti Coast. Some of those investigations involved discussions with communities.

Based on the above considerations, the table on the following page shows the six values and the initial general criteria that accompanying them.

Table 1: Preliminary Values and Criteria from December Consultation Round

Value	Initial Criteria
Quality of water supplied to the consumer	Ability to meet Drinking-water Standards for New Zealand Acceptable taste to most consumers Level of hardness in water supply (impact on appliances)
Social/Cultural	In-catchment solutions given priority Respect of iwi values/Treaty of Waitangi/Tino rangatirotanga Ability of option to meet community amenity growth management aspirations
Performance/Technical	Ability to use existing infrastructure
Economic	Affordable construction cost Affordable operational cost Cost of water
Environmental	Low overall environmental impact – ecological, rivers, groundwater, vegetation, natural amenity and visual
Implementation	Ability for action in a timely manner Ability to obtain approvals

Tables one to five below demonstrate how the issues raised at the December consultation meetings were translated into the values (and their associated criteria) for the project. Each table includes a summary of the views raised by the meeting attendees (with some combined where they relate to similar issues), a discussion of how that issue relates to the project, and the value that captures that view. In some cases where issues raised are not considered suitable for the criteria, reasons are given for this.

Table 2: Values and Criteria from Consultation in December 2009

Value	Views raised	Discussion	Criteria
Water Quality	Need to look at taste from bores. If we stay with bore water we must treat it.	This relates to the quality of groundwater and the treatment of water.	Captured under Quality of Water value – Criteria 2: Taste Odour and Aesthetics.
	Clean water, taste, presence of dissolved solids, hardness, pathogens. Issues around damage to appliances from water.	This relates to the quality raw water and the treatment of water.	Captured under Quality of Water value – Criteria 1: Public Health.
	Good quality and reasonable cost.	Relates to the quality of water and the cost to consumers.	Captured under Quality of Water value – Criteria 2: Taste Odour and Aesthetics.
	Needs to meet Drinking Water Standards for New Zealand (DWSNZ). Water reuse is desirable, however must not impact public health safety	The ability for options to meet the DWSNZ.	Captured under Quality of Water value – Criteria 1: Public Health.
	Public health should be added to social criteria.	Relates to the quality of water.	Captured under Quality of Water value – Criteria 1: Public Health.
Social	Issues of social equity and public ownership need to be addressed. Not keen on privatisation or private ownership of water.	Privatisation of water supply is not being considered nor is it on Council's agenda in any form although there has been strong debate around water metering in the past.	No criteria required
	Approving property development/subdivision should take account of the use of water.	This relates to selecting the best long term option that will provide security of supply and facilitate growth aspirations. Plan Change 75 .addresses water supply for new development/subdivision	No criteria required
	Personal versus Council responsibility for conservation and filtering /secondary water supplies.	Council's water conservation programme picks up the matters relating to conservation of water in the district. The quality of the reticulated water supply and ability to treat the raw water source is relevant to the selection of options.	Captured under Quality of Water criteria – Drinking standards, taste and water hardness.
	The effects on water users from irrigation activities.	Difficult to translate into a criteria as some irrigators could be using bore water. Relates to availability of water and impact on groundwater which is captured elsewhere. There are also issues of lost opportunity for rural water user.	Captured under Economic Value – Criteria 3: Impact on opportunity cost of other potential water users.

Value	Views raised	Discussion	Criteria
Cultural	Respectful of cultural issues	The cultural criteria will be refined consultation with iwi.	Captured under Cultural value – Criteria 3: Identity.
	Our communities need to retain control of our individual water supplies.	Relates to communities making decision about their water ie Waikanae residents making decisions about water in the Waikanae water catchment. Privatisation of water supply is not being considered as part of the project.	Captured under Cultural value – Criteria 1: In Catchment solutions given priority.
	Really serious education programme so people are taught to use water wisely.	Council's Water Conservation Programme deals with water use. However, some options may give a false impression that water conservation is not needed.	Captured under Cultural Value – Criteria 2: Water Conservation.
	We need to use what we have ie Using Waikanae water rather than Ōtaki to have a level of independence.	Relates to the ability to use water from a particular water catchment for water supply in that community.	Captured under Cultural value – Criteria 1: In Catchment solutions given priority.
	Reduce usage to reasonable levels. Less use = smaller supply needed.	This relates to the amount of water the community uses. This is specifically addressed in the Council's Water Conservation Programme and assumptions about consumption rates are incorporated into the design assumptions across all options.	Captured under Cultural value - Criteria 2: Water Conservation.
	As a community we need to value water more.	Relates to the value that the community places on water versus what they are prepared to pay for it. This is a wider discussion which is captured by the Council's Water Conservation Programme.	Captured under Cultural value - Criteria 2: Water Conservation and Criteria 3: Identity.
	Consumption unconstrained encourages wastage.	Council's water conservation programme picks up the matters relating to conservation of water in the district. The required yields for water supply options have been based on a peak daily consumption rate which takes into account water conservation in the district. A separate criteria is therefore not required for the assessment of options as this is included within the design assumptions for the project.	Captured under Cultural value - Criteria 2: Water Conservation.

Value	Views raised	Discussion	Criteria
Environmental	The health of the river for all life systems - Water as a life force. The health of the Waikanae river.	Relates to the effects of options on rivers. This includes impacts on river levels, ecology, recreation values and so forth.	Captured under Environmental value – Criteria 1: Impact on in-stream ecology.
	Using bore water is unnecessary - unbalance the natural make up of the earth under foot. Also there is the issue with contaminated underground water by human poison and waste.	This relates to the effects on groundwater and the quality of groundwater.	Captured under Environmental value – Criteria 3: Impact on groundwater.
	Dams do not destroy the environment and in some cases can improve the environment.	Relates to the impacts of dams and the ability for dams to be used for other activities (eg Recreation).	Captured by Environmental value – Criteria 2: Impact on vegetation/terrestrial ecology. Captured by Social value – Criteria 4: Has other social benefits.
	Look after vegetation.	Relates to minimising impacts on areas of vegetation. A specific measure will be developed relating to ecological impacts.	Captured by Environmental value – Criteria 2: Impact on vegetation/terrestrial ecology.
	Smaller reservoirs are better than large dams.	This relates to the potential environmental effects of large dams. A specific measure will be developed relating to ecological impacts.	Captured by Environmental value – Criteria 1: Impact on in-stream ecology.

Value	Views raised	Discussion	Criteria
Performance	A dam to store water in times of excess and made available in dry conditions. We must plan for development as the population increases.	No decision has been made about what the preferred option is. Above ground storage is one of the options.	Captured under Technical/ Performance value – Reliability and security of supply over time
	Assessment of the options will need to take account of population growth and development.	Captured by Performance value – Criteria 4: Security of supply over time	Captured under Technical/ Performance value – Reliability and security of supply over time.
	What we need is a storage system that will supply the Kāpiti Coast for the next 50 years or more.	Identifying a long-term water supply solution.	Captured under Technical/ Performance value – Reliability and security of supply over time
	Plan for the future now – get the solution right.	This relates to selecting the best long term option that will provide security of supply and facilitate growth aspirations.	Captured by Performance value – Criteria 4: Security of supply over time
	Solution must make the best use of relatively high rainfall. Look at storage of water. Low level dams preferred.	No decision has been made about what the preferred option is. The key theme is ensuring that water is available.	Captured by Performance value – Criteria 4: Security of supply over time.
	The solution should incorporate potable and non-potable mechanisms.	The Council's Water Conservation Programme include a number of initiatives to address non-potable water, the effect of which may reduce the consumptions rates for the district. The consumption rates are a design assumption for the project but cannot be used to differentiate between different options and therefore no criteria has been developed for this.	No criteria required.
	Need to look after the futures of our children.	Relates to finding a long-term solution in terms of reliability, security of supply and one that does not result in high operational costs that will be handed on to future generations.	Captured by Performance value – Criteria 4: Security of supply over time.
	The solution needs to provide sufficient water to provide for the activities that residents enjoy (eg gardening).	Council's water conservation programme picks up the matters relating to the amount of water used in the district. The required yields for water supply options have been based on a peak daily consumption rate which takes into account water conservation in the district. This does not distinguish between what the water is used for. A separate criteria is therefore not required for the assessment of options as this is included within the design assumptions for the project.	No criteria required.
	Consideration of community growth and future demands.	This relates to future growth including subdivisions and the ability to meet these demands. The design assumptions consider future growth options that are staged and/or expandable if these assumptions are wrong.	Captured under Performance value- Criteria 3: Ability to expand for additional supply if needed.
	All year round reliable supply if bores dry up or change.	Finding a solution that provides reliable water during wet and dry seasons.	Captured by Performance value – Criteria 4: Security of supply over time.
	Ability to use existing infrastructure.	Desire to make the best use of existing infrastructure.	Captured by Performance value – Criteria 1: Ability to make best use of existing infrastructure.

Value	Views raised	Discussion	Criteria
Performance	Supply needs to be adequate for home use (300-350l/p/d).	This relates to the consumption assumptions used for the project. The total amount of water that is required has been built into the design assumptions for the project ie Options that cannot yield the required volumes have been eliminated. Therefore no additional criteria is required for the assessment options.	No criteria required.
	Need to maintain the village appeal of Raumati. The water supply solution must be staged properly to ensure appropriate growth and development.	Relates to how options affect Raumati's growth aspirations and the ability for any option to be staged to achieve this.	Captured by Performance value - Criteria 2: Ability to be staged over time.
Implementation	Solution needs to be consentable.	Relates to finding a solution that can obtain the necessary approvals.	Captured under Implementation value – Criteria 1: Difficulty in obtaining resource consents.
	Finding a timely solution.	Relates to the speed in which an option can be approved, constructed and operational.	Captured under Implementation value – Criteria 1: Difficulty in obtaining resource consents and Criteria 2: Difficulty in acquiring land and/or access.
Economic	Cost for construction, treatment and supply must be kept affordable.	Relates to the overall cost of each option.	Captured under Economic Value – Criteria 1: Cost to Construct and Criteria 2: Operational Cost.
	The cost of pipeworks and maintenance.	The cost of related infrastructure for options and ongoing maintenance cost.	Captured under Economic Value – Criteria 2: Operational cost
	No metering of water	Council is not considering the metering of water.	No criteria required.
	Concern about budget available versus finding the best solution.	Relates to the budget available and the possibility that this may exclude the best option.	Captured under Economic Value – Criteria 1: Cost to Construct
	Storage should be above water treatment plant (gravity fed).	No decision has been made about what the preferred option is. It is assumed that the key reason to encourage a gravity fed option is to minimise operational costs.	Captured under Economic Value – Criteria 2: Operational cost
	Many elderly people live in the district and cannot afford significant costs for a solution.	Relates to finding a solution which is within the overall budget for the community.	Captured under Economic Value – Criteria 1: Cost to Construct and Criteria 2: Operational Cost.

4.4 Public Consultation to Rank the Values

Following identification of the values set out in Table 1, public feedback was sought on the ranking (or relative importance) of the values and accompanying criteria. Public meetings were advertised in the local newspapers, via a notice in the Council rates notice delivered to 21,000 dwellings, radio interviews on the local radio station and via the Council's website. The notices were accompanied by a form setting out the values and asking people to rank these values in order of priority. A copy of this form is attached as Appendix 9.

The following meetings were held in January/February 2010:

- Ōtaki: 30 January 2010, 10am at Dr. Gertrude Atmore Supper Room.
- Paekākāriki: 2 February 2010, 7pm at St Peters Hall.
- Paraparaumu and Raumati: 3 February 2010, 9:30am at the Community Centre, Ngahina Street.
- Waikanae: 4 February 2010, 7pm at Senior Citizens Hall.
- Waitangi Day, 6 February 2010.

The focus of the meetings was to provide the community with additional information to assist them in ranking the values. Feedback was provided on the December 2009 consultation meetings and the project team was also available to answer any questions on the project. Approximately 125 people attended these meetings.

At the time of preparing this report, over 380 forms ranking the values have been received. During the consultation and feedback, several members of the community raised concerns regarding the interpretation of the form and how to complete it. It is acknowledged that the feedback form contained a number of weaknesses, however, the feedback received from the community has never the less been useful in the development of the weightings to be accorded to values and their accompanying criteria.

The figures below show the results of the community feedback.

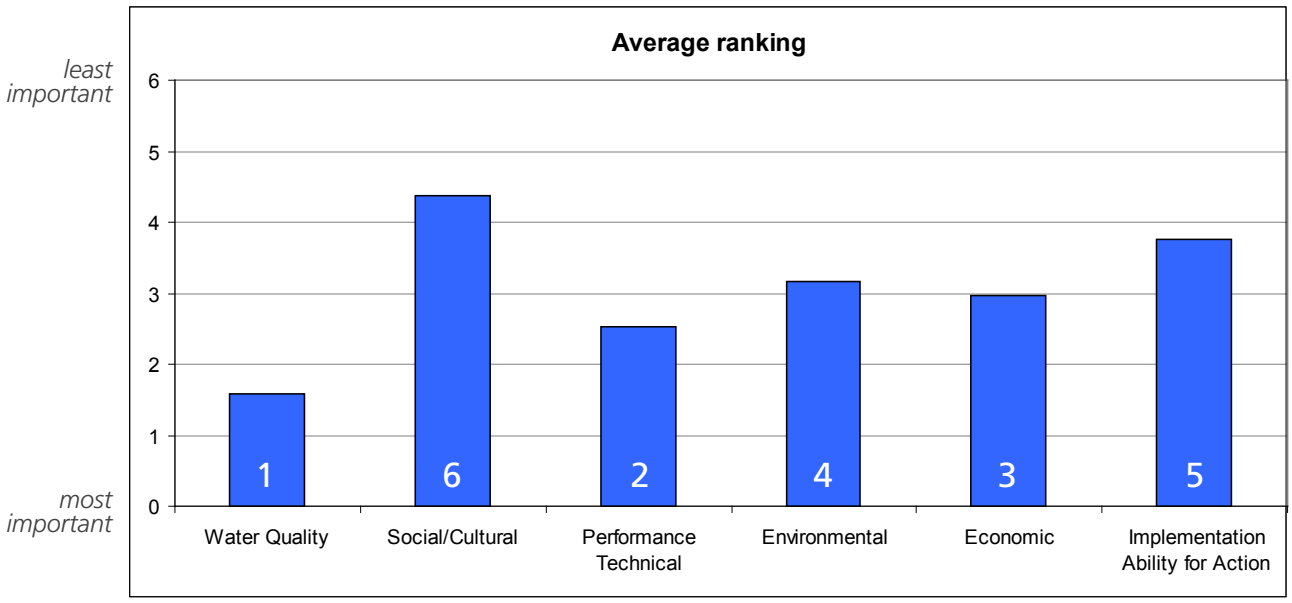


Figure 2: Average Ranking of Values

4.5 Results of the Community Ranking of Values

The results of the feedback show that the water quality value was ranked the highest with social/cultural values ranking sixth. Based on this, the ranking of the values by the community is as follows:

1 (Highest)	Water Quality
2	Performance/technical
3 (equal)	Economic
3 (equal)	Environmental
5	Implementation/Ability for Action
6 (Lowest)	Social/Cultural

The ranking that different communities applied to the values differed. Figure 3 below shows the rankings provided by different communities.

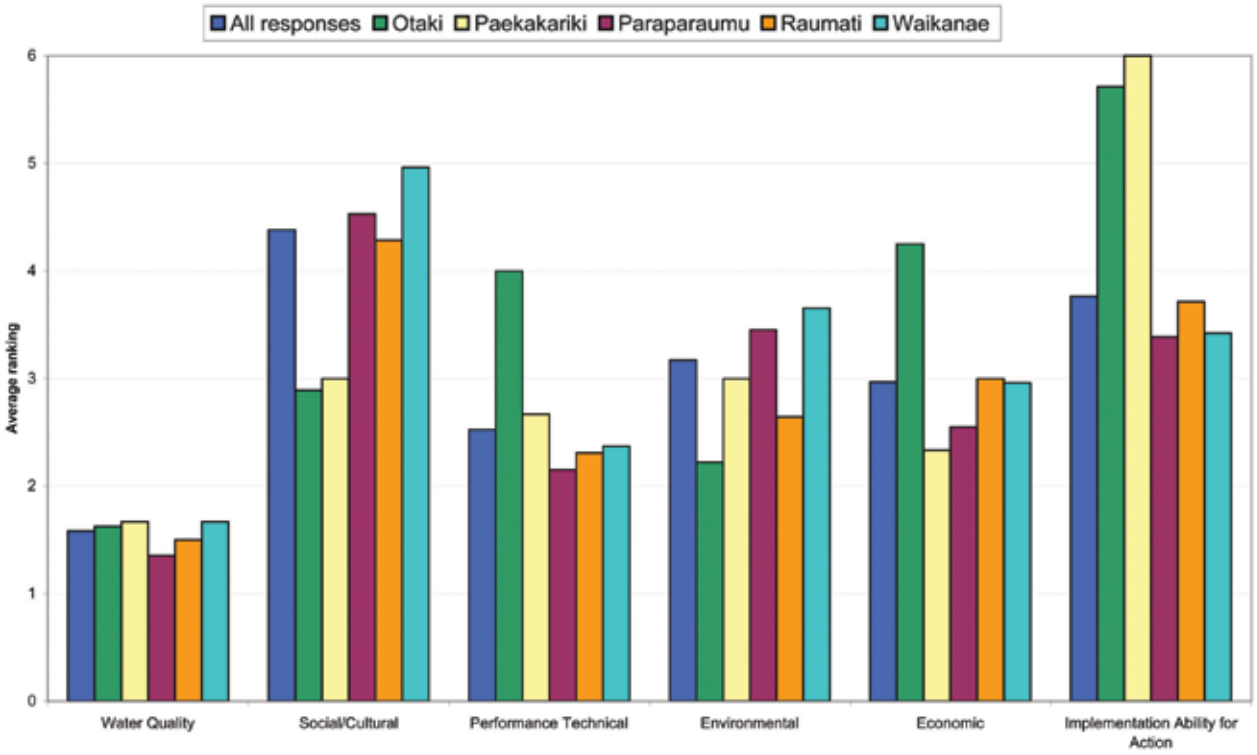


Figure 3: Ranking of values for different communities

These results show that the values that each community hold as important differ slightly. For example the Ōtaki community values the Implementation/Ability for Action higher than other communities. This may be due to the earlier attempt to gain approvals for a water supply solution at Ōtaki. These differences may become relevant if an option is located in a particular community (eg a dam) and that community has ranked a value higher than other communities that may affect that option (eg environmental effects). For current purposes, the values have been averaged across the communities based on the number of responses received from each community.

As a result of the consultation with the community, a number of changes have been made to the values and criteria set out in Table 1. Those of particular significance include separating the social and cultural values. Feedback indicates that the social and cultural values are not well understood by the community and therefore this was reflected in their low ranking. These values are important to the Council so will likely be rated higher in the preferred scenario (see discussion of the scenarios and criteria in Section 7 & Appendix 11).

4.6 Other Matters Arising from Consultation

In addition to consulting members of the community and the public about the values, the consultation also allowed an opportunity for people to raise any comments and concerns in relation to water supply. Appendix 5 is a summary of all the comments received from the community. These comments have been reviewed and have assisted in the identification of assessment criteria for the assessment of options (See discussion in Section 6).

Strong feedback was received at all meetings that water conservation was fundamental to the water project. Council's Water Conservation Project is running 'hand-in-hand' with the Water Supply Project and it is well understood that water conservation is a fundamental part of Council's sustainable water management strategy. Council's water conservation targets will be factored in to any of the options considered for further investigation and are considered as 'part of the project' rather than a separate assessment criteria.

4.7 The Water Forum with Key Stakeholders

The consultation for this stage of the project culminated in a Water Forum held on 17 February 2010. The Water Forum involved a number of invited specialists and interest groups, elected members, iwi and the Technical Advisory Group.

The Water Forum invitees and attendees are set out in Appendix 7. The Water Forum discussed the values rankings and identified key issues to be considered during the next stage of the project (assessing the short-listed options). The outcomes of the Water Forum are discussed in Appendix 10.

The following key matters emerged from discussions at the Water Forum:

- That there may be merit in a preferred water supply solution which includes the Whakatikei Dam.
- That water conservation forms an integral part of the long term water supply solution for the Kāpiti Coast.
- The need to manage the environmental effects of water supply options. For example, the use of off-line dams was discussed as a way of minimising effects on streams.
- The importance of finding a cost effective solution. This includes both construction and operational costs.
- That individuals need to gain a greater appreciation of their water use. Some attendees considered that the best way to achieve this is through water metering.

The discussions at the Water Forum re-enforced the messages that emerged from public consultation. In particular the need for any water supply solution to be coupled with a water conservation programme.

Earlier work in regards to inclusion of a water supply option which includes the regional Whakatikei Dam indicated that the timing for the dam may not correspond with when a new water supply is required for the Kāpiti Coast. As a result of the Water Forum, it has been identified that discussions should be held with the Greater Wellington Regional Council to determine whether a water supply option involving the Whakatikei Dam has potential to meet Council's needs with respect to timing and cost.

5 Tāngata Whenua: Values and Relationships

There are two broad areas involving tāngata whenua which need to be taken into account when assessing water supply options.

First, the approach being used as part of the assessment process takes a series of value statements and their rankings and uses them to analyse performance of options against them. While the concerns of tāngata whenua can to some extent be translated into value statements, in reality the issues are more about the relationship of tāngata whenua to natural systems and the nature of the governance and management systems (including authority and responsibilities) which exist between the two partners to the Treaty.

It is not appropriate to trade off these considerations as part of the mix of value statements. For example, Māori within the Kāpiti Coast have consistently stated that the concept of mauri or the life force found in natural systems, plants and animals, and humans is essential to people's wellbeing. This life force underpins a series of relationships with the environment, not least the role of kaitiaki in protection of that life force and the physical environment that contains it. It is as a consequence of this relationship held, through the mauri, with nature and the physical world, that Māori deeply value the health of the natural environment.

Equally, it is not appropriate to convert matters such as te tino rangatiratanga (authority of those things of significance to Māori – taonga tuku iho) and kaitiakitanga into value statements. These matters are more properly issues of governance, partnership and management systems and structures. These cannot be treated as value statements, to be traded off. Indeed, Council's responsibilities under the Resource Management Act preclude such an approach.

Second, the Council has formally adopted a series of 'bottom-line' statements in its strategy 'Water Matters: Sustainable Water Use Management'. These are:

> Hapū and iwi have a role in water management as kaitiaki of the environment. This kaitiaki responsibility is paralleled by a role of care or manaakitanga towards the wider community. How these roles unfold in relation to water will be a matter for discussion between Hapū, iwi and Council over time (p.15).
>
> From the perspectives of Ngāti Raukawa, Te Atiawa and Ngāti Toa, protection of the mauri of the waterways is a significant concern. This concern encompasses but is not confined to, issues of ecosystem health and potential harm to spiritual kaitiaki that protect the waterways. (p.16)
>
> Council recognises that Hapū and iwi have kaitiaki responsibilities that include:
>
> - consideration of the impact of water management systems on waterways;
> - concern to ensure the wider community is adequately serviced with a safe supply of water.

Council wishes to pursue a partnership approach with iwi in water management issues. To that end it will seek to explore the way in which Hapū and iwi kaitiaki responsibilities and Council water management responsibilities can mutually support and complement each other to achieve the best possible water management for the District. The MCA framework has recognized many concepts of importance to tāngata whenua. However, it is Councils intention to consult with iwi in relation to each area, and the 'in-catchment' and out of catchment solutions identified.

5.1 Treaty of Waitangi: Tino Rangatiratanga and Kaitiakitanga

In terms of addressing issues of tino rangatiratanga and kaitiakitanga, this requires that the overall water management package (supply and conservation) currently under development provides for structures, systems and processes that ensures a partnership approach. The Council has been working for sometime to achieve discussion with each iwi/Hapū on co-management of water and some other areas. This will be reported alongside the water conservation and supply packages.

6 Values Option Selection Criteria

The values and option selection criteria that provide the framework for the multi-criteria analysis are set out in this section. Each of the values are considered and explained separately.

6.1 Outcome #1: Quality of Water Supplied to Consumer

Water quality has consistently been identified as the most important value by the community. The community wants water that is clean, readily treated, and has a good taste. Experience of poor taste issues with bore water is noted by some in the community as a key concern.

Quality of Water Supplied to Consumer		
Criteria 1	*Public health: risk associated with not meeting the Drinking-water Standards for NZ (DWSNZ).*	*Given the significant focus on public health, and the communities strong desire to achieve a high standard of water quality, analysing the risks of being able to meet drinking water standards is relevant. The risks are considered in all options to be relatively low.*
Criteria 2	*Taste, Odour and Aesthetics (excluding hardness): risks associated with water not being acceptable to most consumers.*	*The taste of water is consistently one of the most commonly mentioned issues. Taste, odour and aesthetic qualities of water will vary across different options dependent on the raw water source, treatment required, and potential risks that apply to the type of option.*
Criteria 3	*Hardness: level of hardness in water supply.*	*The existing run of river system from the Waikanae River contrasts with the harder water which is taken from groundwater. It is possible to remove hardness from various water sources using various treatment methods.*

6.2 Outcome #2: Social

Impacts on the community arising from construction, operation and the impacts on the daily lives of residents arising from water use, conservation and providing reliable supply have been raised as a common concern. Managing these effects or choosing an option that minimises the potential for negative effects is a key focus at this stage. There are clearly significant benefits to the community from improving water conservation and providing a reliable supply for the future. These benefits will need to be understood and assessed in the RMA process, and are a key driver for the Council and community.

Social

Criteria 1	*Impact on landowners/ affected parties/water users during construction*	*As with many public works, the various water supply options have potential to have adverse effects on the community during the construction process. While specific designs are not yet available, various options by their nature have greater or lesser potential effects during construction. Minimising such disruption is important to the community.*
Criteria 2	*Impact on landowners/ affected parties/water users for ongoing operation*	*Depending on the type of option and location, private landowners will be affected in various ways. This may include minor activities, easements through to significant effects such as inundation of land (eg with a dam).*
Criteria 3	*Social impact of catastrophic failure*	*A concern for some in the community relates to the impact if for any reasons, a water supply solution fails. The impact of failure will vary depending on the type of option. Failure may be due to a variety of reasons. An example of failure may be sudden flooding following failure of a dam wall.*
Criteria 4	*Has other social benefits (eg recreation)*	*Some options may have the potential for social benefits, such as improved recreational opportunities for the community.*

6.3 Outcome #3: Cultural

The community has echoed the 'water is precious' principle of the project. The community views water conservation as a fundamental part of the solution and has also expressed a desire to find in-catchment solutions if possible. The community has a close association with water, particularly the main waterways of the Ōtaki and Waikanae Rivers. Such cultural affiliations are highly valued and form a part of community identity.

Cultural

Criteria 1	*Water conservation - supports the importance of water conservation and responsible water use by not giving an impression of limitless water being available*	*There is a risk that providing an improved water supply may give a community perception of a 'limitless supply of water' and therefore be detrimental to Council's water conservation objectives. Certain types of options, such as noticeable storage and taking water from high yield rivers, may increase that risk.*
Criteria 2	*In catchment solutions given priority for WPR supply*	*Providing water from local water sources is considered by many in the community to be an important 'indicator' of sustainability*
Criteria 3	*Identity - respects the value of water/rivers/places in defining identity*	*The community has a close association with water, particularly the main waterways of the Ōtaki and Waikanae Rivers. The cultural affiliation with such places and features is a highly valued part of community identity*

6.4 Outcome #4: Environmental

The community has identified a range of environmental concerns generally in relation to providing a sustainable long term water supply. Water conservation measures clearly have a significant benefit to the environment, as success will lead to a reduced requirement to extract water from the natural environment. Impacts of concern include in-stream ecology and native vegetation or conservation areas.

Environmental		
Criteria 1	*Impact on in-stream ecology*	*Various proposals rely on removing water from rivers. The ecology within rivers clearly relies on having a supply of water available. Depending on the nature of the proposal, an option may reduce the amount of water available, change the characteristics of flows, or cause some other change in habitat that would have an adverse effect on ecology.*
Criteria 2	*Impact on vegetation/terrestrial ecology*	*The foothills of the Tararua State Forest Park and conservation land to the east of the urban area include a range of important ecological values. Impacts on these values may range from positive effects, to removal of vegetation and habitat.*
Criteria 3	*Impact on groundwater*	*Groundwater aquifers are an important part of the natural water cycle and system. Careful management of the groundwater resource is required to ensure the long term sustainability of the resource.*
Criteria 4	*Impact on natural and/or urban landscape*	*The amenity of rural and urban areas is important to the community. Water supply options may have a significant impact on landscape values, or may change the amenity in the urban area.*
Criteria 5	*Impact on future use of land*	*The potential to change land use characteristics does arise in relation to some options. Depending on the infrastructure involved, there may be a significant impact on the ability to use land efficiently or for various purposes, including productive purposes.*

6.5 Outcome #5: Performance

A key interest for the community is demonstrating the water supply option chosen will provide proven performance over the design life of the project – that is out to 2060. The ability to link into existing infrastructure is enhanced by significant treatment capacity in the existing Waikanae Treatment Plant. However, the ability to manage the capital expenditure required over time through staging or having potential to expand an option in future makes strong economic sense. Ultimately, the community is looking for a secure supply of water so that the current challenges Council and the community are working through do not need to be addressed again for some time.

Performance		
Criteria 1	*Ability to make best use of existing infrastructure*	*Efficient use of existing infrastructure, and minimising the need to develop new infrastructure represents a strong economic benefit to the community and Council.*
Criteria 2	*Ability to be staged over time*	*Staging allows the option to be build progressively as the demand for additional water increases over time. This allows the community to spread its investment over a longer period of time.*
Criteria 3	*Ability to expand for additional supply if needed*	*Given the range of uncertainties around future demand, the ability to readily expand an option in future if required provides an ability to minimise future risks to supply.*
Criteria 4	*Security of supply over time*	*A number of natural or demand factors may influence the security over time. This may include impacts arising from natural hazards, climate change, local hydrology and so forth. The resilience of options varies when these factors are considered, and identifying options that provide high security of supply is important to the community and Council.*

6.6 Outcome #6: Implementation

There is a very strong desire from the community and Council for action. There have been many *"just get on with it"* comments in the consultation to date. While the process to select an option must be robust, it is important that consideration is given to the ability to easily implement a solution. This includes consideration of RMA factors, and the technology and design that will be utilised.

Implementation		
Criteria 1	*Difficulty in obtaining resource consents*	*There are a range of consents required for a water supply project under the RMA. Almost all will require regional consents to extract water. Others will involve land use consents or possible designation of land.*
Criteria 2	*Difficulty in acquiring land and/ or access*	*The ability to deliver the project quickly and efficiently is identified by the community as important. The desire to "get on with it" has been expressed in a number of forums. One key constraint in terms of time and cost can be the ability to gain access to land in order to execute works.*
Criteria 3	*Level of uncertainty in water resource and design/ technology*	*Some options involve the use of technology or water resource that are less certain than others. Options which involve water sources that are not well understood (eg in terms of quality or yield) are less appealing.*

6.7 Outcome #7: Economic

The solution must be affordable for Council and be value-for-money to the ratepayers of the District. The construction cost and the ongoing operational cost of water supply are key considerations for this project. In addition, the cost to other water users throughout the District must be considered.

Economic		
Criteria 1	*Cost to Construct*	*The cost to construct the solution must be within Council's water supply budget. Those options with a lower construction cost will score more favourably.*
Criteria 2	*Operational Cost*	*The ongoing operational costs must be reasonable and affordable. Those options with a lower operational cost will score more favourably.*
Criteria 3	*Impact on opportunity cost of other potential water users*	*Water supply options have the potential to impact on other water users, such as irrigators and commercial users. The allocation of water to the full range of present and potential users is an important economic consideration.*

7 Results

7.1 Presenting Results

The results of the Multi-Criteria Analysis (MCA) are presented in this section of the report. The results must be considered in the context of the entire report, and in particular, recognising that this analysis is only a tool to assist decision making.

Twenty options have been assessed using the MCA model. Each has various pros and cons, and therefore MCA assessment is useful in identifying those options which have the greatest potential to meet the long term water supply objectives of Council and the community.

There are many policy issues that are embodied within the MCA assessment. Having made a commitment to identify a preferred option, and build that solution by 2015, Council has set a clear intention to resolve water supply for the long term. However, one issue that is particularly important to Council in achieving this is to have tāngata whenua partners confident that the right decision has been made. One of the key issues that arises for tāngata whenua relates to where water is sourced from. The policy framework from Water Matters is clearly favours in catchment solutions in preference to out-of-catchment solutions. The community also have a strong affinity with this policy as well as with water conservation.

Therefore, the ranked options are presented in accordance with this policy setting. That is, a ranked list of those options that are within catchment is provided, along with a ranked list of out-of-catchment solutions.

In addition, over the course of the consultation it is clear that many in the community have a firm view as to what type of option is the best solution for Kāpiti Coast. One factor to consider when analysing the results of the model could therefore be whether a range of options is provided for. The "in-catchment" solutions are by their nature limited to further harvesting of the Waikanae River (ie storage) or improved treatment of groundwater. Where a particular type of option clearly does not 'stack-up' however, it has been eliminated.

While a number of options have been eliminated, there remains the potential for some options to be combined. This is particularly the case in relation to considering the future potential role of the borefields. Whether the borefield is included as part of the current supply network or not has significant implications for the amount of water that needs to be sourced. If the borefields remain as part of the network, a much smaller additional supply is required. Therefore, while some options have been eliminated as stand-alone options (i.e. capable of providing the 2060 demand of 26,000 m^3/day), some may be able to be combined with those on the recommended short list to provide an optimal approach to meeting the demand. It is also important io note that a number of options have been eliminated for good reason to date. This may include yield, cost, or technical reasons. It is considered unlikely that these eliminated options could work in tandem with those on the short-list, with the exception of the existing borefield. The ability to stage the development of water supply infrastructure will be a key element in the next stage of the project.

7.2 Weightings

The weightings that are applied to the MCA model have a significant influence on the ranking process for the options. The process of determining a preferred approach to weightings is not scientific, but rather involves informed judgment. The 'preferred' scenario is informed by the consultation undertaken, the community survey and Water Forum, and Council policy.

These scenarios are discussed in Appendix 9. There are two sets of weightings that need to be determined. Firstly, what weight to apply to the seven 'values' that have been defined through consultation. Secondly, what weight to apply to the specific criteria that sit under each of those values in the MCA model.

The scenarios relate to the Community Values Survey and Consultation, Water Forum and a Preferred Scenario which is explained in detail below and the scenario outcomes can be found in Appendix 10.

The first two scenarios are Scenario 1: Community Values Survey and Consultation and Scenario 2: Water Forum #1 are based on interpretation of the feedback and input from the community. While the inputs to these two scenarios are variable in terms of their scientific robustness and statistical accuracy, both provide an indication of the relative importance of each of the values and criterion.

In addition to comparing the results from the three weighting scenarios, a sensitivity analysis was undertaken on the weighting assigned to each of the seven values. The effect on the overall scores caused by varying each value weighting from 0% (no weight at all on the particular value) to 100% (all the weight on the particular value) was examined. As the weighting for the value under consideration is increased, all other value weightings are reduced but kept in the same proportion to each other as the preferred scenario weightings. This analysis showed that the model is fairly sensitive in that the ranking order of the options changes with a fairly small change (<5%) in the weighting. However, the options on the short-list of ten were fairly consistently preferred over any reasonable range of value weights. This gives confidence that these options are more favourable than the other options and therefore should be investigated and considered further.

In finalising the approach to weighting a number of issues were considered. The following tables provides some discussion and context for how the preferred scenario has been arrived at. The relativity of the values reflects the feedback from the community survey, although greater weight is placed on social and cultural issues in the preferred scenario.

Values	Weighting	Discussion
Quality of Water Supplied to Consumer	25%	There is a clear message from the community that this is the most important value to consider when evaluating the options. This value has been weighted the highest at 25% of the total. Sub-criteria were also weighted in accordance with the strong feedback from the community that taste is the major component of quality of water that is of greatest concern. Hardness was also mentioned by many in the community as a concern. In the end, reference to the NZ Drinking Water Standards was rated at 0% on the basis that all the options evaluated would be able to meet these standards, and it was seen as a 'give-in' that this would occur.
Social	10%	Council policy is clear that the social issues are important, and while weighted at 10%, combined with cultural issues makes up 20% overall. While in the community survey social and cultural issues were combined, and rated low, the way the survey was drafted by combining social and cultural issues, may have caused a level of misunderstanding and subsequently these issues were rated lower. The key social issues of concern relate to impact on the community and landowners/ stakeholders, so these criterion were rated at 35% each. The potential for catastrophic effects was also raised by some in the community, although it is expected that the engineering design team can advise on the actual risks of this occurring during the next stage, and so it rated at 15%. The potential for some options to deliver a range of other social benefits has also arisen, and this is also rated at 15%.

Values	Weighting	Discussion
Cultural	10%	The cultural values represent values that have been raised across all different parts of the community. This value is rated at 10% overall. The greatest issue raised is the need for in-catchment solutions, a value that is shared by the community and specifically by tāngata whenua. This criterion was therefore weighted at 50%, while water conservation is seen by Council as a critical platform for the water management approach in Kāpiti Coast, so was rated at 35%. The final 15% criteria relates to identify, and is included because there is a strongly held view that the identity of the district is influenced by how well the community manages its natural resources.
Environmental	15%	The focus on water conservation is matched by an equal desire in the community to ensure that the water supply regime does not have a significant or unacceptable impact on the districts natural environment. This value was rated at 15% overall.
Performance	15%	Ensuring the final solution provides a water supply that gives the community a secure source of water was the most important concern. This is clearly an important technical matter also, and is weighted highly at 40% The ability to expand an option over time also provides Council with real flexibility, so expandability was weighted at 30%. The remaining two criterion were weighted evenly at 15%.
Implementation	10%	The ability to actually build a final solution is important. This value is weighted at 10% overall. The key issue raised relates to in-stream ecology, but interestingly the protection of groundwater was also a key concern. This is likely due to many local properties using the shallow aquifers for local water sources for irrigation. Both these criteria were weighted at 35%, while the remaining three were seen as providing an important context to the decision, and were weighted evenly at 10% The reality of delivering the solution relates to the ability to get consent first and foremost, so this criterion is weighted at 40%. Many solutions involve access to land, the ability to achieve this is therefore weighted at 30%, while some solutions involve innovative technology for New Zealand, so some acknowledgement of technical challenges is necessary, and this is weighted at 30% also.
Economic	15%	Along with environmental and performance, the economic benefits or impacts of water supply were relatively evenly identified in the community survey. This was therefore weighted at 15% overall. The major concern is the capital cost – there is a real range of costs associated with the 20 options. This is weighted at 50%, while the cost of water is also influenced by operational costs, so this is weighted at a further 30%. As noted previously, the demand for water from different parts of the community means that opportunity cost should be factored into the decision making process, and this is weighted at 20%.

The preferred weighting scenario is not as diversely spread as some of the consultation feedback may have suggested. This aims to take account of Council's various policy issues, and is based on the discussion above. The following table provides a full summary of the final weightings of values and the criterion.

Value		Value Weighting	Criteria	Criteria	Criteria Weighting
1	*Quality of Water Supplied to Consumer*	25%	1	Public health: Risk associated with not meeting Drinking-water Standards for NZ	0%
			2	Taste, Odour and Aesthetics: Risks associated with water not being acceptable to most consumers	65%
			3	Hardness: Level of hardness in water supply	35%
2	*Social*	10%	1	Impact on landowners/affected parties/water users during construction	35%
			2	Impact on landowners/affected parties/water users for ongoing operation	35%
			3	Social impact of catastrophic failure	15%
			4	Has other social benefits (eg recreation)	15%
3	*Cultural*	10%	1	In catchment solutions given priority for WPR supply	50%
			2	Water conservation - supports the importance of water conservation and responsible water use by not giving an impression of limitless water being available	35%
			3	Identity - respects the value of water/rivers/places in defining identity	15%
4	*Environmental*	15%	1	Impact on in-stream ecology	35%
			2	Impact on vegetation/terrestrial ecology	10%
			3	Impact on groundwater	35%
			4	Impact on natural and/or urban landscape	10%
			5	Impact on future use of land	10%
5	*Performance*	15%	1	Ability to make best use of existing infrastructure	15%
			2	Ability to be staged over time	15%
			3	Ability to expand for additional supply if needed	30%
			4	Security of supply over time	40%
6	*Implementation*	10%	1	Difficulty in obtaining resource consents	40%
			2	Difficulty in acquiring land and/or access	30%
			3	Level of uncertainty in water resource and design/ technology	30%
7	*Economic*	15%	1	Cost to construct	50%
			2	Operational cost	30%
			3	Impact on opportunity cost of other potential water users	20%

When the weightings discussed above are applied to the MCA model, the results of the preferred scenario are presented in the following table. The top ten options are considered in the following section. It is worth noting that the aim of this process is to identify 5-8 solutions to take forward to Stage Three. Those options not shortlisted are therefore discarded.

Rank	Option	Option Type	Option Number
1	Otaki Wellfield and Pipeline	Run-of-River	4
2	Otaki River Gorge	Run-of-River	2
3	Otaki River Gorge Transfer	Run-of-River	3
4	Lower Maungakotukutuku Dam	Dam	18
5	Aquifer Storage & Recovery	Groundwater	27
6	Groundwater River Recharge	River Recharge	29
7	Kapakapanui Dam	Dam	12
8	Ngatiawa Dam	Dam	13
9	Kapiti District Integrated Water Supply	District Wide	39
10	Waikanae Borefield and storage	Other	38
11	Waikanae WTP Dam	Dam	11
12	Kapiti District Integrated Water Supply (Otaki Gorge)	District Wide	40
13	Low-low Maungakotukutuku Dam	Dam	19
14	GWRC Whakatikei Dam	Dam	20
15	Extended Waikanae Borefield	Groundwater	23
16	Akatarawa River Transfer	Run-of-River	6
17	Reikorangi Dam (Cambridge Farm)	Dam	16
18	Deep Groundwater	Groundwater	26
19	Storage Ponds - East	Storage Ponds	22
20	Storage Ponds - West	Storage Ponds	21

8 Analysis and Recommended Approach

The approach to identifying a recommended short-list requires an assessment of each of the options in terms of risk and applying judgment to ensure the short-list covers a range of source options to maximise the chances of arriving at the optimal outcome. The context for this has been set out earlier in the report.

To be consistent with Council's policy setting in relation to a preference for in-catchment solutions, the following table identifies the top six in-catchment and four out-of-catchment options.

8.1 Ranked List of Options

In-catchment solutions	
Rank	Option and Option #
4	Lower Maungakotukutuku Dam (#18)
5	Aquifer Storage & Recovery (#27)
6	Groundwater River Recharge (#29)
7	Kapakapanui Dam (#12)
8	Ngātiawa Dam (#13)
10	Borefield and Storage (#38)

Out-of-catchment solutions	
Rank	Option and Option #
1	Ōtaki Well field and Pipeline (#4)
2	Ōtaki River Gorge (#2)
3	Ōtaki River Gorge Transfer (#3)
9	Kāpiti District Integrated Water Supply (#39)

8.2 Risk assessment and evaluation

In keeping with the transparency tradition, the following discussion sets out current known risks for each of the short-listed options and other relevant comments.

8.2.1 In-catchment Options

The list of in-catchment options provides a mix of groundwater and storage related solutions. The following is an analysis of risk associated with each option.

Lower Maungakotukutuku Dam - Option 18

Rank #4

Without more detailed on-site geotechnical investigations of this option there are risks associated with unsuitable ground conditions and higher capital costs. The question about the covenant on part of the site also needs to be resolved. Further investigation and consultation will provide greater certainty in relation to this dam site. There are also a number of different potential locations for the dam itself, meaning that some optimisation of this option is likely to occur early in Stage Three to identify the best approach. The design will need to address any seismic hazard concerns.

Aquifer Storage & Recovery – Option 27

Rank #5

This option involves modifying the existing Waikanae Borefield so that river water could be injected into the aquifer over winter during high river flows for storage until abstraction in the summer.

This option has a high technical risk as it has not been considered previously for Kāpiti and there are no examples of this technology in New Zealand. Nevertheless, it has been successfully implemented in the USA (California in particular) and is seen as holding some promise in Australia. Hydrogeological investigations and modeling will be needed to further assess the feasibility of this option with the Waikanae aquifer. There is a risk that the timeframe for these investigations may not suit the project timeframe and that following this work it may not be shown to be feasible. Another issue at this stage is the unknown cost for implementation, although based on what is currently known about the aquifer it appears economically attractive. Overall this option does have a number of benefits when evaluated against the values and criteria and as long as the risks are acknowledged and accepted, it is worthy of further investigation. In the event that insufficient information to provide certainty can be gained, this option could be discounted early in Stage Three.

Groundwater River Recharge – Option 29

Rank #6

This option involves extending the existing Waikanae Borefield and discharging groundwater to the Waikanae River immediately downstream of the Waikanae WTP intake during periods of low river flow when water cannot currently be abstracted due to residual flow requirements. The groundwater discharge would bolster flow in the river and so potentially allow water to still be abstracted from the river for water supply under low flow conditions. A proportion of groundwater would still be used for water supply, unless the river abstraction consent is increased above the current limit of 23,000 m^3/day.

This option requires investigations to confirm the sustainable long-term yield from Waikanae borefield and to assess the effects of the discharge of groundwater to the Waikanae River. Treatment of the bore water may not be required in this option, but there is a risk that without treatment, there will be some potential issues in relation to the effects on the river water quality and aquatic ecosystems. Also the river water quality during low flow periods needs investigation as to its suitability for water supply.

Kapakapanui Dam - Option 12

Rank #7

Whilst there has been a feasibility study for this option in the past, further investigations are needed to better understand the hydrology of the catchment and the geological conditions. These could adversely affect the capital cost estimate.

Ngātiawa Dam – Option 13

Rank #9

There has been no detailed work on this option previously and therefore there are technical risks, in particular around geological conditions. This could affect the cost estimate for this option. There may also be issues around the zoning of the riparian margins in this area.

Borefield and Storage – Option 38

Rank #10

This option would retain the existing Waikanae Borefield and use a small pond to store river water to make up any shortfall between the future demand and the sustainable yield from the bores. Treatment of the bore water would be required to address taste and hardness issues.

There is a cost risk with this option as further investigation is needed of the bore water treatment requirements, the storage sizing and the long-term sustainable groundwater yield. It is recommended that the investigation of this option should also include as sub-options to extend the existing borefield and close some poor performing bores. As part of the investigations, it is therefore considered prudent to also identify new locations for bores, so this option also involves investigating the potential to extend the borefield. This may assist in mitigation of public perception of the borefield taste/hardness issues. On this basis, this option becomes a "hybrid" with the Extended Borefield (Option #23).

General Comments on Dams

In relation to the short-listed dams, it has been assumed up until this point that the existing Waikanae Borefield will not be utilised if a dam is constructed. However, it may be an option to consider a smaller dam and continue use of the bores with treatment of the bore water.

While some initial investigation has been undertaken, each dam has particular strengths and weaknesses. It is suggested that further investigation and concept design is undertaken for all three of the short-listed dams, and in the event that one or two are clearly behind the best dam, that these drop out early in Stage Three.

8.2.2 Out-of-catchment Options

The top four out-of-catchment options essentially utilise the Ōtaki River as a water source, with the different options abstracting water at different points. Given the significant issues raised by tāngata whenua and the Ōtaki community about these options, the risks are all comparable and relate to relationship issues for Council. Given tāngata whenua's desire to engage with Council once a short-list has been developed, the recommended approach is to have a discussion on the water source first, then to determine the best option (considered to be the Ōtaki Wellfield and Pipeline). The following discussion provides an analysis of risk associated with the Ōtaki River options.

Ōtaki Wellfield and Pipeline - Option 4; Ōtaki River Gorge - Option 2; Ōtaki River Gorge Transfer - Option 3; Kāpiti District Integrated Water Supply - Option 39

The above options are respectively ranked 1, 2, 3 and 9. However, the key risks for all are the same.

The out-of-catchment options which rated most highly all source their water from the Ōtaki River. As is clear from consultation with tāngata whenua, and arising from the previously declined resource consent for the Ōtaki pipeline, significant concerns from not only tāngata whenua remain but also the wider community.

All of these options have different designs from an engineering perspective, and may have different localised environmental effects. The key risk however relates to Council's relationship with tāngata whenua. It is recommended, therefore, that the first issue to resolve is whether Ōtaki River water can be considered. This will require Council to consult with tāngata whenua, and then to make a decision on whether to include one of these options on the short-list in the context of the relationship with tāngata whenua.

If an Otaki option is possible, it is suggested that either the Ōtaki Wellfield and pipeline or the Kāpiti District Integrated Water Supply are considered. The first because it was first ranked in the MCA process. The second because, while ranked 9th, it provides an alternative perspective on the use of the Otaki River, which is as a district-wide resource. The integrated water supply solution involves building a treatment plant and then reticulating the water to Ōtaki township and possibly the Te Horo/Hautere area (a district wide solution), as well as piping water to the existing Waikanae water treatment plant. This may be considered by the local community to provide an additional benefit to off-set the adverse effects associated with taking water out of the catchment.

There are clearly potential risks associated with the overall timeframe if the consultation process with tāngata whenua does not result in an early agreement on whether to proceed with investigation. Another key risk relates to lost opportunity cost. Using the Ōtaki River for water supply could conflict with future economic development in the form of agricultural, horticultural and industrial activities in the Ōtaki area. The extent to which Otaki River water may be used in future for any use, is likely to be dependent on the level of effect on the river, plus the degree of acceptance of that use by the local community.

8.3 Recommendations

The aim of this report is to assist Council in identifying a short-list of options to take forward for detailed evaluation which involves developing concept designs for each option. On the basis of the foregoing analysis of the ranked list, plus a consideration of risks associated with each option, it is recommended that the Council adopt two short-lists: In-catchment and Out-of-catchment. The approach to each list however should vary in terms of the next steps. Whether the out-of-catchment solutions (i.e. Otaki River) are progressed further is dependent on the results of the next round of consultation with tāngata whenua. It is important to note that while the Otaki River has a particular focus in this discussion, both Raukawa and Te Atiawa will be consulted about the out of catchment solutions, because this is an important issue for the relationship between Council and tāngata whenua.

The recommendations are as follows:

Recommendation 1	It is recommended that Council short-list the following options: *Lower Maungakotukutuku Dam (Option 18)* *Aquifer Storage & Recovery (Option 27)* *Groundwater River Recharge (Option 23)* *Kapakapanui Dam (Option 12)* *Ngātiawa Dam (Option 13)* *Extended Borefield and Storage (Option 38 & 23)*

The next steps for these options should be:

- To develop a concept design for each solution
- Develop comparable cost estimates for each solution
- Establish a framework to reach agreement with tāngata whenua in terms of their position on each of the short-listed in-catchment solutions;
- Consult with the community, including specifically affected landowners and affected parties
- Carry out a preliminary assessment of the effects and benefits of each option
- Undertake an assessment of the water related issues (i.e. taste, quality, security of supply, hydrology etc)
- Prepare a cost-benefit assessment of the options.

Recommendation 2	That Council progress consultation with tāngata whenua and local communities in relation to the Ōtaki River as a water source to determine whether an out-of-catchment solution should be included on the short-list.

Recommendation 3	That Council eliminate those options identified in this report that have cost, yield or other technical faults, and that there be no further investigation of options not included on the short-list.

Appendix 1

Values

Appendix 1 - Contents

Value #1: Water Quality

#	Criteria	Criteria Scale	Explanation	Source Information
1.1	Public health: Risk associated with not meeting the Drinking-water Standards for NZ (DWSNZ)	Almost zero	The risk of the water supply not meeting the requirements of the DWSNZ is almost zero.	Water quality results for water sources and experience from similar projects
		Low	There is a low risk, due the nature of the raw water source, that the water supply may not meet all of the requirements of the DWSNZ all of the time.	
1.2	Taste, Odour and Aesthetics: Risks associated with water not being acceptable to most consumers	Almost zero	The risk of taste, odour and aesthetic problems with the water supply is almost zero.	Water quality results for water sources and experience from similar projects
		Low	There is a low risk of the taste, odour and aesthetic quality of the water supply not being acceptable to most consumers.	
		Possible	The quality of the water may be such that taste and odour thresholds may be exceeded or the aesthetic quality of the water may not be acceptable to most consumers.	
1.3	Hardness: Level of hardness in water supply	Matches existing river supply	The hardness of the water supply is similar to the existing river supply (around 30 mg/L - higher value means more likely to get scale deposition).	Water quality results for water sources and experience from similar projects
		Less than 100 mg/L	The hardness of the water supply will be higher than that from the river supply but less than that from the existing Waikanae borefield.	
		Greater than 100 mg/L	The hardness of the water supply will be similar to that from the existing Waikanae borefield.	

Value #2: Social

#	Criteria	Criteria Scale	Explanation	Source Information
2.1	Impact on landowners/ affected parties/ water users during construction	Low Impact	Few people/properties directly affected (<20). Low impact on local services/ roads/ public areas – minimal disruption anticipated. No more than minor adverse effects on water supply – quality and supply. No more than minor adverse effects on river flows and/or access.	Land parcel/ ownership database GIS/ option concept and location plans
		Medium Impact	Moderate number of people/properties directly affected (20-50). Some impact on local services/ roads/ public areas, however effects minor and/or able to be mitigated – some disruption anticipated. Some impact on water supply- however effects minor and/or able to be mitigated. Some impact on river flows and/or access- however effects minor and/or able to be mitigated.	
		High Impact	Many people/properties affected (>50). Some impact on local services/roads/public areas, adverse effects likely to be more than minor/unable to be mitigated. Some impact on water supply, adverse effects likely to be more than minor/ unable to be mitigated. Some impact on river flows and/or access, adverse effects likely to be more than minor/ unable to be mitigated.	
2.2	Impact on landowners/ affected parties/ water users for ongoing operation	Low Impact	No direct long-term adverse effects on people/properties (access, noise, visual).	Land parcel/ ownership database GIS/ option concept and location plans
		Medium Impact	Minor direct long-term adverse effects on people/properties (access, noise, visual). People/ properties affected </= 5.	
		High Impact	More than minor direct long-term adverse effects on people/ properties (access, noise, visual). People/ properties affected >5.	
2.3	Social impact of catastrophic failure	Low	No hazards identified in option area. No households likely to be directly adversely affected by failure. Low hazard risk assessment score.	District and Regional Hazard maps Land parcel/ ownership database GIS/ option concept and location plans Hazard risk assessment
		Medium	Hazards identified in option area. Some households likely to be directly adversely affected by failure, however adverse effects minor/ able to be mitigated. Moderate hazard risk assessment score.	
		High	Hazards identified in option area. Some households likely to be directly adversely affected by failure, adverse effects more than minor/ not able to be mitigated. High hazard risk assessment score.	
2.4	Has other social benefits (e.g. recreation)	Yes	Other benefits for community identified.	Assessment of option concept design and co-benefit potential
		No	Other benefits for not identified.	

Value #3: Cultural

#	Criteria	Criteria Scale	Explanation	Source Information
3.1	In catchment solutions given priority for WPR supply	Water source is fully within community catchment	Water source is fully within community catchment	GIS/ option concept and location plans
		Water source is not fully within community catchment	Water source is not fully within community catchment	
3.2	Water conservation - supports the importance of water conservation and responsible water use by not giving an impression of limitless water being available	Supportive	Low risk of giving a community perception of a 'limitless supply of water'	GIS/ option concept and location plans
		Not supportive	Medium or high risk of giving a community perception of a 'limitless supply of water'	
3.3	Identity - respects the value of water/ rivers/ places in defining identity	No identified risk of compromising this value	No identified risk of compromising this value	GIS/ option concept and location plans
		Identified risk of compromising this value	Identified risk of compromising this value	

Value #4: Environmental

#	Criteria	Criteria Scale	Explanation	Source Information
4.1	Impact on in-stream ecology	Low	No threatened species identified in option area. No sites of in-stream ecological/ environmental significance identified in option area. No long-term impact on river flows. No obvious structures along/in the river corridor.	District and Regional Plans Previous investigations where relevant Site visit AEE investigation
		Medium	Threatened species identified in option area, however effects minor and/or able to be mitigated. Sites of in-stream ecological/ environmental significance identified in option area, however effects minor and/or able to be mitigated. Minor impact on river flows. Structures along/in the river corridor, however effects minor and/or able to be mitigated.	
		High	Threatened species identified in option area, effects likely to be more than minor. Sites of in-stream ecological/ environmental significance identified in option area, effects likely to be more than minor. More than minor impact on river flows. Structures along/in the river corridor, effects likely to be more than minor.	
4.2	Impact on vegetation/ terrestrial ecology	Low	No native/ significant vegetation requiring protection identified in option area. No sites of terrestrial ecological significance identified in option area.	District and Regional Plans Previous investigations where relevant Site visit AEE investigation
		Medium	Native/ significant vegetation requiring protection identified in option area, however effects minor and/or able to be mitigated. Sites of terrestrial ecological significance identified in option area, however effects minor and/or able to be mitigated.	
		High	Native/ significant vegetation requiring protection identified in option area, adverse effects likely to be more than minor/ unable to be mitigated. Sites of terrestrial ecological significance identified in option area, adverse effects likely to be more than minor/ unable to be mitigated.	
4.3	Impact on groundwater	Low	No more than minor adverse effect on groundwater.	District and Regional Plans Previous investigations where relevant Site visit AEE investigation
		Medium	Groundwater will be affected, however no adverse effects to the long-term sustainability of the aquifer/ significant change in groundwater levels.	
		High	Groundwater will be affected, adverse effects likely to be more than minor/ unable to be mitigated.	

4.4	Impact on natural and/ or urban landscape	Low	No significant/ outstanding landscapes identified in option area. No more than minor change to the landscape.	District and Regional Plans Previous investigations where relevant Site visit AEE investigation
		Medium	No significant/ outstanding landscapes identified in option area. Noticeable change to the landscape, however able to mitigate adverse effects through design.	
		High	Significant/ outstanding landscapes identified in option area. Noticeable change to the landscape, adverse effects likely to be more than minor/ unable to be mitigated.	
4.5	Impact on future use of land	Low	No impact on the use of land in the future	District and Regional Plans Previous investigations where relevant Site visit AEE investigation
		Medium	Some impact on the use of land in the future, however adverse effects able to be mitigated.	
		High	Some impact on the use of land in the future, adverse effects likely to be more than minor/ unable to be mitigated.	

Value #5: Performance

#	Criteria	Criteria Scale	Explanation	Source Information
5.1	Ability to make best use of existing infrastructure	High	All existing water supply infrastructure will continue to be used (ie, intake, treatment plant, bores, raw water pipelines, trunk mains, reservoirs).	District and Regional Plans District records on current infrastructure Previous investigations where relevant Site visit AEE investigation
		Medium	Some of the existing water supply infrastructure will continue to be used	
		Low	Not much of the existing water supply infrastructure will continue to be used.	
5.2	Ability to be staged over time	High	The option can be developed over time to match increasing total water demand due to population growth	District and Regional Plans Previous investigations where relevant Site visit AEE investigation
		Medium	Part of the option can be developed over time to match increasing total water demand	
		Low	The option cannot be developed over time to match increasing total water demand	
5.3	Ability to expand for additional supply if needed	High	Straightforward to expand the option at a later date to increase the supply capacity if needed	District and Regional Plans Previous investigations where relevant Site visit AEE investigation
		Medium	Some difficulty to expand the option at a later date to increase the supply capacity if needed	
		Low	Very difficult to expand the option at a later date to increase the supply capacity if needed	
5.4	Security of supply over time	High	Water supply from option not likely to be adversely affected by drought, natural hazards, and/or climate change.	Previous investigations and hazard assessments where relevant District and Regional hazard maps
		Medium	Option may be adversely affected by drought, natural hazards, and/or climate change, but impact on water supply minor and/or able to be mitigated.	
		Low	Option may be adversely affected by drought, natural hazards, and/or climate change and impact on water supply more than minor and/or not able to be mitigated.	

Value #6: Implementation

#	Criteria	Criteria Scale	Explanation	Source Information
6.1	Difficulty in obtaining resource consents	Low	Controlled Activity Status. No history of opposition.	Preliminary Planning Scoping Report.
		Medium	Discretionary Activity Status. Has some history of opposition/ opposition can be mitigated.	
		High	Non-complying Activity Status. Has a history of opposition/ opposition can not be easily mitigated.	
6.2	Difficulty in acquiring land and/or access	Low	Low number of properties required to be acquired (<5). No public/ special land parcels required to be acquired.	Land parcel/ ownership database. GIS/ option concept and location plans.
		Medium	Number of properties required to be acquired (5-10). No public/ special land parcels required to be acquired.	
		High	Number of properties required to be acquired (>10). Public/ special land parcels required to be acquired.	
6.3	Level of uncertainty in water resource and design/ technology	Low	Water resource and environmental effects well understood and investigated. Limited further investigations required to test the option. Design/technology well understood and easily able to be justified/supported.	Review of previous investigation reports to identify information gaps. Design/ technology risk assessment.
		Medium	Water resource and environmental effects are understood, however further investigations required to test the option. Design/technology understood, however will require specialist input to justify/support.	
		High	Water resource and environmental effects not well understood. Significant further investigations required to test the option. Design/technology unproven/ not well understood. Will require a significant amount of specialist input to justify/ support.	

Value #7: Economic

#	Criteria	Criteria Scale	Explanation	Source Information
7.1	Cost to Construct	<$10 million	<$10 million	GIS/ option concept and location plans Construction cost estimate
		$10-20 million	$10-20 million	
		>$20 million	>$20 million	
7.2	Operational Cost	Lower than current river water supply	Lower than current river water supply	GIS/ option concept and location plans Operational cost estimate
		Of about the same order as current river water supply	Of about the same order as current river water supply	
		Higher than current river water supply	Higher than current river water supply	
7.3	Impact on opportunity cost of other potential water users	Low	Low risk of negative effects on other potential water users	GIS/ option concept and location plans High-level assessment of other water users
		Medium	Medium risk of negative effects on other potential water users	
		High	High risk of negative effects on other potential water users	

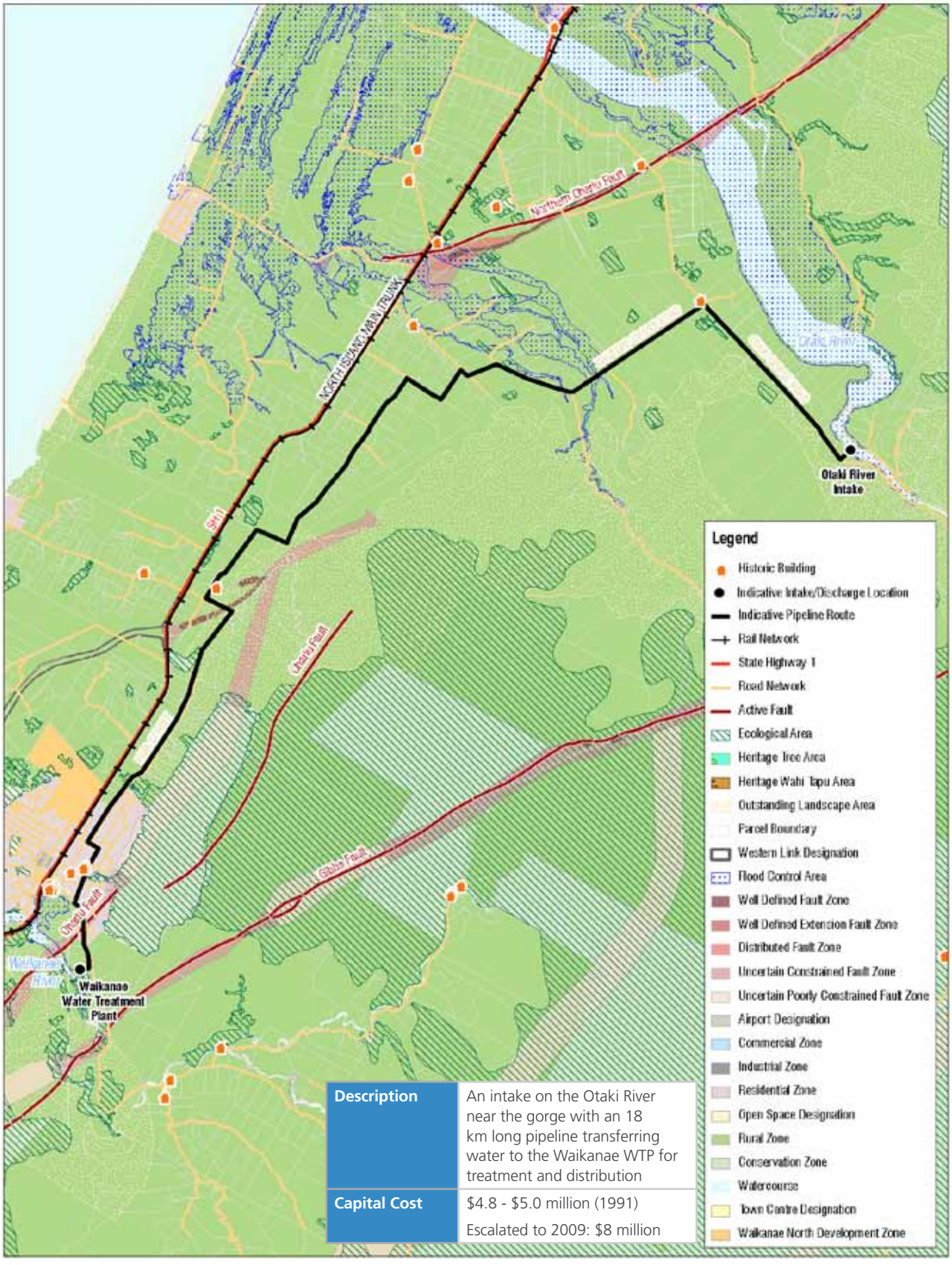
Appendix 2

Option Information

Appendix 2 - Contents

Option 2 - Otaki River Gorge

Value		Criteria		Rating	Comments
1	Quality of Water Supplied to Consumer	1	Public health	Almost zero	
		2	Taste, Odour and Aesthetics	Almost zero	
		3	Hardness	Matches existing river supply	
2	Social	1	Impact during construction	Low impact	Assume pipeline route kept away from SH1 but along local roads Estimated construction period 9-12 months
		2	Impact for ongoing operation	Low impact	
		3	Social impact of catastrophic failure	Low	Pipe crosses faultline, however unlikely to result in catastrophic social impact as pumps can be turned off
		4	Other social benefits (eg. recreation)	No	
3	Cultural	1	In catchment solutions	Water source is not fully within community catchment	
		2	Water conservation	Not supportive	Otaki River is a large, high yield river which is highly visible and so may give impression of high water availability
		3	Identity	Identified risk of compromising this value	Otaki community's identity may be affected by water transfer to WPR
4	Environmental	1	Impact on in-stream ecology	Medium	At least residual flow remains in the river
		2	Impact on vegetation/ terrestrial ecology	Low	Subject to pipeline avoiding highly rated ecological areas
		3	Impact on groundwater	Medium	Potential effect on river recharge of shallow aquifer
		4	Impact on natural and/or urban landscape	Low	
		5	Impact on future use of land	Low	
5	Performance	1	Ability to make best use of existing infrastructure	Medium	Not using Waikanae Borefield
		2	Ability to be staged over time	Low	
		3	Ability to expand	Medium	Potential to install a larger pipe or a bigger pump
		4	Security of supply over time	High	High yielding river
6	Implementation	1	Difficulty in obtaining resource consents	High	The issue of taking water from the Otaki River has a history of objection from the Otaki community and iwi. Feedback from consultation to date is that opposition remains.
		2	Difficulty in acquiring land and/ or access	Low	Need to purchase land not foreseeable as pipe can run along road reserve
		3	Level of uncertainty in water resource and design/technology	Low	
7	Economic	1	Cost to construct	$10-20 million	
		2	Operational cost	Higher than current river water supply	Additional pumping from Otaki to Waikanae WTP
		3	Impact on opportunity cost of other potential water users	High	Expect other potential abstractors, such as horticultural users, would be able to take water in a 10yr or 20yr drought but not in a 50yr drought.

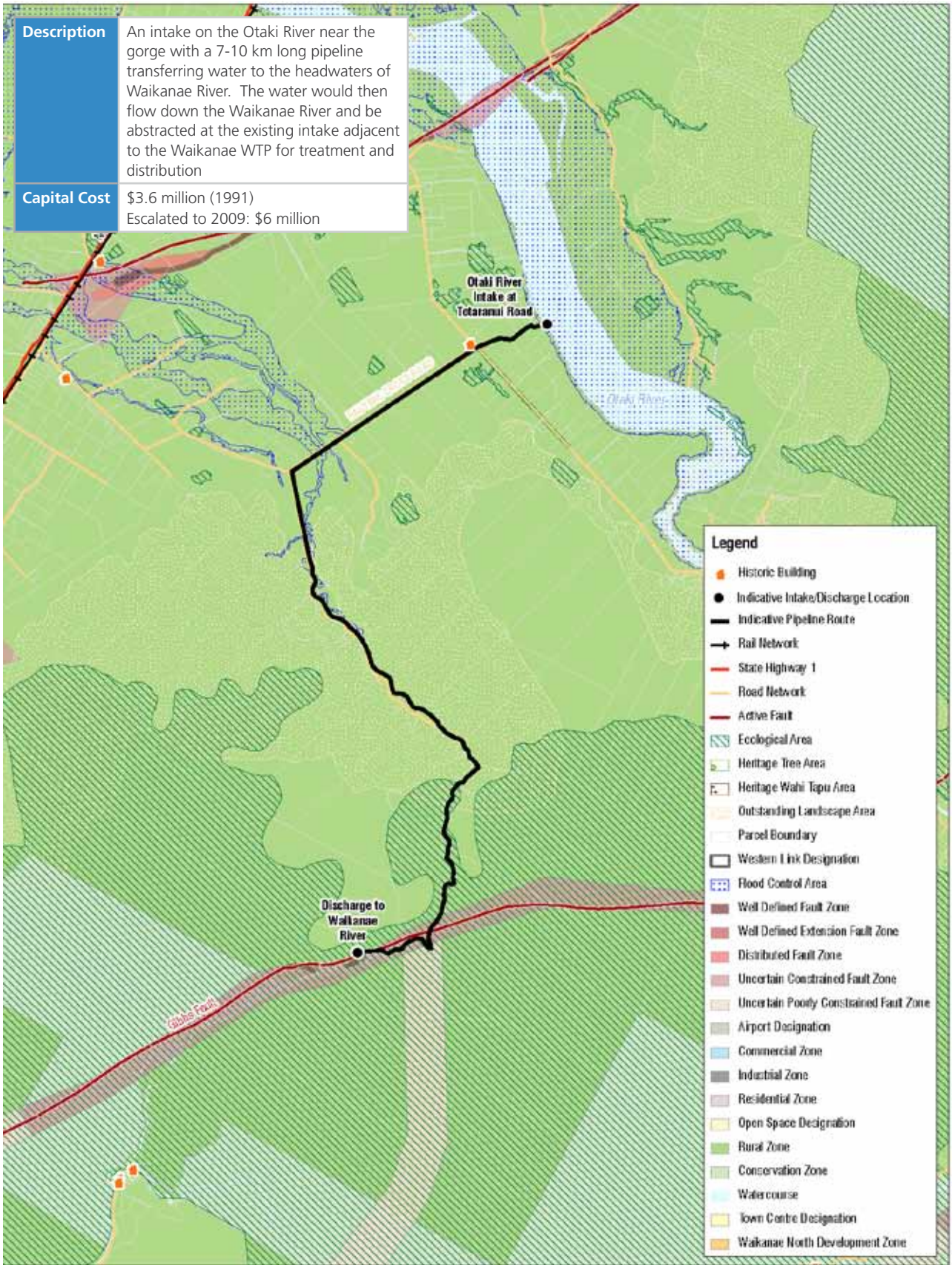


Description	An intake on the Otaki River near the gorge with an 18 km long pipeline transferring water to the Waikanae WTP for treatment and distribution
Capital Cost	$4.8 - $5.0 million (1991) Escalated to 2009: $8 million

Option 3 - Otaki River Gorge Transfer

Value		Criteria		Rating	Comments
1	Quality of Water Supplied to Consumer	1	Public health	Almost zero	
		2	Taste, Odour and Aesthetics	Almost zero	
		3	Hardness	Matches existing river supply	
2	Social	1	Impact during construction	Medium impact	Walkway would have to be closed
		2	Impact for ongoing operation	Low impact	
		3	Social impact of catastrophic failure	Low	
		4	Other social benefits (eg. recreation)	No	However there may be potential to improve the existing tracks
3	Cultural	1	In catchment solutions	Water source is not fully within community catchment	
		2	Water conservation	Not supportive	Otaki River is a large, high yield river which is highly visible and so may give impression of high water availability
		3	Identity	Identified risk of compromising this value	Otaki community's identity may be affected by water transfer to WPR
4	Environmental	1	Impact on in-stream ecology	Medium	Potential negative impact on the Otaki River ecology through water abstraction (although residual flow will remain), but potential positive impact on the Waikanae River ecology by increasing flows
		2	Impact on vegetation/ terrestrial ecology	Medium	Based on pipeline laid on existing road
		3	Impact on groundwater	Medium	Indigenous vegetation of Tararua Ranges
		4	Impact on natural and/or urban landscape	Low	Potential effect on river recharge of shallow aquifer
		5	Impact on future use of land	Low	
5	Performance	1	Ability to make best use of existing infrastructure	Medium	
		2	Ability to be staged over time	Low	Not using Waikanae Borefield
		3	Ability to expand	Medium	
		4	Security of supply over time	High	Potential to install larger pipe or pump
6	Implementation	1	Difficulty in obtaining resource consents	High	The issue of taking water from the Otaki River has a history of objection from the Otaki community and iwi. Feedback from consultation to date is that opposition remains.
		2	Difficulty in acquiring land and/ or access	Medium	Access through a national walkway is required
		3	Level of uncertainty in water resource and design/technology	Low	
7	Economic	1	Cost to construct	<$10 million	
		2	Operational cost	Higher than current river water supply	Additional pumping from Otaki to Waikanae WTP
		3	Impact on opportunity cost of other potential water users	High	Expect other potential abstractors, such as horticultural users, would be able to take water in a 10yr or 20yr drought but not in a 50yr drought.

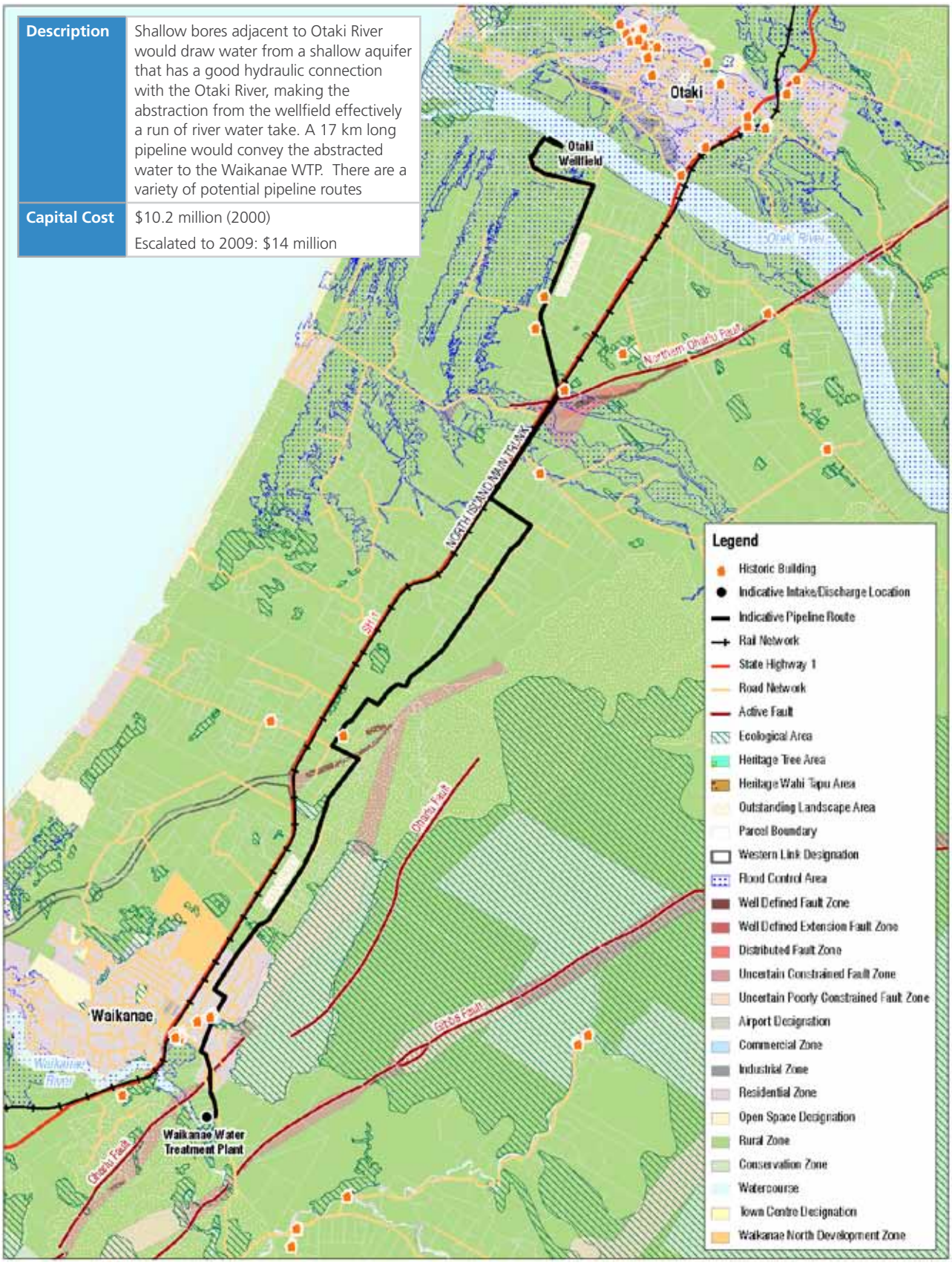
Description	An intake on the Otaki River near the gorge with a 7-10 km long pipeline transferring water to the headwaters of Waikanae River. The water would then flow down the Waikanae River and be abstracted at the existing intake adjacent to the Waikanae WTP for treatment and distribution
Capital Cost	$3.6 million (1991) Escalated to 2009: $6 million



Option 4 - Otaki Wellfield and Pipeline

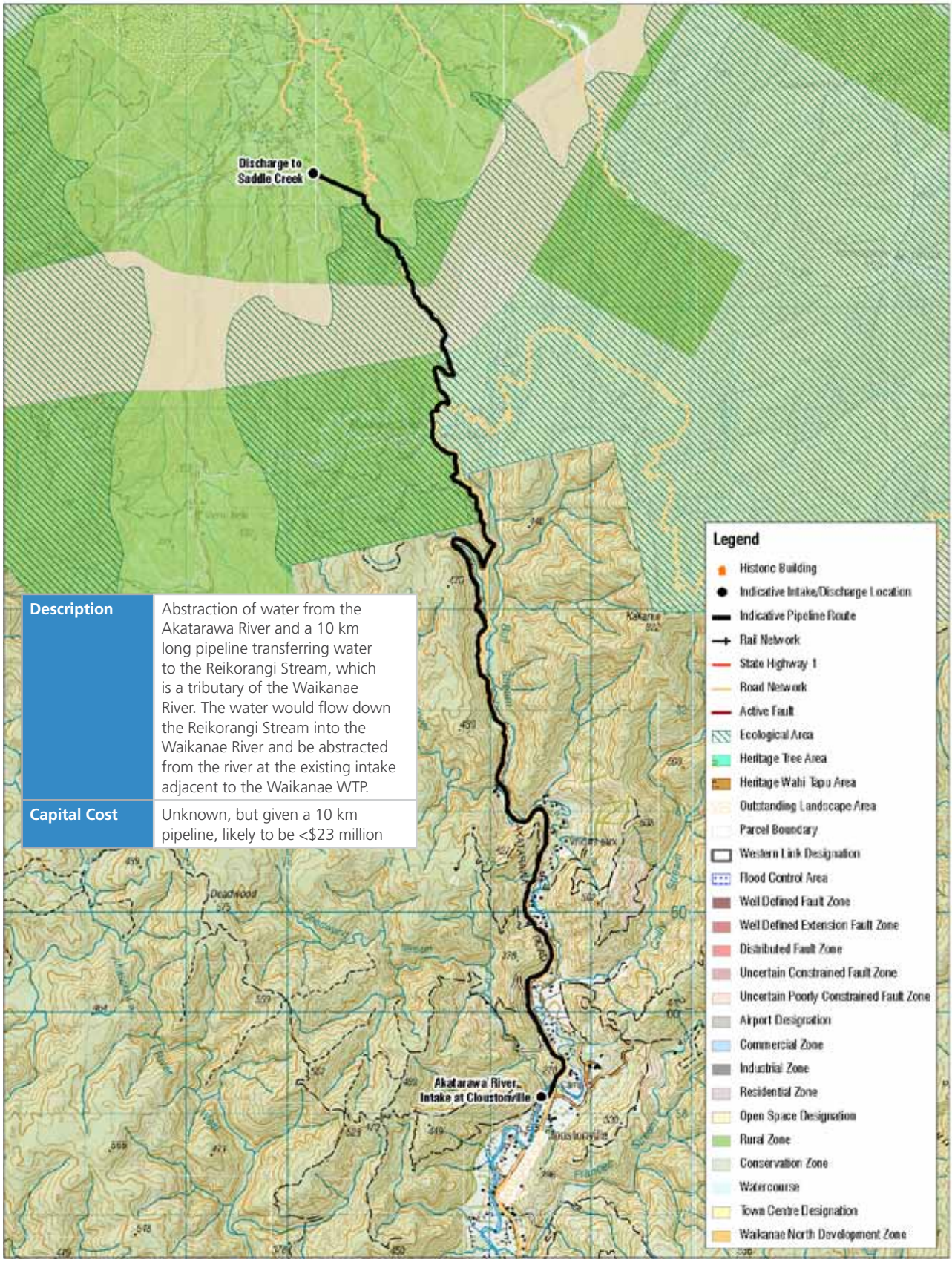
Value		Criteria		Rating	Comments
1	Quality of Water Supplied to Consumer	1	Public health	Almost zero	
		2	Taste, Odour and Aesthetics	Almost zero	
		3	Hardness	Matches existing river supply	
2	Social	1	Impact during construction	Low impact	The pipe would need to cross SH1 and rail line. Assume pipeline route does not follow SH1 but follows local roads
		2	Impact for ongoing operation	Low impact	
		3	Social impact of catastrophic failure	Low	
		4	Other social benefits (eg. recreation)	No	
3	Cultural	1	In catchment solutions	Water source is not fully within community catchment	
		2	Water conservation	Not supportive	
		3	Identity	Identified risk of compromising this value	Otaki River is a large, high yield river which is highly visible and so may give impression of high water availability
4	Environmental	1	Impact on in-stream ecology	Low	Potential negative impact on the Otaki River ecology through water abstraction (although residual flow will remain). However, this will have less impact than the other Otaki River options as the water take is further downstream.
		2	Impact on vegetation/ terrestrial ecology	Low	
		3	Impact on groundwater	Medium	Possible effects on river recharge of aquifer.
		4	Impact on natural and/or urban landscape	Low	
		5	Impact on future use of land	Low	
5	Performance	1	Ability to make best use of existing infrastructure	Medium	Not using Waikanae Borefield
		2	Ability to be staged over time	Low	
		3	Ability to expand	Medium	Potential to install larger pipe or pump
		4	Security of supply over time	High	
6	Implementation	1	Difficulty in obtaining resource consents	High	Previous failed consent. The issue of taking water from the Otaki River has a history of objection from the Otaki community and iwi. Feedback from consultation to date is that opposition remains.
		2	Difficulty in acquiring land and/ or access	Low	
		3	Level of uncertainty in water resource and design/technology	Low	
7	Economic	1	Cost to construct	$10-20 million	
		2	Operational cost	Higher than current river water supply	Additional pumping from Otaki to Waikanae WTP
		3	Impact on opportunity cost of other potential water users	High	Expect other potential abstractors, such as horticultural users, would be able to take water in a 10yr or 20yr drought but not in a 50yr drought.

Description	Shallow bores adjacent to Otaki River would draw water from a shallow aquifer that has a good hydraulic connection with the Otaki River, making the abstraction from the wellfield effectively a run of river water take. A 17 km long pipeline would convey the abstracted water to the Waikanae WTP. There are a variety of potential pipeline routes
Capital Cost	$10.2 million (2000) Escalated to 2009: $14 million



Option 6 - Akatarawa River Transfer

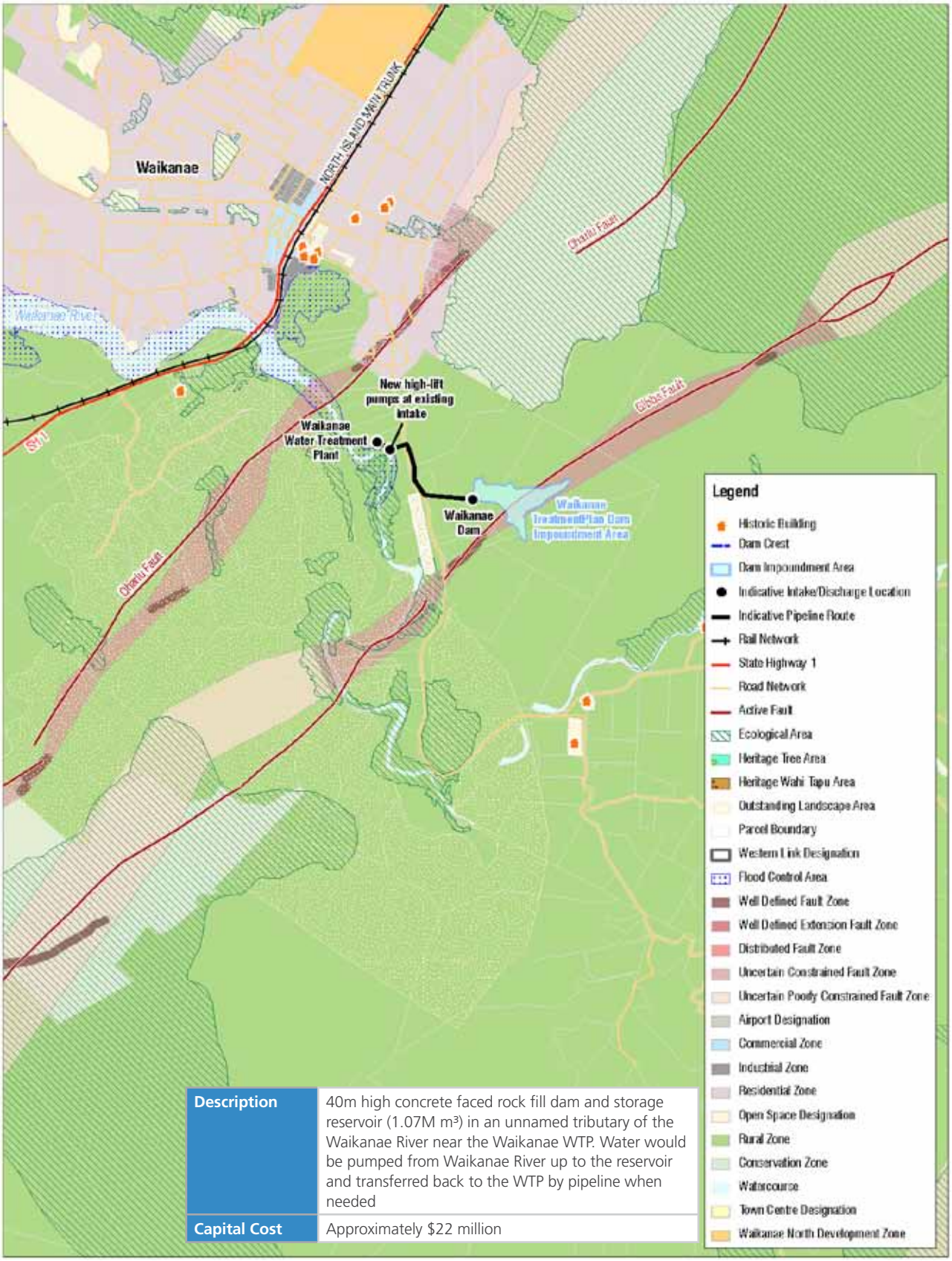
Value		Criteria		Rating	Comments
1	Quality of Water Supplied to Consumer	1	Public health	Almost zero	
		2	Taste, Odour and Aesthetics	Almost zero	
		3	Hardness	Matches existing river supply	
2	Social	1	Impact during construction	High impact	Many users of Akatarawa Road
		2	Impact for ongoing operation	Low impact	
		3	Social impact of catastrophic failure	Low	
		4	Other social benefits (eg. recreation)	No	However, potential social benefit in upgrading the road
3	Cultural	1	In catchment solutions	Water source is not fully within community catchment	
		2	Water conservation	Not supportive	Akatarawa River is not within Kapiti District so possible impression of limitless water from out of district
		3	Identity	Identified risk of compromising this value	Identity of Hutt and Waikanae communities may be affected by transfer from Akatarawa River to Waikanae River
4	Environmental	1	Impact on in-stream ecology	Medium	Need further investigation into effects on in-stream ecology
		2	Impact on vegetation/ terrestrial ecology	Medium	Requires access through significant vegetation
		3	Impact on groundwater	Medium	Akatarawa River is part of the recharge of Hutt Aquifers
		4	Impact on natural and/or urban landscape	Low	
		5	Impact on future use of land	Low	
5	Performance	1	Ability to make best use of existing infrastructure	Medium	Not using Waikanae Borefield
		2	Ability to be staged over time	Low	
		3	Ability to expand	Low	Relatively low yield river
		4	Security of supply over time	High	
6	Implementation	1	Difficulty in obtaining resource consents	High	Regional Council Water Supply potentially could oppose
		2	Difficulty in acquiring land and/ or access	Low	
		3	Level of uncertainty in water resource and design/technology	Medium	Some uncertainties around water resource
7	Economic	1	Cost to construct	$10-20 million	Minor allowance for road improvement
		2	Operational cost	Higher than current river water supply	Additional pumping to transfer water over catchment boundary
		3	Impact on opportunity cost of other potential water users	High	Other potential water users in Hutt, including GWRC water supply



Description	Abstraction of water from the Akatarawa River and a 10 km long pipeline transferring water to the Reikorangi Stream, which is a tributary of the Waikanae River. The water would flow down the Reikorangi Stream into the Waikanae River and be abstracted from the river at the existing intake adjacent to the Waikanae WTP.
Capital Cost	Unknown, but given a 10 km pipeline, likely to be <$23 million

Option 11 - Waikanae WTP Dam

Value		Criteria		Rating	Comments
1	Quality of Water Supplied to Consumer	1	Public health	Almost zero	
		2	Taste, Odour and Aesthetics	Low	Risk of algal blooms in reservoir
		3	Hardness	Matches existing river supply	
2	Social	1	Impact during construction	Medium impact	Two land owners highly affected and potentially opposed to dam
		2	Impact for ongoing operation	Low impact	
		3	Social impact of catastrophic failure	High	
		4	Other social benefits (eg. recreation)	No	Assumes no recreational enhancements made as part of project
3	Cultural	1	In catchment solutions	Water source is fully within community catchment	
		2	Water conservation	Not supportive	Large volume of stored water may give impression of limitless water being available
		3	Identity	No identified risk of compromising this value	
4	Environmental	1	Impact on in-stream ecology	Low	Very small catchment and no flow in stream in summer currently - effectively off river storage, taking extra water from Waikanae River during high flows
		2	Impact on vegetation/ terrestrial ecology	Low	
		3	Impact on groundwater	Low	
		4	Impact on natural and/or urban landscape	Medium	Low impact on wider community but however localised impact for nearby residents
		5	Impact on future use of land	High	Land flooded so not available for other future use
5	Performance	1	Ability to make best use of existing infrastructure	Medium	Not using Waikanae Borefield
		2	Ability to be staged over time	Low	
		3	Ability to expand	Low	Might be harder to raise height due to type of dam construction (concrete)
		4	Security of supply over time	Medium	Question around supply for dam filling
6	Implementation	1	Difficulty in obtaining resource consents	Medium	40m high dam Discretionary activity
		2	Difficulty in acquiring land and/ or access	Medium	Land acquisition may be difficult.
		3	Level of uncertainty in water resource and design/technology	Low	
7	Economic	1	Cost to construct	>$20 million	Excludes land acquisition
		2	Operational cost	Of about the same order as current river water supply	Pumping costs (to dam) can be recovered by a hydropower scheme
		3	Impact on opportunity cost of other potential water users	Low	

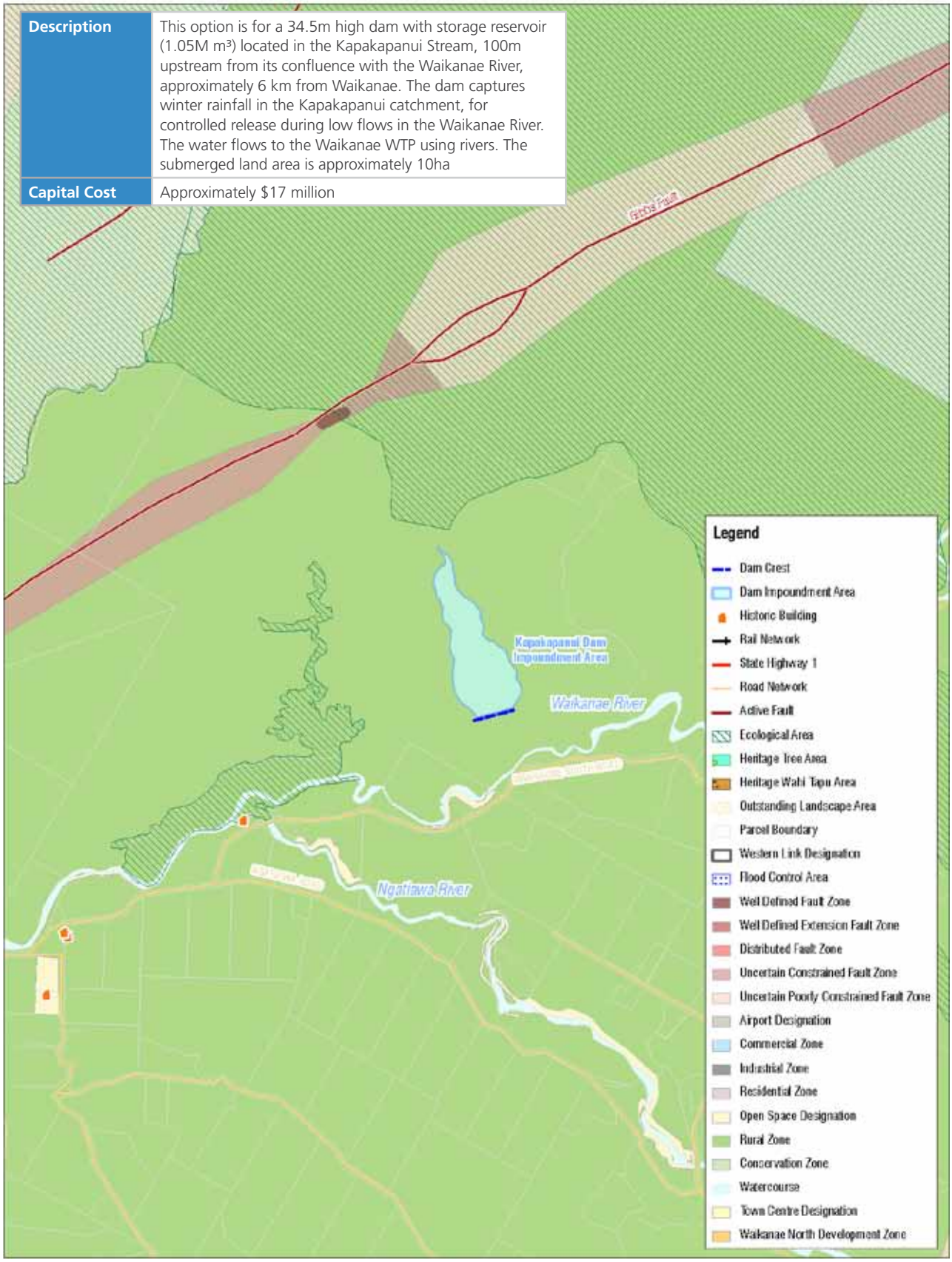


Description	40m high concrete faced rock fill dam and storage reservoir (1.07M m³) in an unnamed tributary of the Waikanae River near the Waikanae WTP. Water would be pumped from Waikanae River up to the reservoir and transferred back to the WTP by pipeline when needed
Capital Cost	Approximately $22 million

Option 12 - Kapakapanui Dam

Value		Criteria		Rating	Comments
1	Quality of Water Supplied to Consumer	1	Public health	Almost zero	
		2	Taste, Odour and Aesthetics	Low	Risk of algae in reservoir
		3	Hardness	Matches existing river supply	
2	Social	1	Impact during construction	Low impact	One landowner - can move dam upstream to reduce impact on flat land
		2	Impact for ongoing operation	Low impact	
		3	Social impact of catastrophic failure	Medium	Relatively low dam wall, not many people around and off main river channel
		4	Other social benefits (eg. recreation)	No	Private land ownership so public access restricted
3	Cultural	1	In catchment solutions	Water source is fully within community catchment	
		2	Water conservation	Not supportive	Large volume of stored water may give impression of limitless water being available
		3	Identity	No identified risk of compromising this value	
4	Environmental	1	Impact on in-stream ecology	Medium	Damming stream Potentially releasing water that has high algae content
		2	Impact on vegetation/ terrestrial ecology	Low	Mostly pasture
		3	Impact on groundwater	Low	
		4	Impact on natural and/or urban landscape	Medium	Not very visible from public view
		5	Impact on future use of land	High	Land flooded so not available for other future use. Possibly better access to land on other side of gorge Potential for positive impact on surrounding land values for forming a 'lake view'
5	Performance	1	Ability to make best use of existing infrastructure	Medium	Not using Waikanae Borefield
		2	Ability to be staged over time	Low	
		3	Ability to expand	Medium	Dam type is feasibly exandable (e.g. by increasing height)
		4	Security of supply over time	Medium	Long refill time
6	Implementation	1	Difficulty in obtaining resource consents	Medium	Land owner is potentially amenable if location is upstream
		2	Difficulty in acquiring land and/ or access	Low	
		3	Level of uncertainty in water resource and design/technology	Medium	Uncertainties about north abutment and yield from small catchment
7	Economic	1	Cost to construct	$10-20 million	
		2	Operational cost	Of about the same order as current river water supply	Limited opportunity to produce power and still need to pump water out of Waikanae River
		3	Impact on opportunity cost of other potential water users	Low	

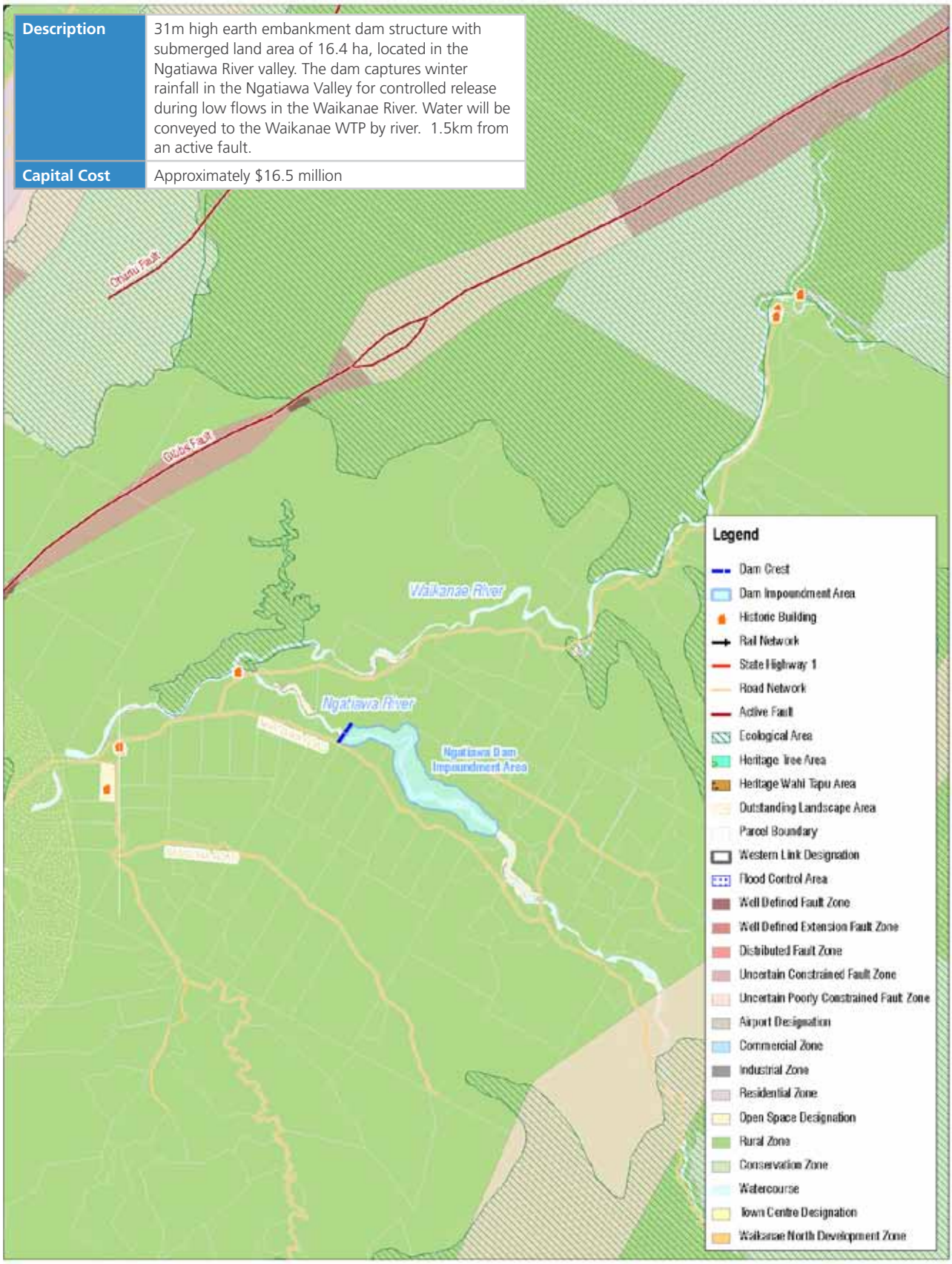
Description	This option is for a 34.5m high dam with storage reservoir (1.05M m³) located in the Kapakapanui Stream, 100m upstream from its confluence with the Waikanae River, approximately 6 km from Waikanae. The dam captures winter rainfall in the Kapakapanui catchment, for controlled release during low flows in the Waikanae River. The water flows to the Waikanae WTP using rivers. The submerged land area is approximately 10ha
Capital Cost	Approximately $17 million



Option 13 - Ngatiawa Dam

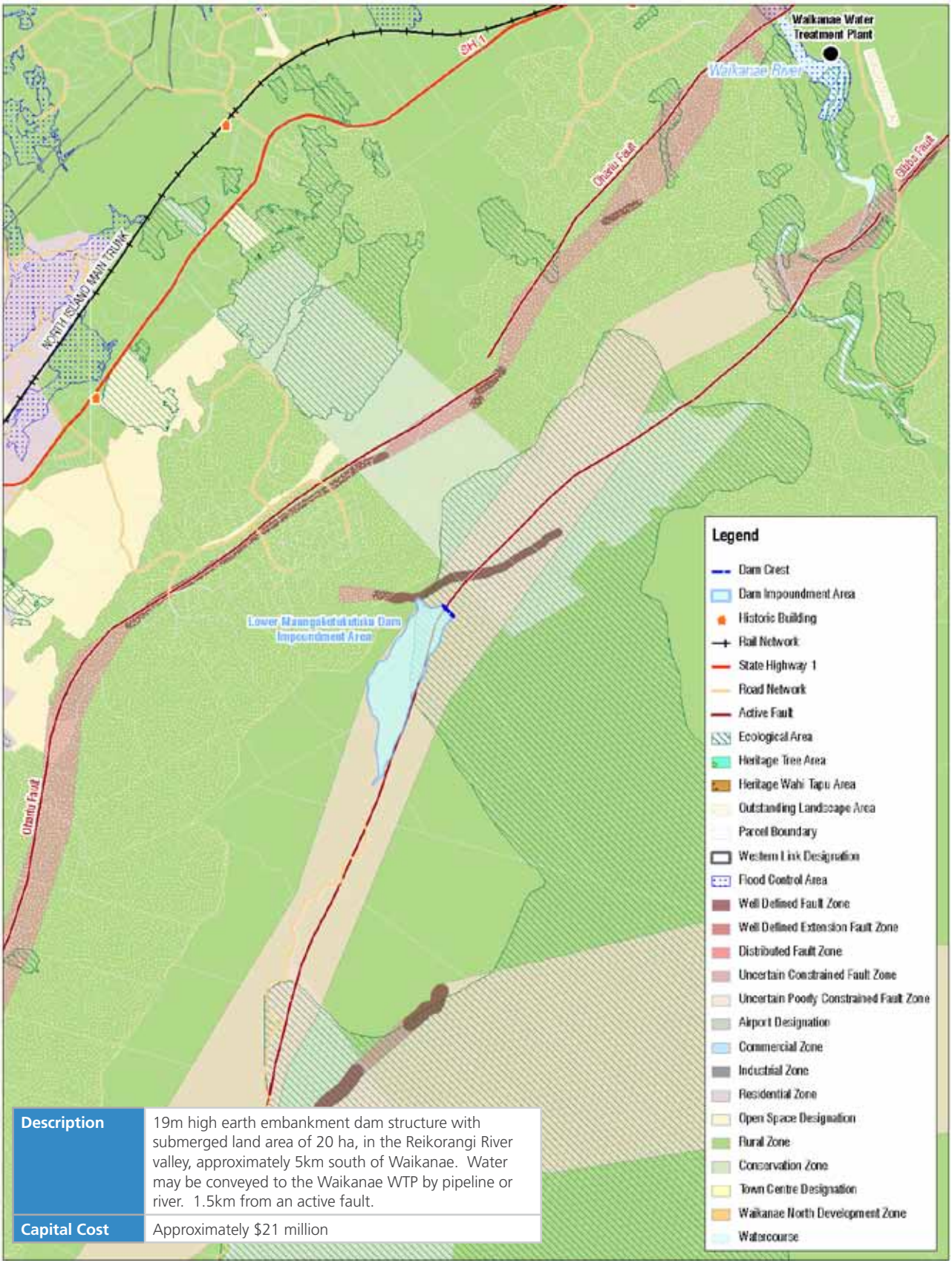
Value		Criteria		Rating	Comments
1	Quality of Water Supplied to Consumer	1	Public health	Almost zero	
		2	Taste, Odour and Aesthetics	Low	Risk of algal blooms in reservoir
		3	Hardness	Matches existing river supply	
2	Social	1	Impact during construction	Medium impact	Road users affected
		2	Impact for ongoing operation	Low impact	Compensation for land acquisition
		3	Social impact of catastrophic failure	Medium	Confirm wether water would escape river gorge
		4	Other social benefits (eg. recreation)	Yes	
3	Cultural	1	In catchment solutions	Water source is fully within community catchment	
		2	Water conservation	Not supportive	Large volume of stored water may give impression of limitless water being available
		3	Identity	No identified risk of compromising this value	
4	Environmental	1	Impact on in-stream ecology	High	Damming river
		2	Impact on vegetation/ terrestrial ecology	High	Identified ecological areas Loss of riparian vegetation
		3	Impact on groundwater	Low	
		4	Impact on natural and/or urban landscape	Medium	Viewable from a public road
		5	Impact on future use of land	High	Area of vineyard
5	Performance	1	Ability to make best use of existing infrastructure	Medium	Not using Waikanae Borefield
		2	Ability to be staged over time	Low	
		3	Ability to expand	Medium	Dam type is feasibly exandable
		4	Security of supply over time	High	Relatively large river catchment
6	Implementation	1	Difficulty in obtaining resource consents	Medium	Outstanding Landscape
		2	Difficulty in acquiring land and/ or access	Medium	Uncertain about new vineyard owner
		3	Level of uncertainty in water resource and design/technology	Low	
7	Economic	1	Cost to construct	$10-20 million	Including potential land purchase
		2	Operational cost	Of about the same order as current river water supply	Assuming no hydro power generation
		3	Impact on opportunity cost of other potential water users	Low	

Description	31m high earth embankment dam structure with submerged land area of 16.4 ha, located in the Ngatiawa River valley. The dam captures winter rainfall in the Ngatiawa Valley for controlled release during low flows in the Waikanae River. Water will be conveyed to the Waikanae WTP by river. 1.5km from an active fault.
Capital Cost	Approximately $16.5 million



Option 16 - Reikorangi Dam (Cambridge Farm)

Value		Criteria		Rating	Comments
1	Quality of Water Supplied to Consumer	1	Public health	Almost zero	
		2	Taste, Odour and Aesthetics	Low	Risk of algal blooms in reservoir
		3	Hardness	Matches existing river supply	
2	Social	1	Impact during construction	Medium impact	
		2	Impact for ongoing operation	Low impact	
		3	Social impact of catastrophic failure	Medium	Confirm if water likely to stay in river channel
		4	Other social benefits (eg. recreation)	Yes	Area of Outstanding Landscape, potential to provide walking tracks
3	Cultural	1	In catchment solutions	Water source is fully within community catchment	
		2	Water conservation	Not supportive	Large volume of stored water may give impression of limitless water being available
		3	Identity	No identified risk of compromising this value	
4	Environmental	1	Impact on in-stream ecology	High	Damming river
		2	Impact on vegetation/ terrestrial ecology	Medium	Some vegetation affected
		3	Impact on groundwater	Low	Would raise groundwater levels upstream of the dam but this is not necessarily a negative impact
		4	Impact on natural and/or urban landscape	High	Area of identified outstanding landscape
		5	Impact on future use of land	High	Land flooded so not available for other future use
5	Performance	1	Ability to make best use of existing infrastructure	Medium	Not using Waikanae Borefield
		2	Ability to be staged over time	Low	
		3	Ability to expand	Medium	May be able to raise dam wall
		4	Security of supply over time	Medium	
6	Implementation	1	Difficulty in obtaining resource consents	Medium	Outstanding Landscape area
		2	Difficulty in acquiring land and/ or access	Medium	
		3	Level of uncertainty in water resource and design/technology	Low	
7	Economic	1	Cost to construct	>$20 million	
		2	Operational cost	Of about the same order as current river water supply	Assumes no hydro power generation
		3	Impact on opportunity cost of other potential water users	Low	

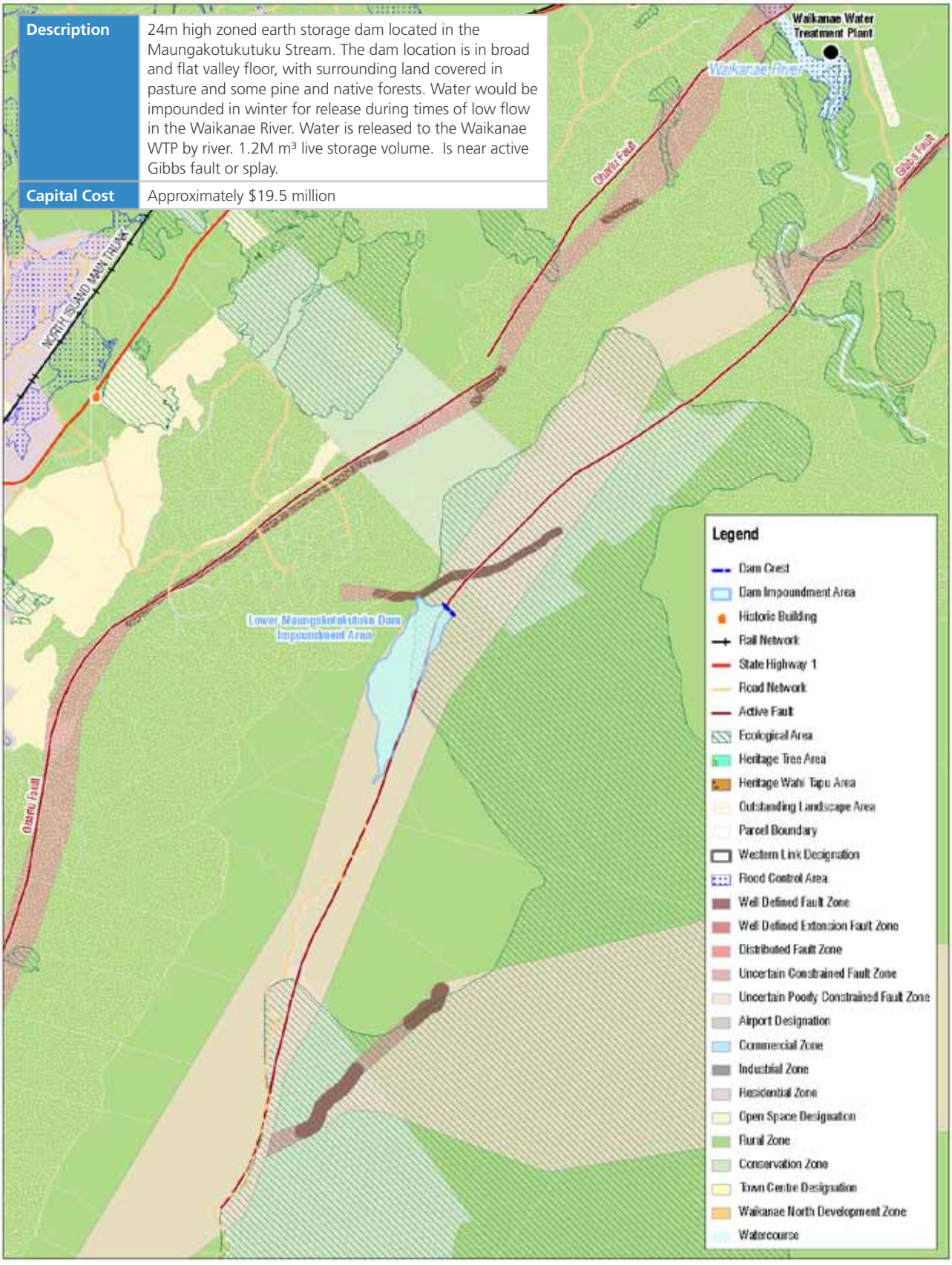


Description	19m high earth embankment dam structure with submerged land area of 20 ha, in the Reikorangi River valley, approximately 5km south of Waikanae. Water may be conveyed to the Waikanae WTP by pipeline or river. 1.5km from an active fault.
Capital Cost	Approximately $21 million

Option 18 - Lower Maungatukutuku Dam

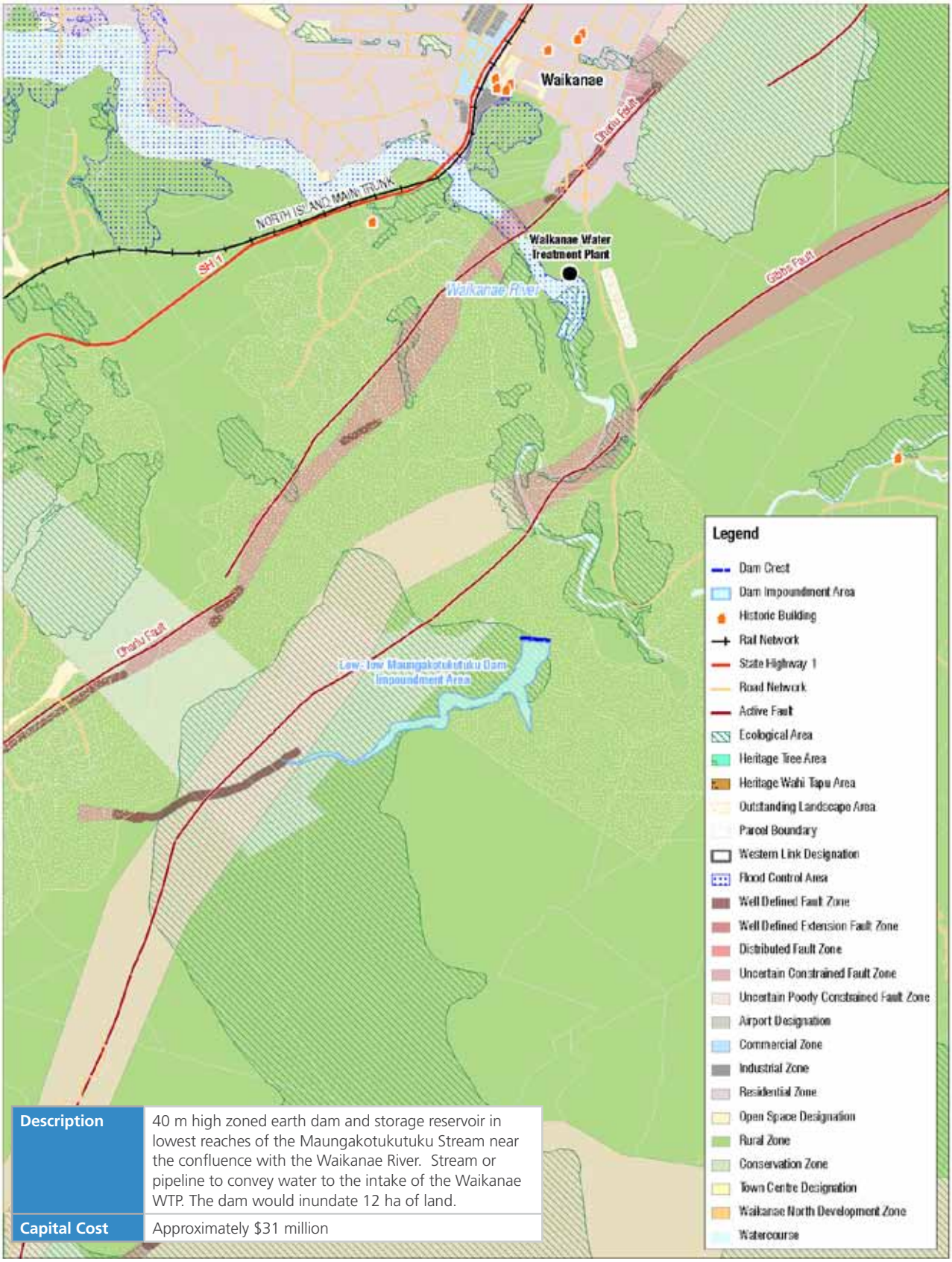
Value		Criteria		Rating	Comments
1	Quality of Water Supplied to Consumer	1	Public health	Almost zero	
		2	Taste, Odour and Aesthetics	Low	Risk of algal blooms in reservoir
		3	Hardness	Matches existing river supply	
2	Social	1	Impact during construction	Medium impact	
		2	Impact for ongoing operation	Low impact	
		3	Social impact of catastrophic failure	Medium	Further upstream than Low-low option. Confirm wether water would stay in river channel
		4	Other social benefits (eg. recreation)	Yes	Recreation use possible due to close proximity to existing reserve
3	Cultural	1	In catchment solutions	Water source is fully within community catchment	
		2	Water conservation	Not supportive	Large volume of stored water may give impression of limitless water being available
		3	Identity	No identified risk of compromising this value	
4	Environmental	1	Impact on in-stream ecology	High	Damming stream
		2	Impact on vegetation/ terrestrial ecology	High	
		3	Impact on groundwater	Low	
		4	Impact on natural and/or urban landscape	Medium	Tararua Ranges ecological area
		5	Impact on future use of land	High	Assuming currently productive land
5	Performance	1	Ability to make best use of existing infrastructure	Medium	Not using Waikanae Borefield
		2	Ability to be staged over time	Low	
		3	Ability to expand	Medium	
		4	Security of supply over time	High	
6	Implementation	1	Difficulty in obtaining resource consents	Medium	
		2	Difficulty in acquiring land and/ or access	Low	
		3	Level of uncertainty in water resource and design/technology	Low	
7	Economic	1	Cost to construct	$10-20 million	
		2	Operational cost	Of about the same order as current river water supply	Hydro power not accounted for
		3	Impact on opportunity cost of other potential water users	Low	

Description	24m high zoned earth storage dam located in the Maungakotukutuku Stream. The dam location is in broad and flat valley floor, with surrounding land covered in pasture and some pine and native forests. Water would be impounded in winter for release during times of low flow in the Waikanae River. Water is released to the Waikanae WTP by river. 1.2M m³ live storage volume. Is near active Gibbs fault or splay.
Capital Cost	Approximately $19.5 million



Option 19 - Low-low Maungatukutuku Dam

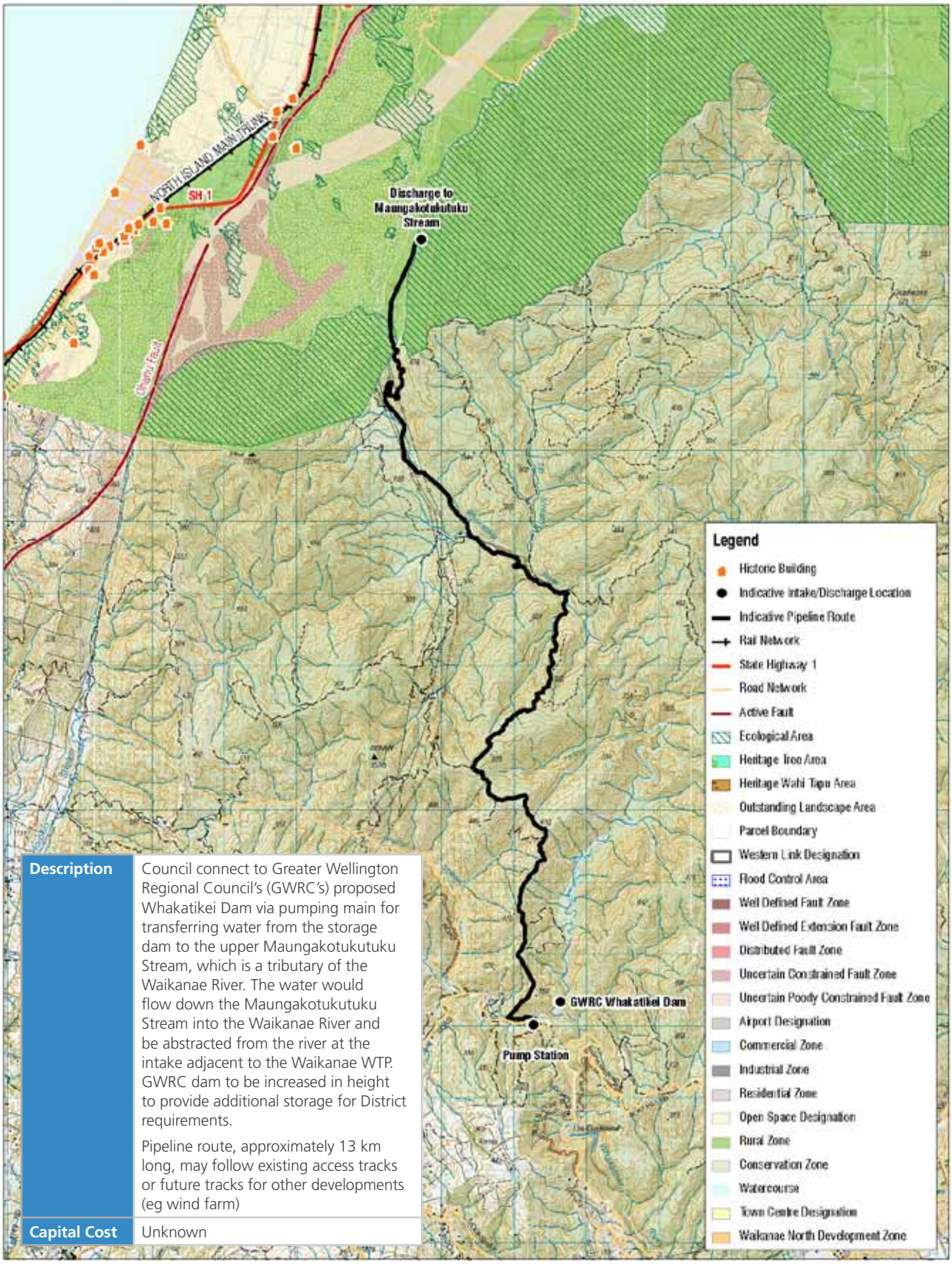
Value		Criteria		Rating	Comments
1	Quality of Water Supplied to Consumer	1	Public health	Almost zero	
		2	Taste, Odour and Aesthetics	Low	Risk of algal blooms in reservoir
		3	Hardness	Matches existing river supply	
2	Social	1	Impact during construction	Medium impact	Unsure of how many land owners affected
		2	Impact for ongoing operation	Low impact	
		3	Social impact of catastrophic failure	High	Further upstream than Low-low option. Confirm water likely to stay in river channel
		4	Other social benefits (eg. recreation)	Yes	Recreation use likely due to close proximity to existing reserve
3	Cultural	1	In catchment solutions	Water source is fully within community catchment	
		2	Water conservation	Not supportive	Large volume of stored water may give impression of limitless water being available
		3	Identity	No identified risk of compromising this value	
4	Environmental	1	Impact on in-stream ecology	High	Damming stream
		2	Impact on vegetation/ terrestrial ecology	High	
		3	Impact on groundwater	Low	
		4	Impact on natural and/or urban landscape	High	Tararua Ranges ecological area
		5	Impact on future use of land	Medium	Assuming currently productive land
5	Performance	1	Ability to make best use of existing infrastructure	Medium	Not using Waikanae Borefield
		2	Ability to be staged over time	Low	
		3	Ability to expand	Medium	May be able to raise concrete dam with anchors
		4	Security of supply over time	High	
6	Implementation	1	Difficulty in obtaining resource consents	Medium	In an Ecological Area and within an Outstanding Landscape Area
		2	Difficulty in acquiring land and/ or access	High	
		3	Level of uncertainty in water resource and design/technology	Low	
7	Economic	1	Cost to construct	>$20 million	
		2	Operational cost	Of about the same order as current river water supply	
		3	Impact on opportunity cost of other potential water users	Low	



Description	40 m high zoned earth dam and storage reservoir in lowest reaches of the Maungakotukutuku Stream near the confluence with the Waikanae River. Stream or pipeline to convey water to the intake of the Waikanae WTP. The dam would inundate 12 ha of land.
Capital Cost	Approximately $31 million

Option 20 - GWRC Whakatikei Dam

Value		Criteria		Rating	Comments
1	Quality of Water Supplied to Consumer	1	Public health	Almost zero	
		2	Taste, Odour and Aesthetics	Low	Risk of algal blooms in reservoir
		3	Hardness	Matches existing river supply	
2	Social	1	Impact during construction	Medium impact	Impact on forestry operations from pipeline construction
		2	Impact for ongoing operation	Low impact	
		3	Social impact of catastrophic failure	Low	
		4	Other social benefits (eg. recreation)	No	
3	Cultural	1	In catchment solutions	Water source is not fully within community catchment	
		2	Water conservation	Not supportive	Whakatikei Dam not within Kapiti District so possible impression of limitless water from out of district. Also large volume of stored water
		3	Identity	Identified risk of compromising this value	Identity of Hutt and Waikanae communities may be affected by transfer from Whakatikei River to Waikanae catchment
4	Environmental	1	Impact on in-stream ecology	Medium	Discharge to Maungakotukutuku Stream
		2	Impact on vegetation/ terrestrial ecology	Medium	Aim to keep to existing tracks but some vegetation clearance likely along pipeline route. Vegetation to be confirmed
		3	Impact on groundwater	Low	
		4	Impact on natural and/or urban landscape	Low	
		5	Impact on future use of land	Low	
5	Performance	1	Ability to make best use of existing infrastructure	Medium	Not using Waikanae Borefield
		2	Ability to be staged over time	Low	
		3	Ability to expand	Medium	Potentially install larger pipe
		4	Security of supply over time	High	
6	Implementation	1	Difficulty in obtaining resource consents	Medium	Possible ecological areas
		2	Difficulty in acquiring land and/ or access	Medium	Depending on land ownership in northern area
		3	Level of uncertainty in water resource and design/technology	Low	As GWRC may not build dam until 2020 at earliest, would need to be in conjunction with other interim water supply measure Could build pipeline to Whakatikei River now GWRC may want contribution to the base cost of the dam ($140m including WTP, Dam and a pipeline to bring into Wellington network)
7	Economic	1	Cost to construct	$10-20 million	Assume $1 million for raising the dam and cost excludes contribution to base cost of dam
		2	Operational cost	Higher than current river water supply	Additional pumping to transfer water over catchment boundary
		3	Impact on opportunity cost of other potential water users	Medium	Possible impacts on GWRC's future use of water

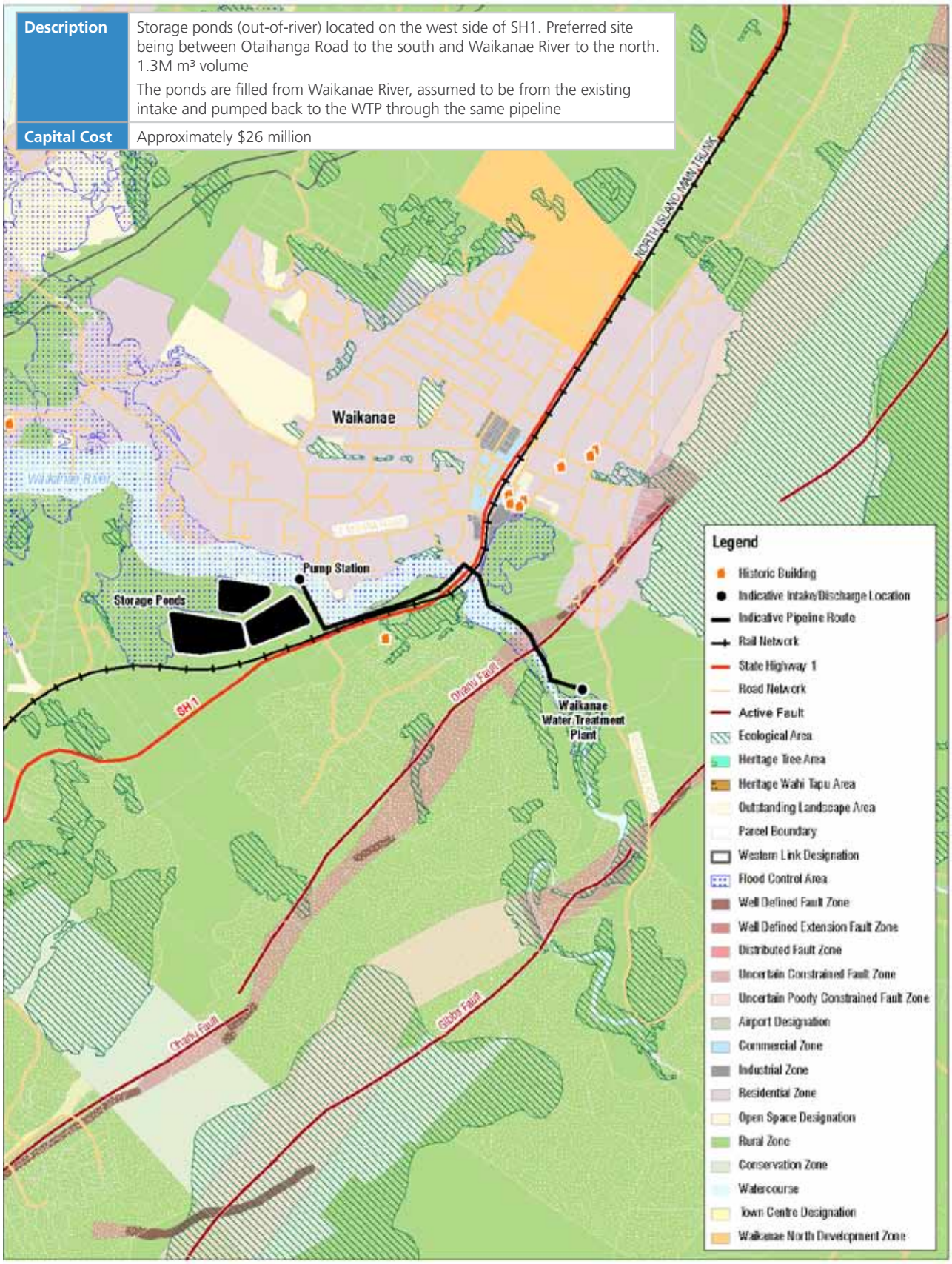


Description	Council connect to Greater Wellington Regional Council's (GWRC's) proposed Whakatikei Dam via pumping main for transferring water from the storage dam to the upper Maungakotukutuku Stream, which is a tributary of the Waikanae River. The water would flow down the Maungakotukutuku Stream into the Waikanae River and be abstracted from the river at the intake adjacent to the Waikanae WTP. GWRC dam to be increased in height to provide additional storage for District requirements. Pipeline route, approximately 13 km long, may follow existing access tracks or future tracks for other developments (eg wind farm)
Capital Cost	Unknown

Option 21 - Storage Ponds West

Value		Criteria		Rating	Comments
1	Quality of Water Supplied to Consumer	1	Public health	Almost zero	
		2	Taste, Odour and Aesthetics	Possible	Possibly prone to algal blooms
		3	Hardness	Matches existing river supply	
2	Social	1	Impact during construction	High impact	Dust issues in relation to close proximity to urban areas Adjacent to SH1 and rail line
		2	Impact for ongoing operation	Medium impact	Possible bird/water fowl issues
		3	Social impact of catastrophic failure	Medium	Potential of flooding of rail lines and urban area
		4	Other social benefits (eg. recreation)	No	
3	Cultural	1	In catchment solutions	Water source is fully within community catchment	
		2	Water conservation	Not supportive	Large volume of stored water may give impression of limitless water being available
		3	Identity	No identified risk of compromising this value	
4	Environmental	1	Impact on in-stream ecology	Low	
		2	Impact on vegetation/ terrestrial ecology	Medium	
		3	Impact on groundwater	Low	Identified forest remnant lost
		4	Impact on natural and/or urban landscape	High	
		5	Impact on future use of land	High	
5	Performance	1	Ability to make best use of existing infrastructure	Medium	Not using Waikanae Borefield
		2	Ability to be staged over time	High	Build ponds as needed
		3	Ability to expand	Low	No available adjacent land to extend
		4	Security of supply over time	Medium	Question around water for filling ponds
6	Implementation	1	Difficulty in obtaining resource consents	Medium	Potential consenting issues with take from Waikanae River
		2	Difficulty in acquiring land and/ or access	Medium	Access issues potentially with NZTA, KiwiRail and urban land owners
		3	Level of uncertainty in water resource and design/technology	Low	
7	Economic	1	Cost to construct	>$20 million	
		2	Operational cost	Of about the same order as current river water supply	
		3	Impact on opportunity cost of other potential water users	Low	

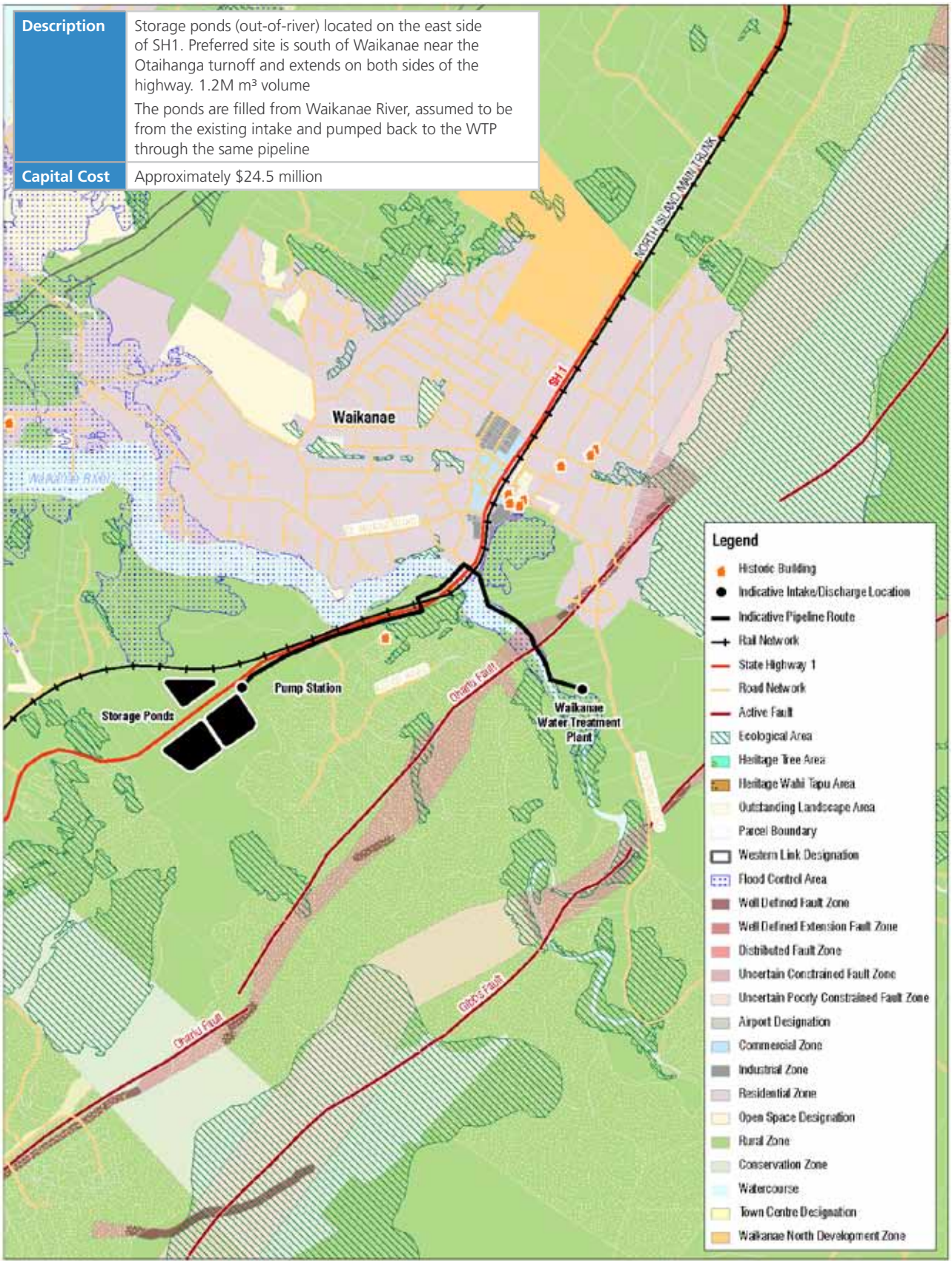
Description	Storage ponds (out-of-river) located on the west side of SH1. Preferred site being between Otaihanga Road to the south and Waikanae River to the north. 1.3M m³ volume The ponds are filled from Waikanae River, assumed to be from the existing intake and pumped back to the WTP through the same pipeline
Capital Cost	Approximately $26 million



Option 22 - Storage Ponds East

Value		Criteria		Rating	Comments
1	Quality of Water Supplied to Consumer	1	Public health	Almost zero	
		2	Taste, Odour and Aesthetics	Possible	Possibly prone to algal blooms than dam options
		3	Hardness	Matches existing river supply	
2	Social	1	Impact during construction	Medium impact	Single landowner potentially willing to sell Access from SH1
		2	Impact for ongoing operation	Medium impact	Possible bird/waterfowl issues
		3	Social impact of catastrophic failure	Medium	Potential flooding of rail and road
		4	Other social benefits (eg. recreation)	No	
3	Cultural	1	In catchment solutions	Water source is fully within community catchment	
		2	Water conservation	Not supportive	Large volume of stored water may give impression of limitless water being available
		3	Identity	No identified risk of compromising this value	
4	Environmental	1	Impact on in-stream ecology	Low	
		2	Impact on vegetation/ terrestrial ecology	Low	
		3	Impact on groundwater	Low	
		4	Impact on natural and/or urban landscape	High	
		5	Impact on future use of land	High	
5	Performance	1	Ability to make best use of existing infrastructure	Medium	Not using Waikanae Borefield
		2	Ability to be staged over time	High	Build ponds as needed
		3	Ability to expand	Medium	Potential to extend to the west depending on transmission lines
		4	Security of supply over time	Medium	Question around water for filling ponds
6	Implementation	1	Difficulty in obtaining resource consents	Medium	
		2	Difficulty in acquiring land and/ or access	Medium	Potential access issues and construction issues with regard to transmission lines and access from SH1
		3	Level of uncertainty in water resource and design/technology	Low	
7	Economic	1	Cost to construct	>$20 million	
		2	Operational cost	Of about the same order as current river water supply	
		3	Impact on opportunity cost of other potential water users	Low	

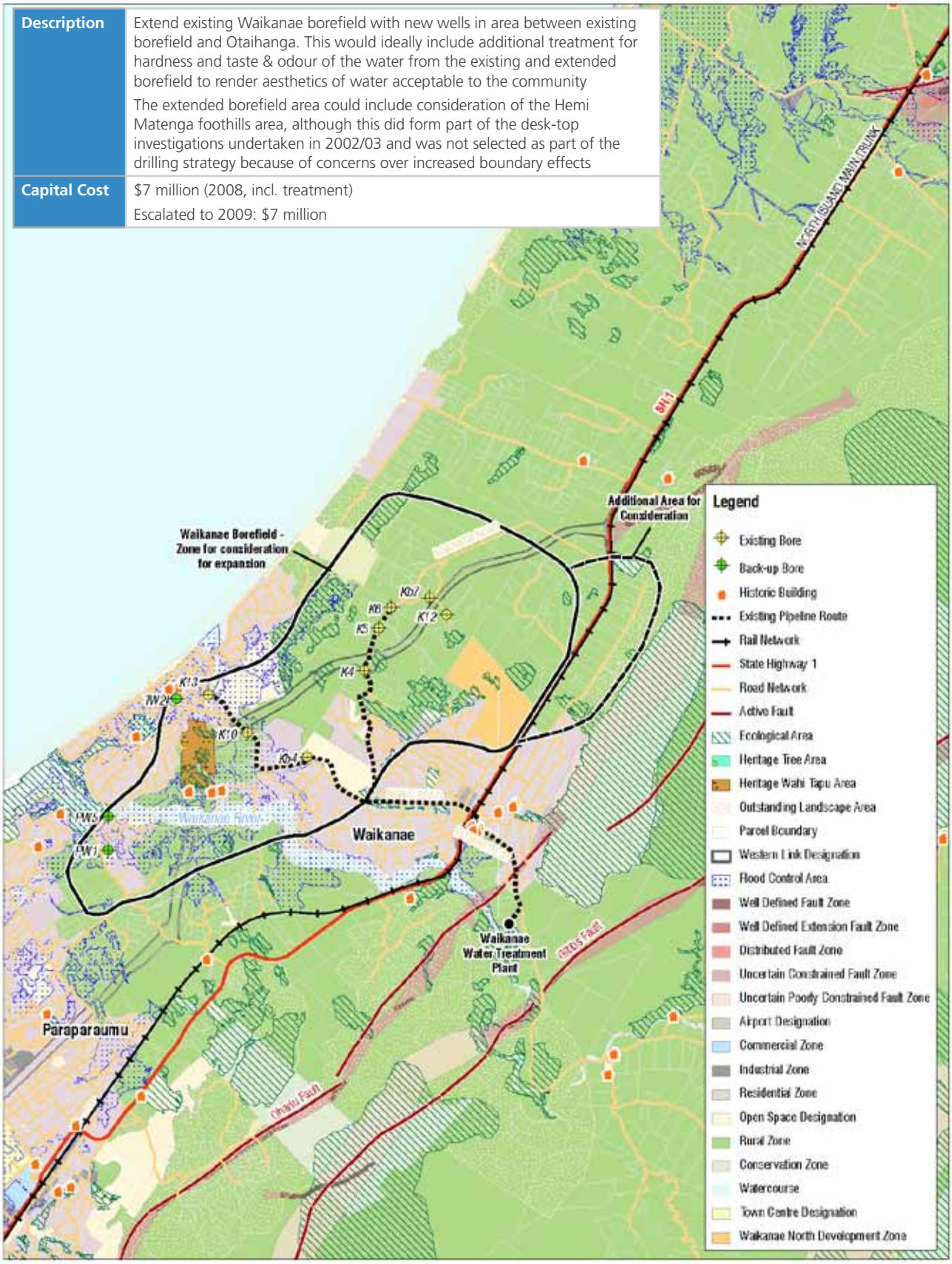
Description	Storage ponds (out-of-river) located on the east side of SH1. Preferred site is south of Waikanae near the Otaihanga turnoff and extends on both sides of the highway. 1.2M m³ volume The ponds are filled from Waikanae River, assumed to be from the existing intake and pumped back to the WTP through the same pipeline
Capital Cost	Approximately $24.5 million



Option 23 - Extended Waikanae Borefield

Value		Criteria		Rating	Comments
1	Quality of Water Supplied to Consumer	1	Public health	Almost zero	
		2	Taste, Odour and Aesthetics	Possible	Assumes significant treatment
		3	Hardness	Less than 100 mg/L	With treatment
2	Social	1	Impact during construction	Low impact	Works mostly within road reserves
		2	Impact for ongoing operation	Low impact	Based on no effects on other bores, including shallow bores
		3	Social impact of catastrophic failure	Low	
		4	Other social benefits (eg. recreation)	No	
3	Cultural	1	In catchment solutions	Water source is fully within community catchment	
		2	Water conservation	Supportive	
		3	Identity	No identified risk of compromising this value	
4	Environmental	1	Impact on in-stream ecology	Low	
		2	Impact on vegetation/ terrestrial ecology	Low	Assume no adverse effects on wetlands to the north
		3	Impact on groundwater	Medium	requires further investigation
		4	Impact on natural and/or urban landscape	Low	
		5	Impact on future use of land	Low	
5	Performance	1	Ability to make best use of existing infrastructure	High	
		2	Ability to be staged over time	High	
		3	Ability to expand	Medium	Depends on sustainable yield
		4	Security of supply over time	Medium	Information gap on yield over a period of time
6	Implementation	1	Difficulty in obtaining resource consents	Medium	
		2	Difficulty in acquiring land and/ or access	Low	
		3	Level of uncertainty in water resource and design/technology	High	
7	Economic	1	Cost to construct	$10-20 million	Includes treatment
		2	Operational cost	Higher than current river water supply	
		3	Impact on opportunity cost of other potential water users	Medium	Further investigation required

Description	Extend existing Waikanae borefield with new wells in area between existing borefield and Otaihanga. This would ideally include additional treatment for hardness and taste & odour of the water from the existing and extended borefield to render aesthetics of water acceptable to the community The extended borefield area could include consideration of the Hemi Matenga foothills area, although this did form part of the desk-top investigations undertaken in 2002/03 and was not selected as part of the drilling strategy because of concerns over increased boundary effects
Capital Cost	$7 million (2008, incl. treatment) Escalated to 2009: $7 million



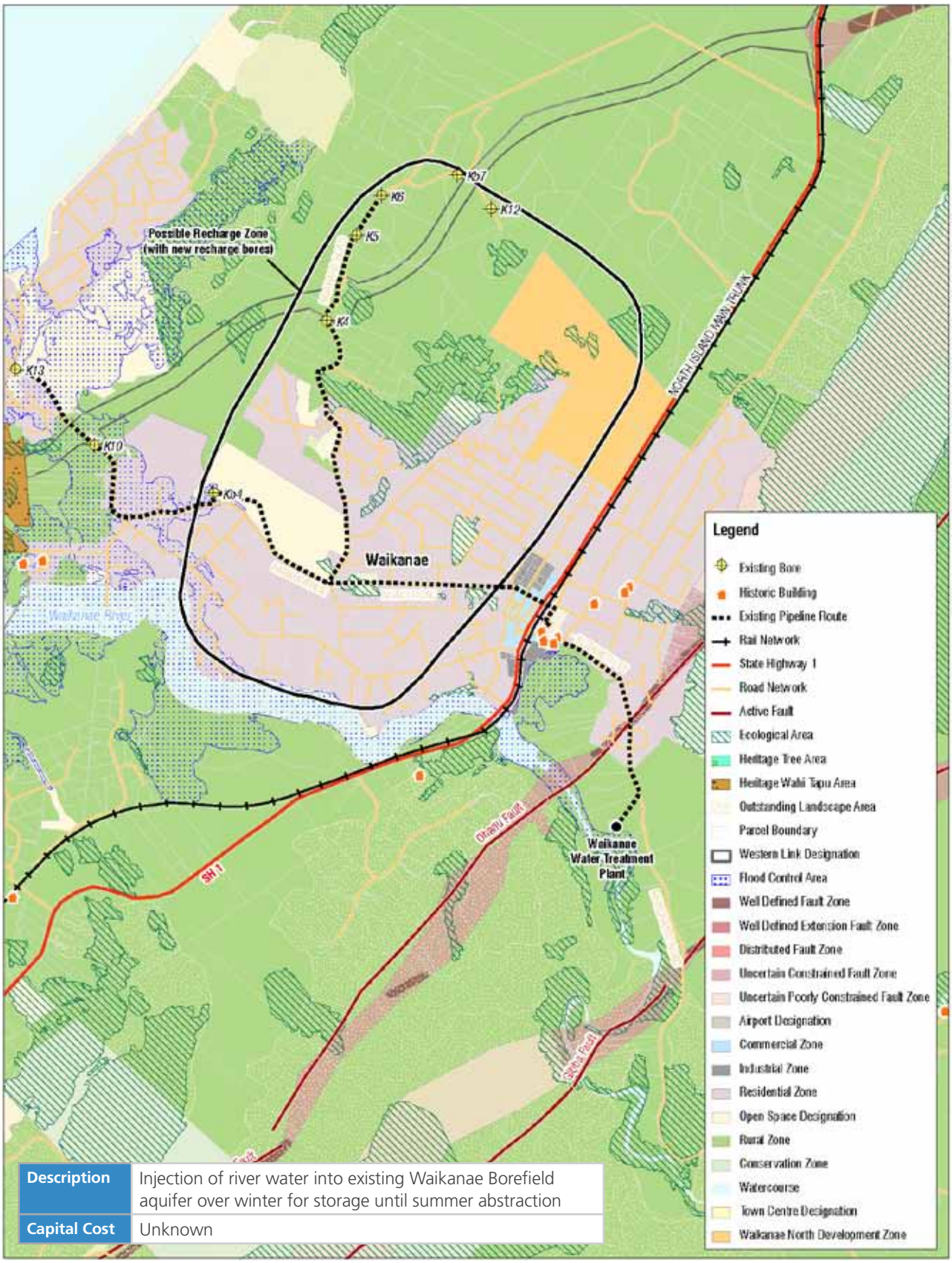
Option 26 - Deep Groundwater

Value		Criteria		Rating	Comments
1	Quality of Water Supplied to Consumer	1	Public health	Almost zero	
		2	Taste, Odour and Aesthetics	Possible	
		3	Hardness	Less than 100 mg/L	With treatment
2	Social	1	Impact during construction	Low impact	
		2	Impact for ongoing operation	Low impact	
		3	Social impact of catastrophic failure	Low	
		4	Other social benefits (eg. recreation)	No	
3	Cultural	1	In catchment solutions	Water source is fully within community catchment	
		2	Water conservation	Supportive	
		3	Identity	No identified risk of compromising this value	
4	Environmental	1	Impact on in-stream ecology	Low	
		2	Impact on vegetation/ terrestrial ecology	Low	
		3	Impact on groundwater	Medium	Needs further investigation
		4	Impact on natural and/or urban landscape	Low	
		5	Impact on future use of land	Low	
5	Performance	1	Ability to make best use of existing infrastructure	Medium	Not using Waikanae Borefield
		2	Ability to be staged over time	High	
		3	Ability to expand	Medium	Depends on available and sustainable yield
		4	Security of supply over time	Low	Information available suggests low yield
6	Implementation	1	Difficulty in obtaining resource consents	Medium	
		2	Difficulty in acquiring land and/ or access	Low	
		3	Level of uncertainty in water resource and design/technology	High	Unknown quantity of water
7	Economic	1	Cost to construct	$10-20 million	
		2	Operational cost	Higher than current river water supply	Pumping from deeper aquifer
		3	Impact on opportunity cost of other potential water users	Low	No other interest in using this very deep source

Description	Abstraction of very deep groundwater (approx. 100m to 200m below ground) in Waikanae area, from basement rock
Capital Cost	Unknown

Option 27 - Aquifer Storage & Recovery

Value		Criteria		Rating	Comments
1	Quality of Water Supplied to Consumer	1	Public health	Almost zero	
		2	Taste, Odour and Aesthetics	Low	Potential deterioration of river water stored underground
		3	Hardness	Less than 100 mg/L	Potential mixing of river and groundwater in aquifer
2	Social	1	Impact during construction	Low impact	
		2	Impact for ongoing operation	Low impact	
		3	Social impact of catastrophic failure	Low	
		4	Other social benefits (eg. recreation)	No	
3	Cultural	1	In catchment solutions	Water source is fully within community catchment	
		2	Water conservation	Supportive	
		3	Identity	Identified risk of compromising this value	Potential compromise of identity from storing river water below ground
4	Environmental	1	Impact on in-stream ecology	Low	
		2	Impact on vegetation/ terrestrial ecology	Low	
		3	Impact on groundwater	Medium	Discharge of river water to aquifer
		4	Impact on natural and/or urban landscape	Low	
		5	Impact on future use of land	Low	
5	Performance	1	Ability to make best use of existing infrastructure	High	
		2	Ability to be staged over time	High	
		3	Ability to expand	Medium	Not infinite supply of water
		4	Security of supply over time	Medium	
6	Implementation	1	Difficulty in obtaining resource consents	Medium	Taking water from the Waikanae River and discharging water to ground
		2	Difficulty in acquiring land and/ or access	Low	
		3	Level of uncertainty in water resource and design/technology	High	
7	Economic	1	Cost to construct	$10-20 million	
		2	Operational cost	Higher than current river water supply	
		3	Impact on opportunity cost of other potential water users	Low	Because taking water at high flows

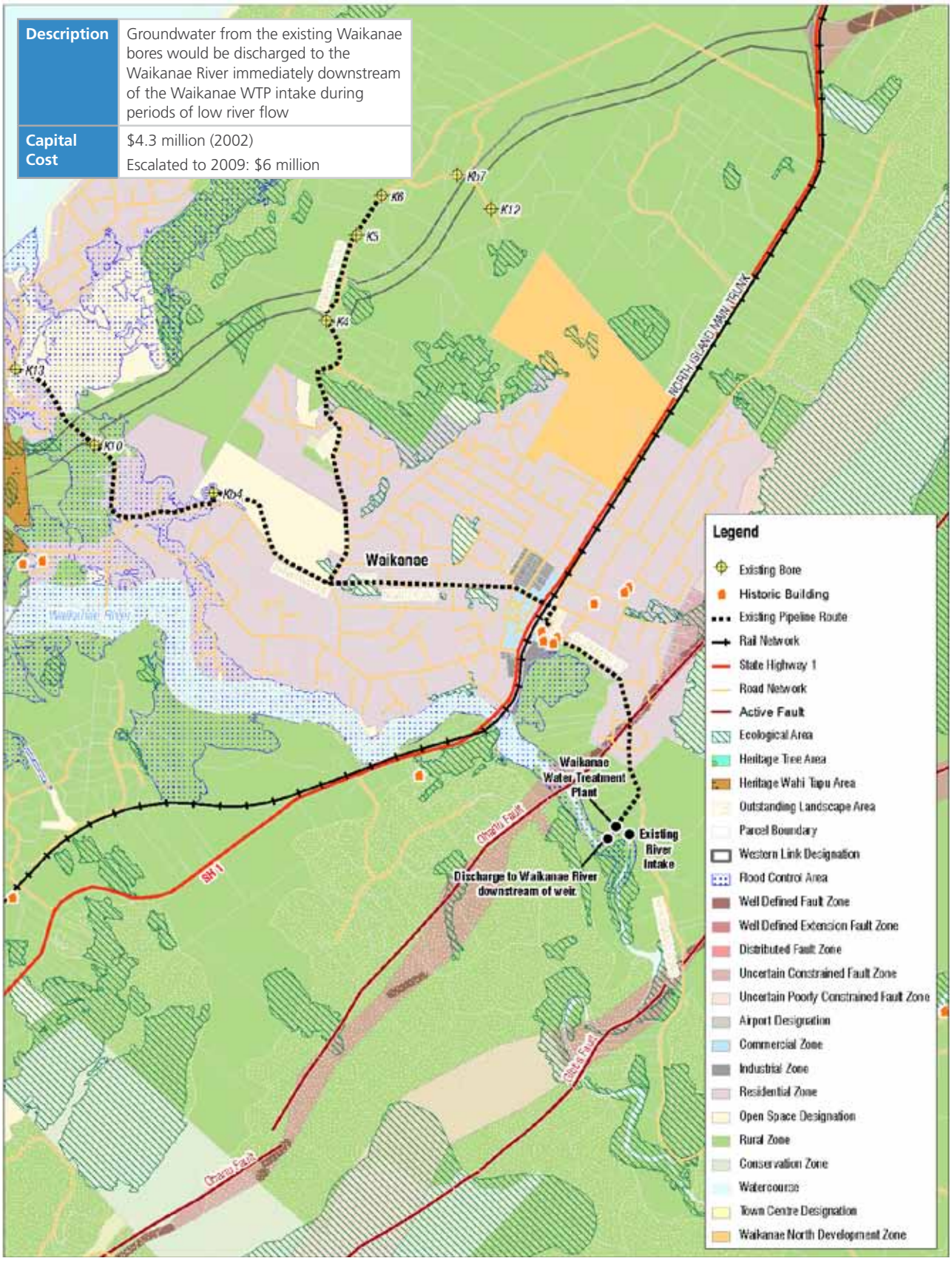


Description	Injection of river water into existing Waikanae Borefield aquifer over winter for storage until summer abstraction
Capital Cost	Unknown

Option 29 - Groundwater River Recharge

Value		Criteria		Rating	Comments
1	Quality of Water Supplied to Consumer	1	Public health	Almost zero	
		2	Taste, Odour and Aesthetics	Low	Dilution of bore water with river water Assume no treatment of groundwater Possible low quality of water in the river during low flows
		3	Hardness	Less than 100 mg/L	Dilution of bore water with river water Assume no treatment of groundwater
2	Social	1	Impact during construction	Low impact	
		2	Impact for ongoing operation	Low impact	
		3	Social impact of catastrophic failure	Low	
		4	Other social benefits (eg. recreation)	No	
3	Cultural	1	In catchment solutions	Water source is fully within community catchment	
		2	Water conservation	Supportive	
		3	Identity	Identified risk of compromising this value	
4	Environmental	1	Impact on in-stream ecology	Medium	Further investigation required
		2	Impact on vegetation/ terrestrial ecology	Low	
		3	Impact on groundwater	Medium	Need to confirm sustainable yield
		4	Impact on natural and/or urban landscape	Low	
		5	Impact on future use of land	Low	
5	Performance	1	Ability to make best use of existing infrastructure	High	Assume borefield is extended
		2	Ability to be staged over time	High	
		3	Ability to expand	Medium	Depends on sustainable yield of aquifer
		4	Security of supply over time	Medium	Borefield supply restricted
6	Implementation	1	Difficulty in obtaining resource consents	Medium	Need to prove the bore water has no effect on river ecology Possible use of existing consents for groundwater take and discharge to river
		2	Difficulty in acquiring land and/ or access	Low	
		3	Level of uncertainty in water resource and design/technology	High	Need to confirm sustainable yield and determine effects of discharge
7	Economic	1	Cost to construct	<$10 million	
		2	Operational cost	Higher than current river water supply	
		3	Impact on opportunity cost of other potential water users	Medium	Further investigation required on potential and existing users

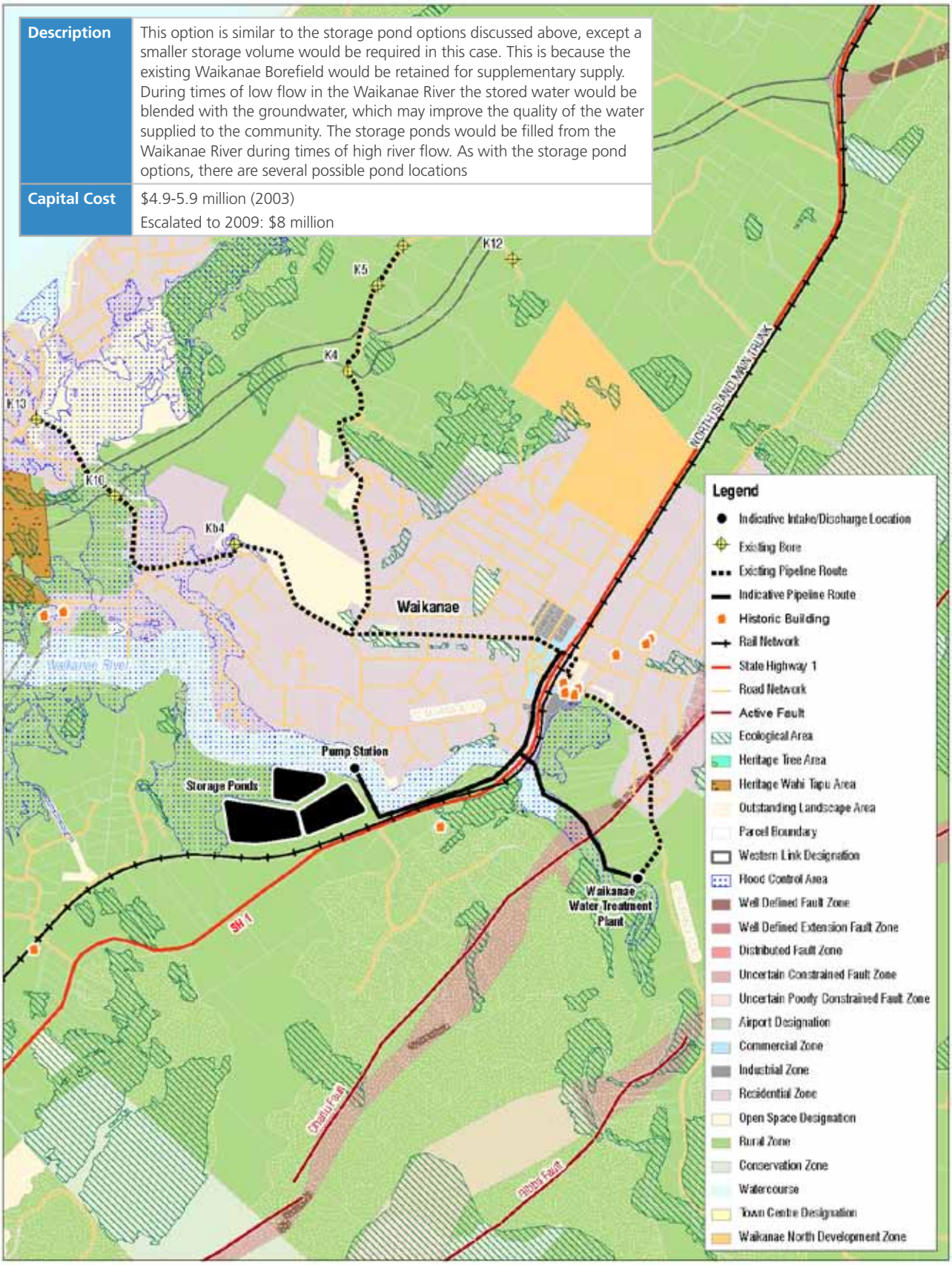
Description	Groundwater from the existing Waikanae bores would be discharged to the Waikanae River immediately downstream of the Waikanae WTP intake during periods of low river flow
Capital Cost	$4.3 million (2002) Escalated to 2009: $6 million



Option 38 - Waikanae Borefield and Storage

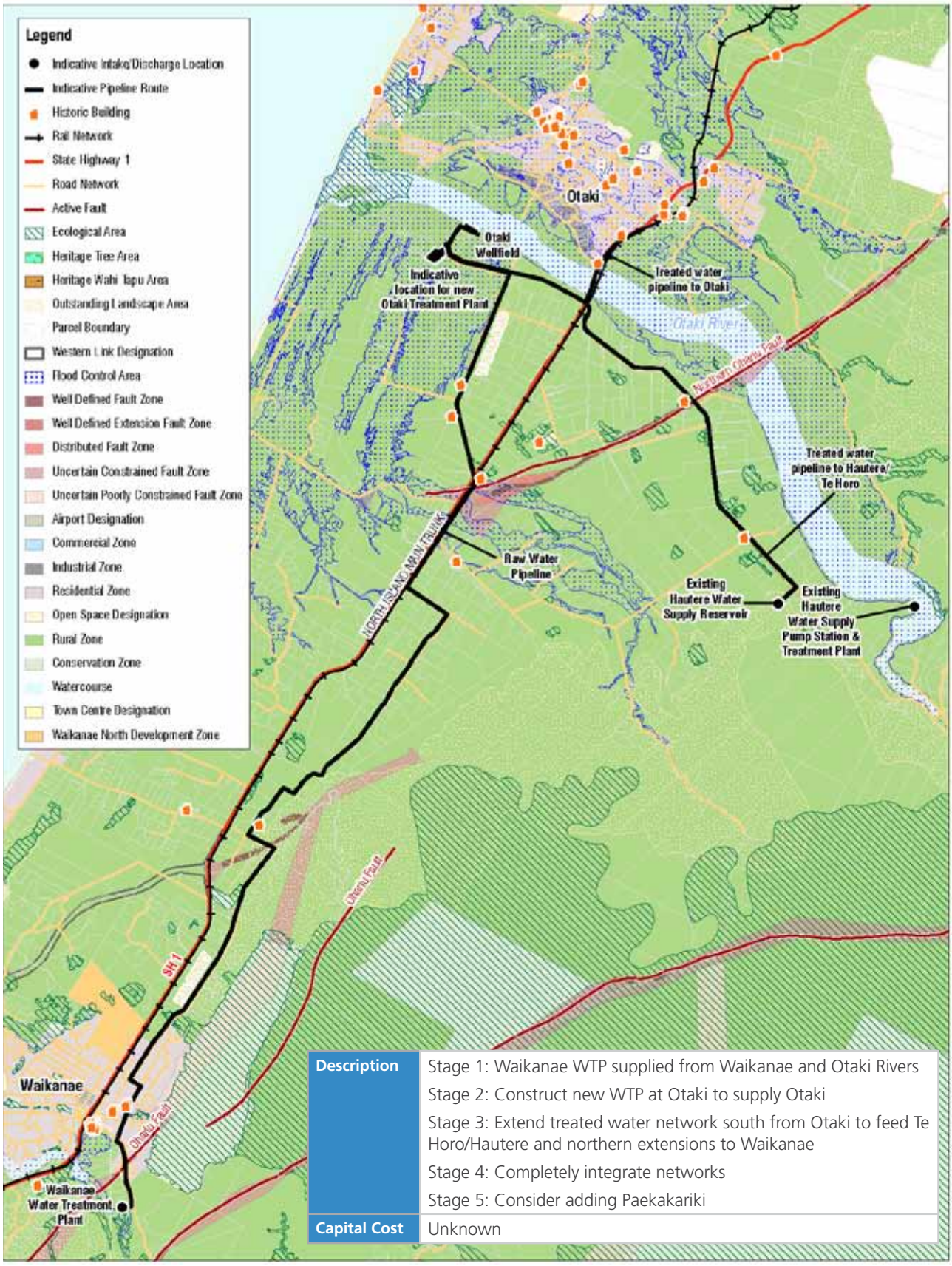
Value		Criteria		Rating	Comments
1	Quality of Water Supplied to Consumer	1	Public health	Almost zero	
		2	Taste, Odour and Aesthetics	Low	Dilution of bore water with stored water
		3	Hardness	Less than 100 mg/L	With treatment
2	Social	1	Impact during construction	High impact	Dust issues, close proximity to urban area Adjacent to SH1 and railway
		2	Impact for ongoing operation	Medium impact	Potential bird/ water fowl issue
		3	Social impact of catastrophic failure	Medium	Possible flooding of rail and urban area
		4	Other social benefits (eg. recreation)	No	
3	Cultural	1	In catchment solutions	Water source is fully within community catchment	
		2	Water conservation	Supportive	Smaller storage volume than dam and storage pond options
		3	Identity	No identified risk of compromising this value	
4	Environmental	1	Impact on in-stream ecology	Low	
		2	Impact on vegetation/ terrestrial ecology	Medium	Identified forest remnant lost
		3	Impact on groundwater	Low	Only taking as much as is currently consented
		4	Impact on natural and/or urban landscape	Medium	Less impact due to smaller ponds when compared to other storage pond options
		5	Impact on future use of land	High	
5	Performance	1	Ability to make best use of existing infrastructure	High	
		2	Ability to be staged over time	High	
		3	Ability to expand	High	Construct bores and ponds as required
		4	Security of supply over time	Medium	Smaller ponds so land available for expansion
6	Implementation	1	Difficulty in obtaining resource consents	Medium	Long term yield to be confirmed
		2	Difficulty in acquiring land and/ or access	Medium	
		3	Level of uncertainty in water resource and design/technology	Medium	Access issues with SH1 and rail
7	Economic	1	Cost to construct	$10-20 million	Taking bore field water on different or more days than current. Uncertain about long term groundwater yield
		2	Operational cost	Higher than current river water supply	
		3	Impact on opportunity cost of other potential water users	Low	

Description	This option is similar to the storage pond options discussed above, except a smaller storage volume would be required in this case. This is because the existing Waikanae Borefield would be retained for supplementary supply. During times of low flow in the Waikanae River the stored water would be blended with the groundwater, which may improve the quality of the water supplied to the community. The storage ponds would be filled from the Waikanae River during times of high river flow. As with the storage pond options, there are several possible pond locations
Capital Cost	$4.9-5.9 million (2003) Escalated to 2009: $8 million



Option 39 - Kapiti District Integrated Water Supply

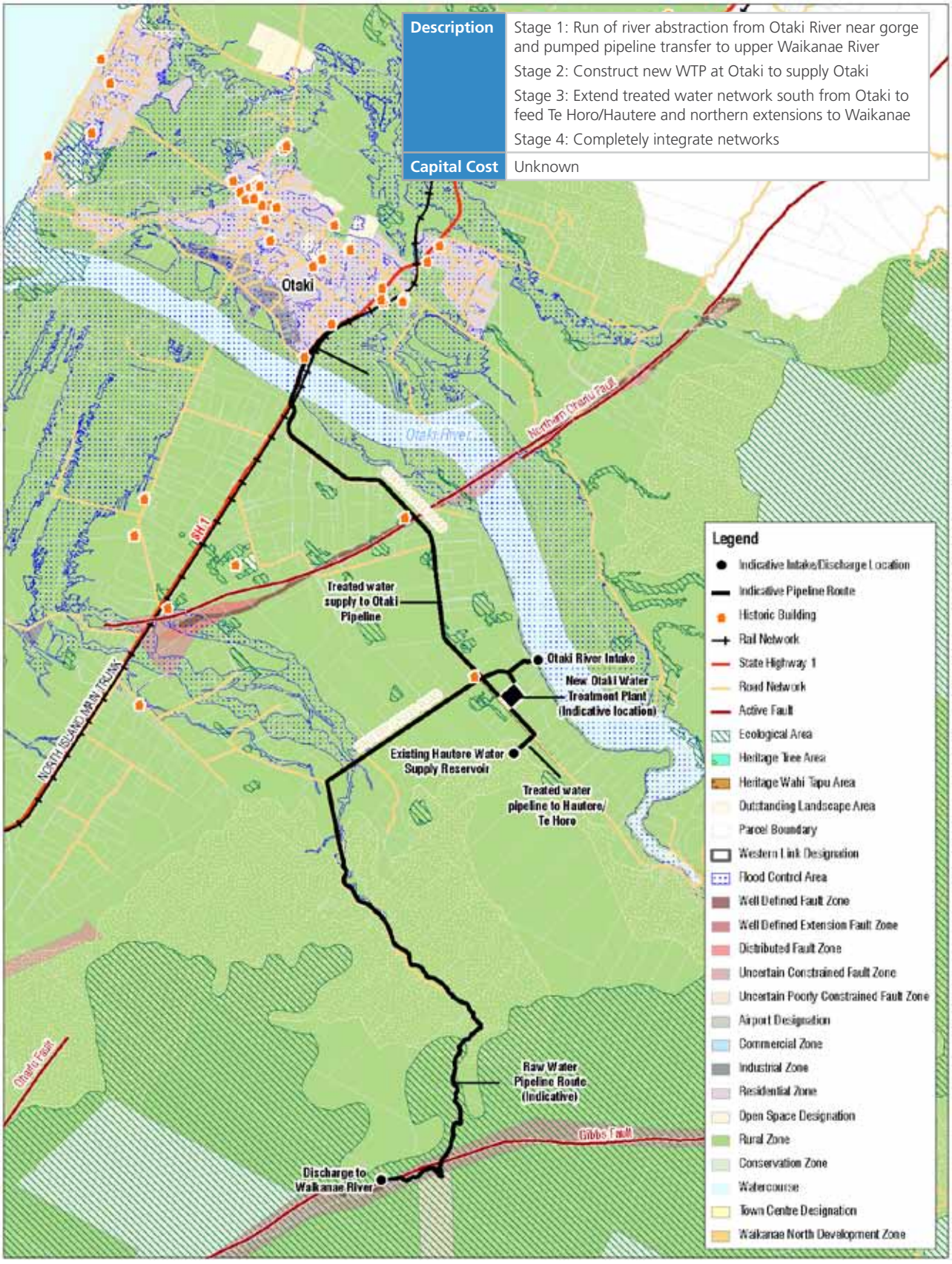
Value		Criteria		Rating	Comments
1	Quality of Water Supplied to Consumer	1	Public health	Almost zero	
		2	Taste, Odour and Aesthetics	Almost zero	
		3	Hardness	Matches existing river supply	
2	Social	1	Impact during construction	Medium impact	Impacts from treatment plant construction
		2	Impact for ongoing operation	Low impact	
		3	Social impact of catastrophic failure	Low	
		4	Other social benefits (eg. recreation)	No	
3	Cultural	1	In catchment solutions	Water source is not fully within community catchment	Criteria in some ways doesn't apply as option is for all communities excluding Paekakariki
		2	Water conservation	Not supportive	Otaki River is a large, high yield river which is highly visible and so may give impression of high water availability
		3	Identity	Identified risk of compromising this value	Otaki community's identity may be affected by water transfer to WPR
4	Environmental	1	Impact on in-stream ecology	Low	
		2	Impact on vegetation/ terrestrial ecology	Low	
		3	Impact on groundwater	Medium	Possible effects on river recharge of aquifer
		4	Impact on natural and/or urban landscape	Low	
		5	Impact on future use of land	Low	
5	Performance	1	Ability to make best use of existing infrastructure	Medium	Not using Waikanae Borefield
		2	Ability to be staged over time	Low	
		3	Ability to expand	Medium	
		4	Security of supply over time	High	
6	Implementation	1	Difficulty in obtaining resource consents	High	Known opposition
		2	Difficulty in acquiring land and/ or access	Low	
		3	Level of uncertainty in water resource and design/technology	Low	
7	Economic	1	Cost to construct	>$20 million	
		2	Operational cost	Higher than current river water supply	Pumping and treatment
		3	Impact on opportunity cost of other potential water users	High	Potential irrigators in Otaki area


Legend
Indicative Intake/Discharge Location
Indicative Pipeline Route
Historic Building
Rail Network
State Highway 1
Road Network
Active Fault
Ecological Area
Heritage Tree Area
Heritage Wahi Tapu Area
Outstanding Landscape Area
Parcel Boundary
Western Link Designation
Flood Control Area
Well Defined Fault Zone
Well Defined Extension Fault Zone
Distributed Fault Zone
Uncertain Constrained Fault Zone
Uncertain Poorly Constrained Fault Zone
Airport Designation
Commercial Zone
Industrial Zone
Residential Zone
Open Space Designation
Rural Zone
Conservation Zone
Watercourse
Town Centre Designation
Waikanae North Development Zone
Otaki
Otaki Wellfield
Indicative location for new Otaki Treatment Plant
Treated water pipeline to Otaki
Otaki River
Northern Otaki Fault
Treated water pipeline to Hautere/ Te Horo
NORTH ISLAND MAIN TRUNK
Raw Water Pipeline
Existing Hautere Water Supply Reservoir
Existing Hautere Water Supply Pump Station & Treatment Plant
Otaki Fault
SH 1
Waikanae
Otaki Fault
Waikanae Water Treatment Plant
Description
Stage 1: Waikanae WTP supplied from Waikanae and Otaki Rivers
Stage 2: Construct new WTP at Otaki to supply Otaki
Stage 3: Extend treated water network south from Otaki to feed Te Horo/Hautere and northern extensions to Waikanae
Stage 4: Completely integrate networks
Stage 5: Consider adding Paekakariki
Capital Cost
Unknown

Option 40 - Kapiti District Integrated Water Supply (Otaki Gorge)

Value		Criteria		Rating	Comments
1	Quality of Water Supplied to Consumer	1	Public health	Almost zero	
		2	Taste, Odour and Aesthetics	Almost zero	
		3	Hardness	Matches existing river supply	
2	Social	1	Impact during construction	Medium impact	Walkway closed
		2	Impact for ongoing operation	Low impact	
		3	Social impact of catastrophic failure	Low	
		4	Other social benefits (eg. recreation)	No	
3	Cultural	1	In catchment solutions	Water source is not fully within community catchment	
		2	Water conservation	Not supportive	Otaki River is a large, high yield river which is highly visible and so may give impression of high water availability
		3	Identity	Identified risk of compromising this value	Otaki community's identity may be affected by water transfer to WPR
4	Environmental	1	Impact on in-stream ecology	Medium	Taking water from further upstream than Option 39, so impact likely to be greater
		2	Impact on vegetation/ terrestrial ecology	Medium	Access through indigenous vegetation of Tararua Ranges
		3	Impact on groundwater	Medium	Pipe laid on existing tracks
		4	Impact on natural and/or urban landscape	Low	
		5	Impact on future use of land	Low	
5	Performance	1	Ability to make best use of existing infrastructure	Medium	
		2	Ability to be staged over time	Low	Not using Waikanae Borefield
		3	Ability to expand	Medium	
		4	Security of supply over time	High	
6	Implementation	1	Difficulty in obtaining resource consents	High	
		2	Difficulty in acquiring land and/ or access	Low	Known opposition
		3	Level of uncertainty in water resource and design/technology	Low	
7	Economic	1	Cost to construct	>$20 million	
		2	Operational cost	Higher than current river water supply	
		3	Impact on opportunity cost of other potential water users	High	Pumping and treatment
					Potential irrigators in Otaki area

Description	Stage 1: Run of river abstraction from Otaki River near gorge and pumped pipeline transfer to upper Waikanae River Stage 2: Construct new WTP at Otaki to supply Otaki Stage 3: Extend treated water network south from Otaki to feed Te Horo/Hautere and northern extensions to Waikanae Stage 4: Completely integrate networks
Capital Cost	Unknown



Appendix 3

Eliminated Option Information

Appendix 3 - Contents

Run of River

OPTION 1 - Waitohu Stream	
Description	Abstraction of water from the Waitohu Stream with a 20 km long pipeline transferring water to the Waikanae WTP for treatment and distribution
Yield	4,900 m^3/day
Capital Cost	Unknown, but based on other options likely <$23 million
Reason for Elimination	The Waitohu Stream has a relatively small catchment and the initial hydrology work has confirmed that the yield is too low to be of interest if residual flow requirements are to be met.

OPTION 5 - Mangaone Stream	
Description	Abstraction of water from the Mangaone Stream with a 12 km long pipeline transferring water to the Waikanae WTP for treatment and distribution.
Yield	2,160 m^3/day
Capital Cost	Unknown, but based on other options likely <$23 million
Reason for Elimination	The Mangaone Stream has a relatively small catchment and the initial hydrology work has confirmed that the yield is too low to be of interest if residual flow requirements are to be met.

OPTION 7 - Whakatikei River Transfer	
Description	Abstraction of water from the Whakatikei River and a 6 km long pipeline for transferring the water to the upper Maungakotukutuku Stream, which is a tributary of the Waikanae River. The water would flow down the Maungakotukutuku Stream into the Waikanae River and be abstracted from the river at the existing intake adjacent to the Waikanae WTP.
Yield	<10,000 m^3/day
Capital Cost	Unknown, unformed country means price difficult to estimate, but likely to be <$23 million
Reason for Elimination	The Whakatikei River has a larger catchment in comparison to the Waitohu and Mangaone Streams, however at the proposed point of abstraction the catchment is too small to provide sufficient yield as a stand alone option.

Dams

OPTION 8 - Waitohu Dam	
Description	A 33m high earth embankment dam and storage reservoir in the Waitohu River with a 24 km pipeline transferring water to the Waikanae WTP. Reservoir surface area of 115,000m^2. The geology of the site is grey sandstone with mudstone sequences and poorly bedded sandstone.
Yield	Mean flow 677 l/s, 17 days to fill (storage volume 1.1M m^3)
Capital Cost	Approximately $24 million, excluding pipeline costs and land purchases
Reason for Elimination	The most significant reason for elimination is the high cost and secondly poor (or high risk of being poor) foundation and/or abutment conditions

OPTION 9 - Mangaone Dam	
Description	A 26m high earth embankment dam and storage reservoir in the Mangaone Stream with a pipeline transferring water to the Waikanae WTP. Reservoir surface area of 173,000m^2. It would be 2km from Gibbs fault. The geology of the site is made up of gravel alluvium, also grey sandstone sequences and poorly bedded sandstone.
Yield	Mean flow 246 l/s, 47 days to fill (storage volume 1.06M m^3)
Capital Cost	Approximately $22.5 million, excluding pipeline costs & land purchases.
Reason for Elimination	This option has been eliminated because of high cost and poor (or high risk of being poor) foundation and/or abutment conditions.

OPTION 10 - Combined Storage Dam in the Waikanae River	
Description	22m high earth embankment or RCC dam located in the Waikanae River, 1km upstream of the Waikanae WTP, crest length 250m. Reservoir surface area of 811,000m^2. The storage reservoir created by the dam provides storage for bulk water supply purposes and additional capacity for the detention of flood water. A diversion provides for continuous run of river flows. 0.1km from Gibbs fault.
Yield	Storage volume 5.9M m^3 ;Mean flow 3.16 m^3/s
Capital Cost	Approximately $26.5 million
Reason for Elimination	Due to high cost, significant potential for sedimentation from high bed load in the river (876,000 m^3/50yrs), high social impacts and being very near to a fault line, this dam option is eliminated.

OPTION 14 - Upper Ngātiawa Dam	
Description	25m high earth embankment dam structure located approximately 3 km upstream of the confluence of the Ngātiawa and Waikanae Rivers. This reservoir will submerge approximately 14 ha of land, which is mainly clear farmland. 2.5km from an active fault.
Yield	Mean flow 1.05 m3/s => 10 days to fill (storage volume 1.26M m^3)
Capital Cost	Approximately $23 million (excluding land purchase)
Reason for Elimination	The Upper Ngātiawa dam has been eliminated because of high cost, significant potential for sedimentation from high bed load in the river, and high social impacts which in this case includes dwellings and productive land.

OPTION 15 - Rangiora Dam	
Description	26m high rockfill embankment dam structure with submerged land area of 20 ha, located in the Rangiora Stream valley. The dam captures runoff in the Rangiora Valley for controlled release during low flows in the Waikanae River. 2 km from an active fault.
Yield	Mean flow 158l/s => 73 days to fill (storage volume 1.09M m^3)
Capital Cost	Approximately $28 million
Reason for Elimination	This option has been eliminated due to high cost, potential for landslides within the dam reservoir and extremely high social impacts (houses and road)

Groundwater

OPTION 24 - Eastern Waikanae Borefield	
Description	Two new wells in the order of 50m to 70m deep, located to the east of the township, between the railway and the water treatment plant. This was considered as short-term augmentation in 2003 when the Council delayed the construction of the proposed borefield pipeline until the long-term sustainability of that borefield was proven.
Yield	4,000 m^3/day (assumes two production wells)
Capital Cost	$1.7 million (2003)
Escalated to 2009:	$2 million
Reason for Elimination	This option will not meet yield requirements as a stand alone option, hence its elimination. However, this option has been incorporated into the more general "Extended Waikanae Borefield" option (Option 23).

OPTION 31 - River Recycle	
Description	Water abstracted from the lower reaches of the Waikanae River would be pumped back to an upstream site on the river immediately downstream of the WTP intake. Abstraction would need to be positioned upstream of the point of saline influence.
Yield	<15,000 m^3/day
Capital Cost	Unknown
Reason for Elimination	This option has been eliminated because of inadequate yield.

Other

OPTION 37 - Non-potable Reticulation Network ("Dual Pipe" System)	
Description	A non-potable water reticulation system would result in an area of properties having two water supplies: one potable and one non-potable. The non-potable water supply would be used for outdoor uses (such as garden watering and car washing), and also for toilet flushing. The non-potable water reticulation system would be supplied with highly treated effluent from an advanced treatment plant added at the Paraparaumu WWTP - we have assumed it would be of a standard that Australian authorities set for this type of application. In order for this option to meet the 2060 planning figure for demand of 26,000 m^3/day, the existing borefield would have to be retained (and probably extended) for times when no or limited water can be taken from the Waikanae River for potable supply. Reduced demand for potable water reduces the volume of fresh water to be abstracted from the environment and treated to potable standards.
Yield	Approximately 7,000 m^3/day of wastewater available
Capital Cost	For a non-potable reticulation system to serve only half of Waikanae and an advanced treatment plant with a capacity of around 2,000 m3/day, the cost is estimated to be of the order of $19M. The cost of treating the water from the borefield to address taste and hardness would have to be added to this, and this cost may be in the range of $5M to $10M.
Reason for Elimination	This option has been eliminated on the basis of high cost, uncertainties over the reduction in potable water demand, the public health risks associated with a non-potable water system (although these are small), and the impacts of retrofitting an additional reticulation network to established residential communities. However, it should be further investigated as a potential initiative in the Water Conservation Plan.

OPTION 41 - Grey Water Recycling	
Description	For the purposes of considering Grey Water Recycling as an option for this project the following assumptions have been made: ▪ it would be retrofitted to existing houses rather than the new houses being done as part of Plan Change 75 ▪ it would be led and funded by Council, but households would have to elect to have the system installed on their property. In order for this greywater option to meet the 2060 planning figure for demand of 26,000 m^3/day, the existing borefield would have to be retained.
Yield	Typical greywater yields have been estimated by Council to be 300 L/property/day. If 50% of WPR households, say 10,000 properties, retrofitted a greywater system then the potential reduction in demand (i.e. virtual yield) is 3,000 m^3/day. Note that in order to realise this yield, all 10,000 properties would not be able use this much water from the Kāpiti water supply on the same peak demand day.
Capital Cost	Based on a budget pricing for a greywater-only system (assuming 500 installations per year), we estimate that for 10,000 properties the cost of this option would be $18.2M. To this would have to be added the cost of treating the borefield, of at least $5M possibly as high as $10M.
Reason for Elimination	On the basis of the uncertainties over the degree of take-up of greywater systems by the community, the uncertainties over whether the yield will be realised, high cost, and not to mention the increased public health risks associated with future property owners who may not have the same commitment to the ongoing running and maintenance of greywater systems; this option has been eliminated. However, it should be further investigated as a potential initiative in the Water Conservation Plan.

Appendix 4

MCA Results, Graphs & Graph Descriptors

Appendix 4 - MCA Results

The results of the multi-criteria analysis are presented in the following graphs. The graphs show the weighted scores for each option for the preferred scenario. The horizontal axis has been sorted so that the best scoring option is on the left. Figures 1-7 show the weighted scores for each value. Figure 8 shows the weighted overall scores.

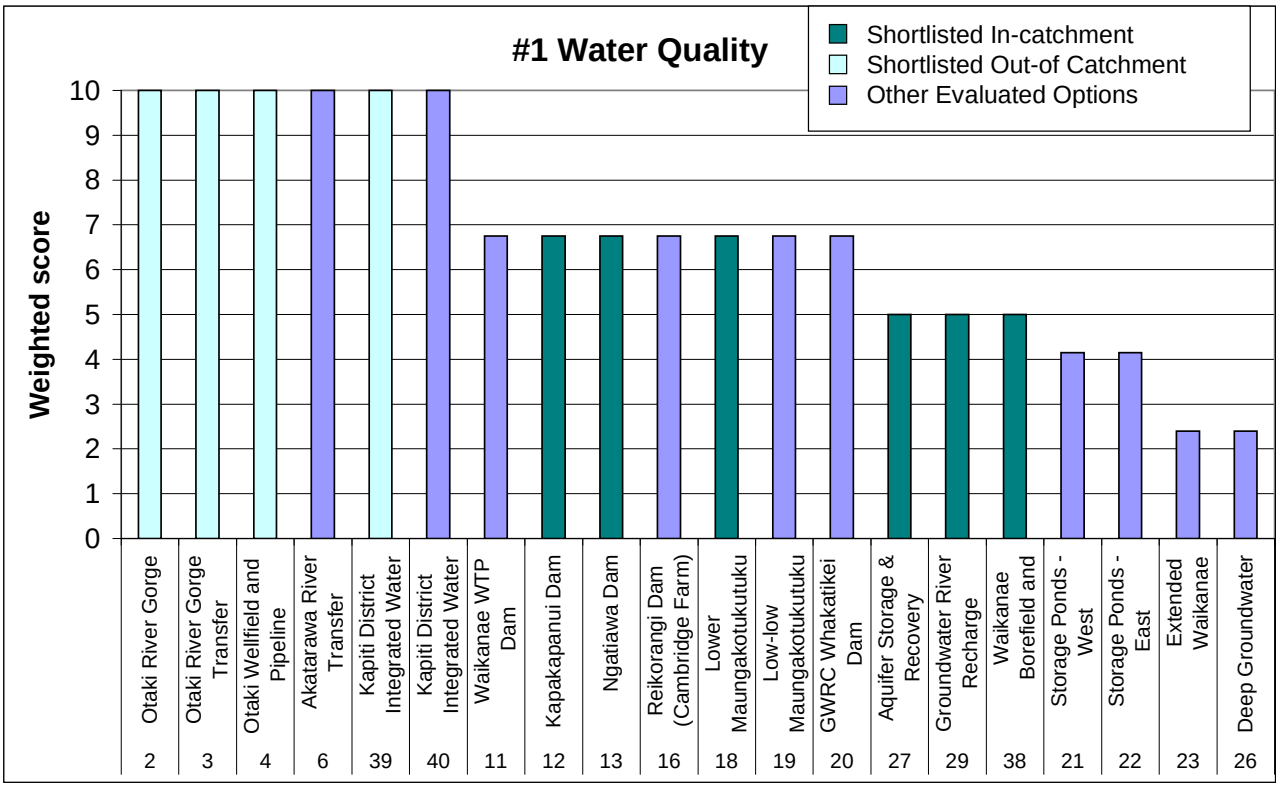


Figure 1 – Weighted Scores for Value #1: Water Quality

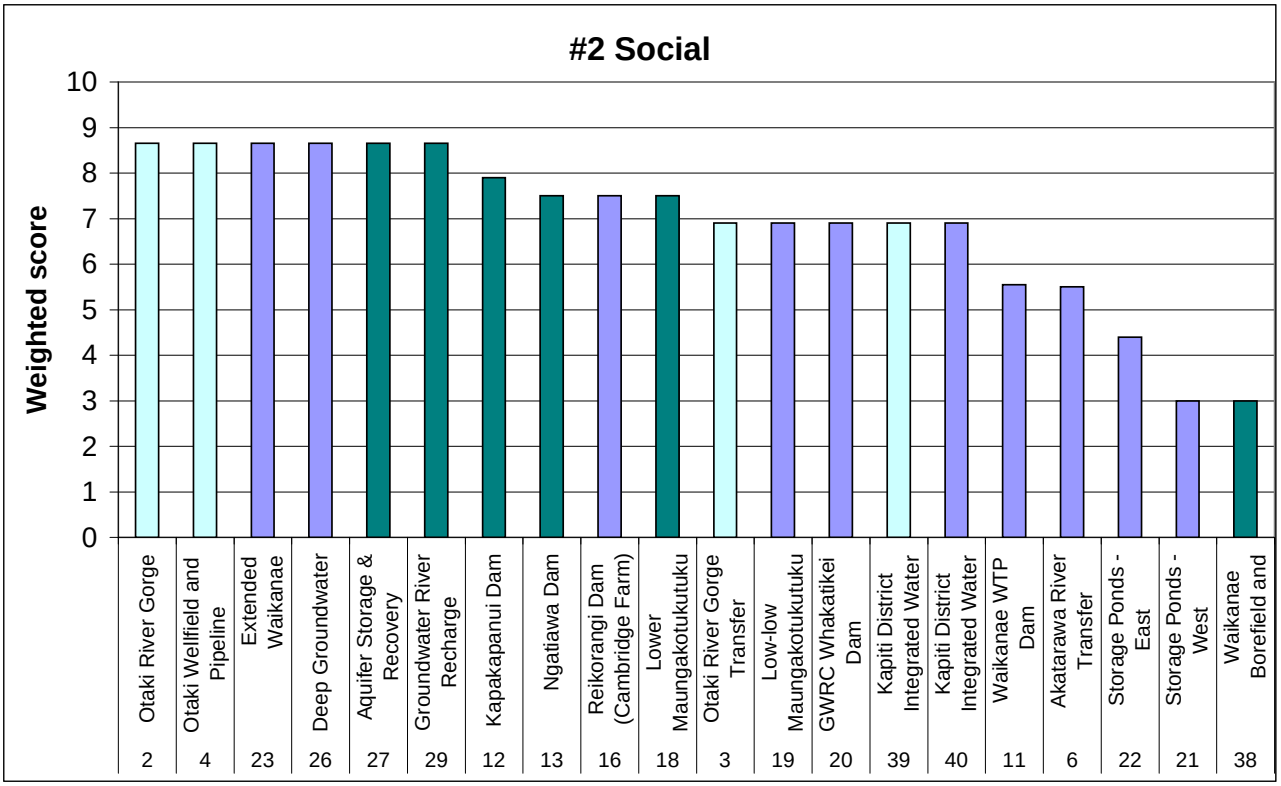


Figure 2 – Weighted Scores for Value #2: Social

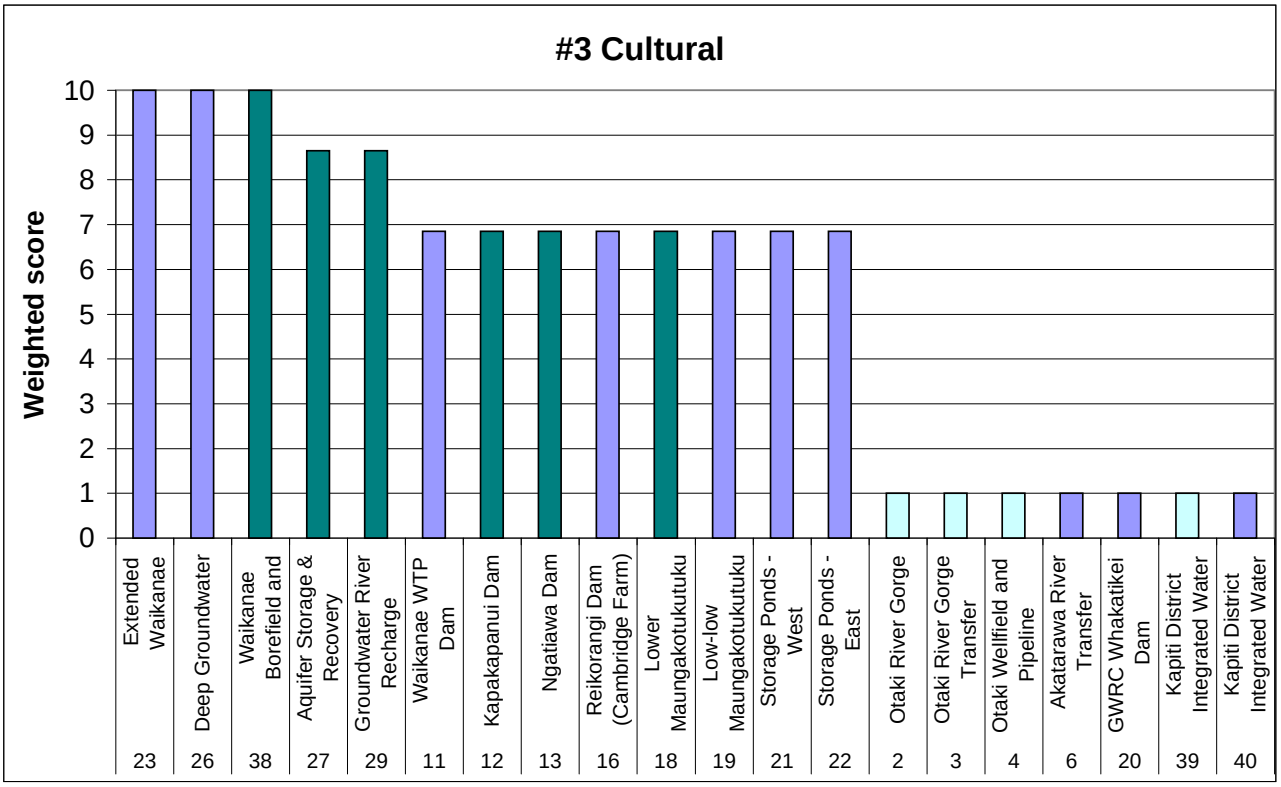


Figure 3 – Weighted Scores for Value #3: Cultural

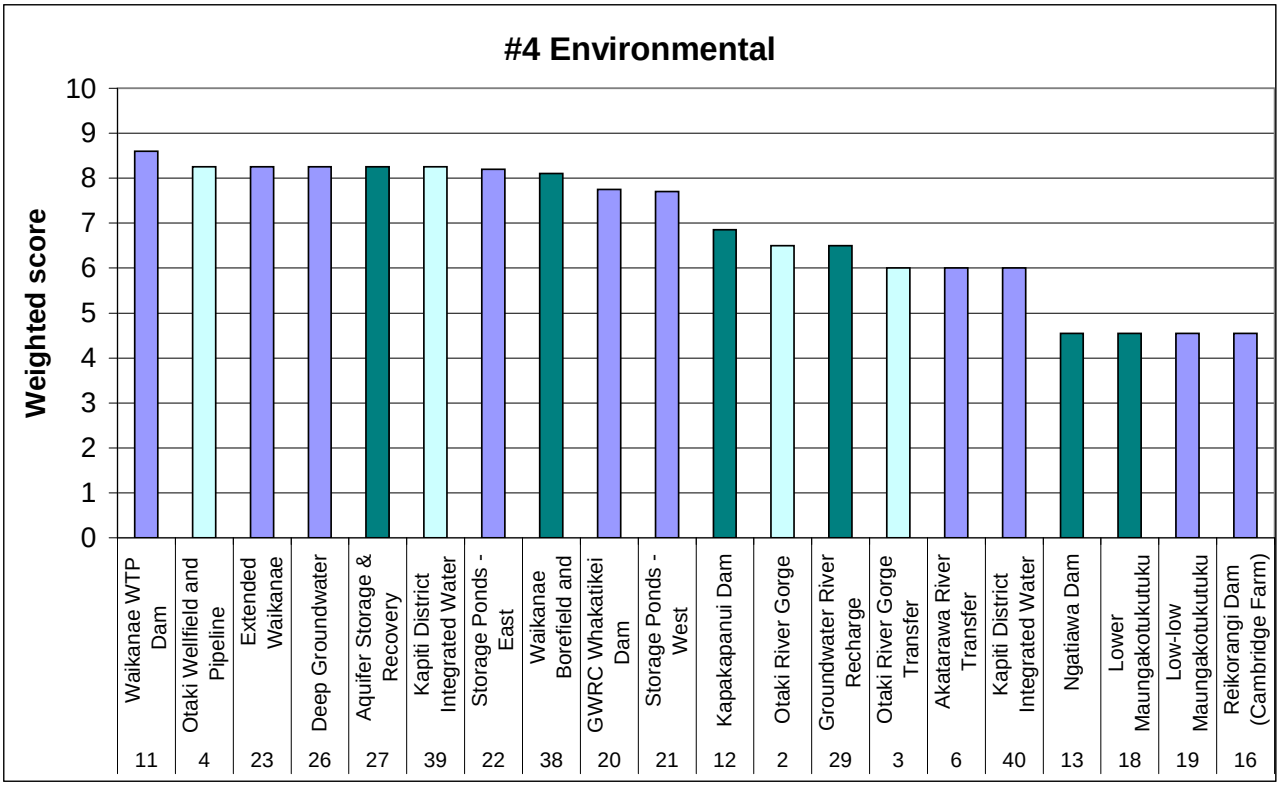


Figure 3 – Weighted Scores for Value #3: Cultural

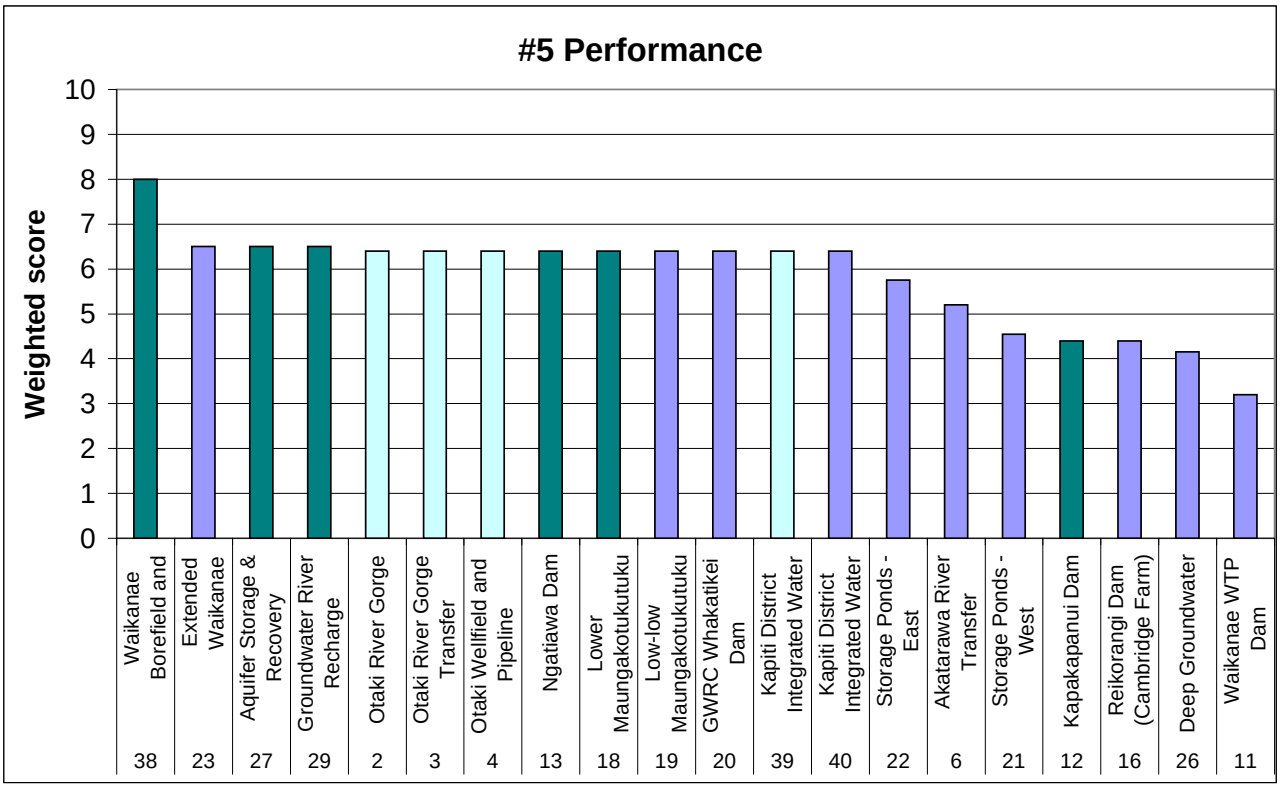


Figure 5 – Weighted Scores for Value #5: Performance

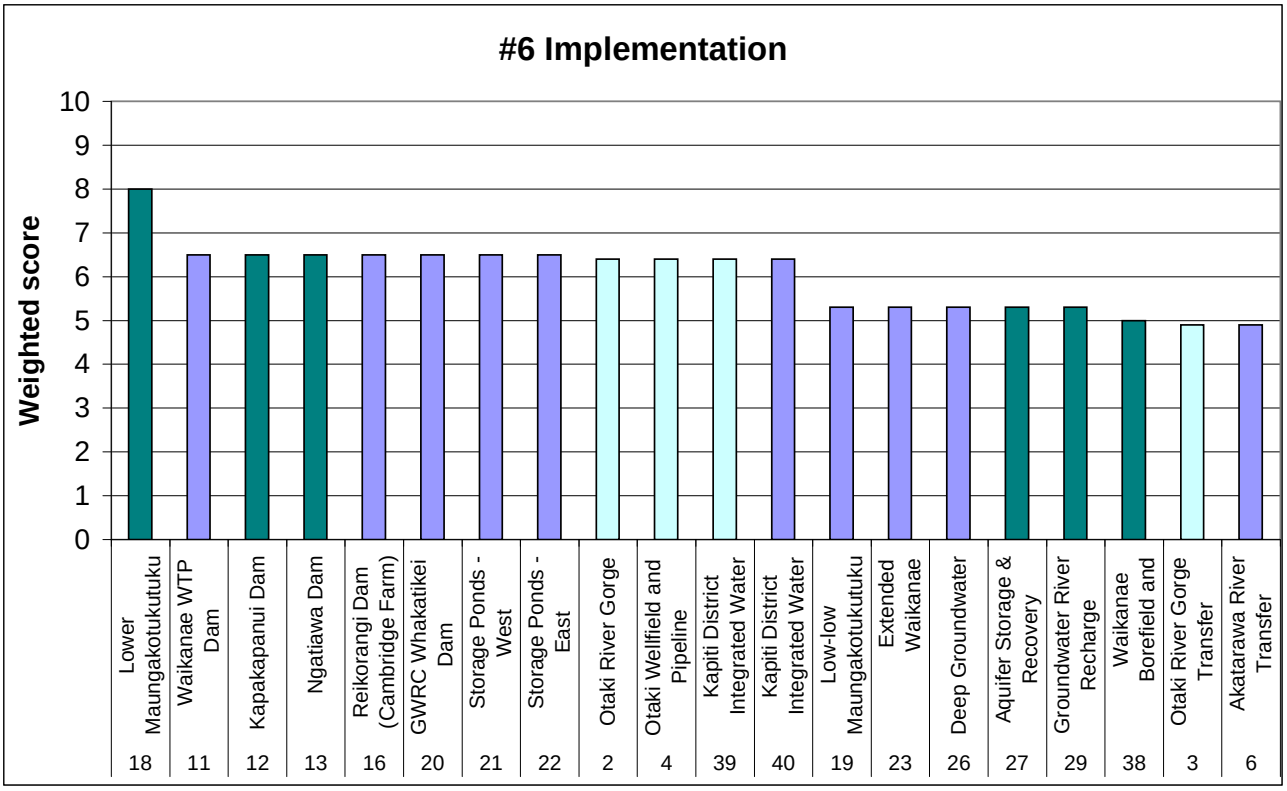


Figure 6 – Weighted Scores for Value #6: Implementation

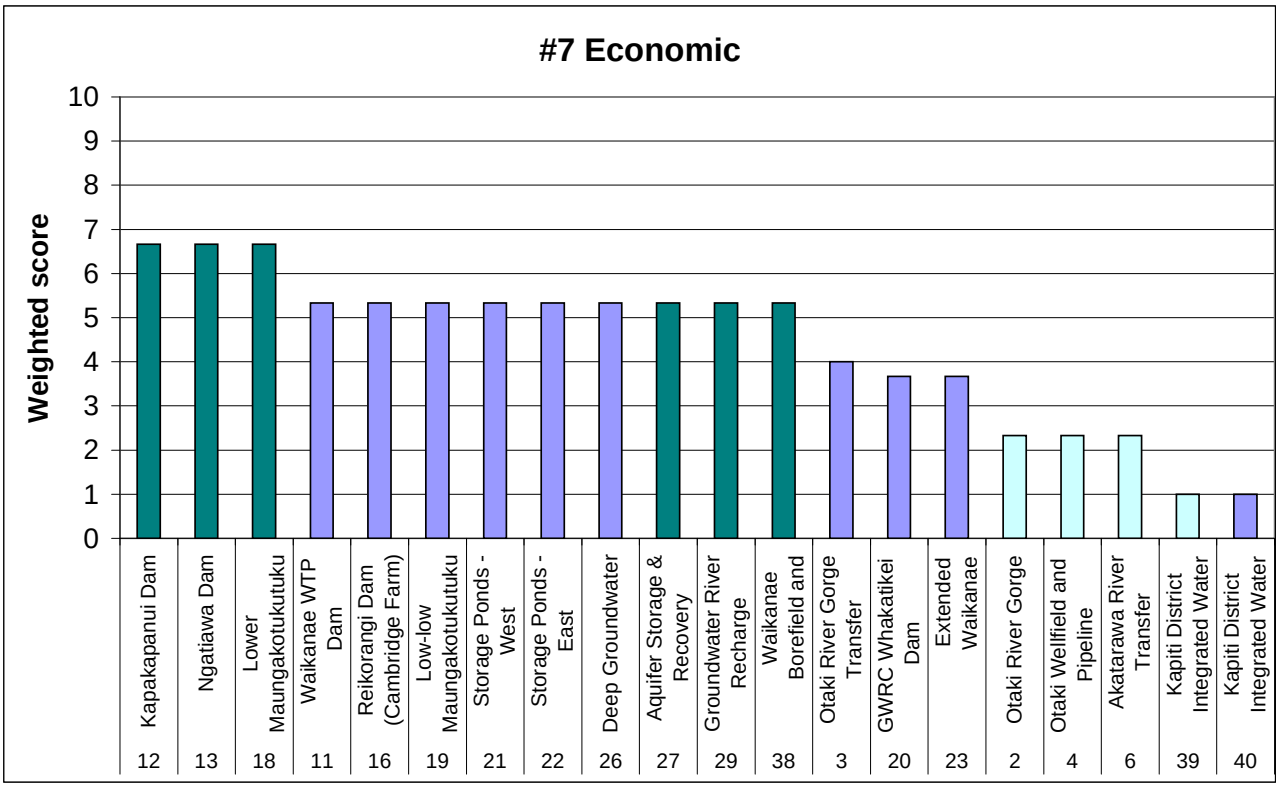


Figure 7 – Weighted Scores for Value #7: Economic

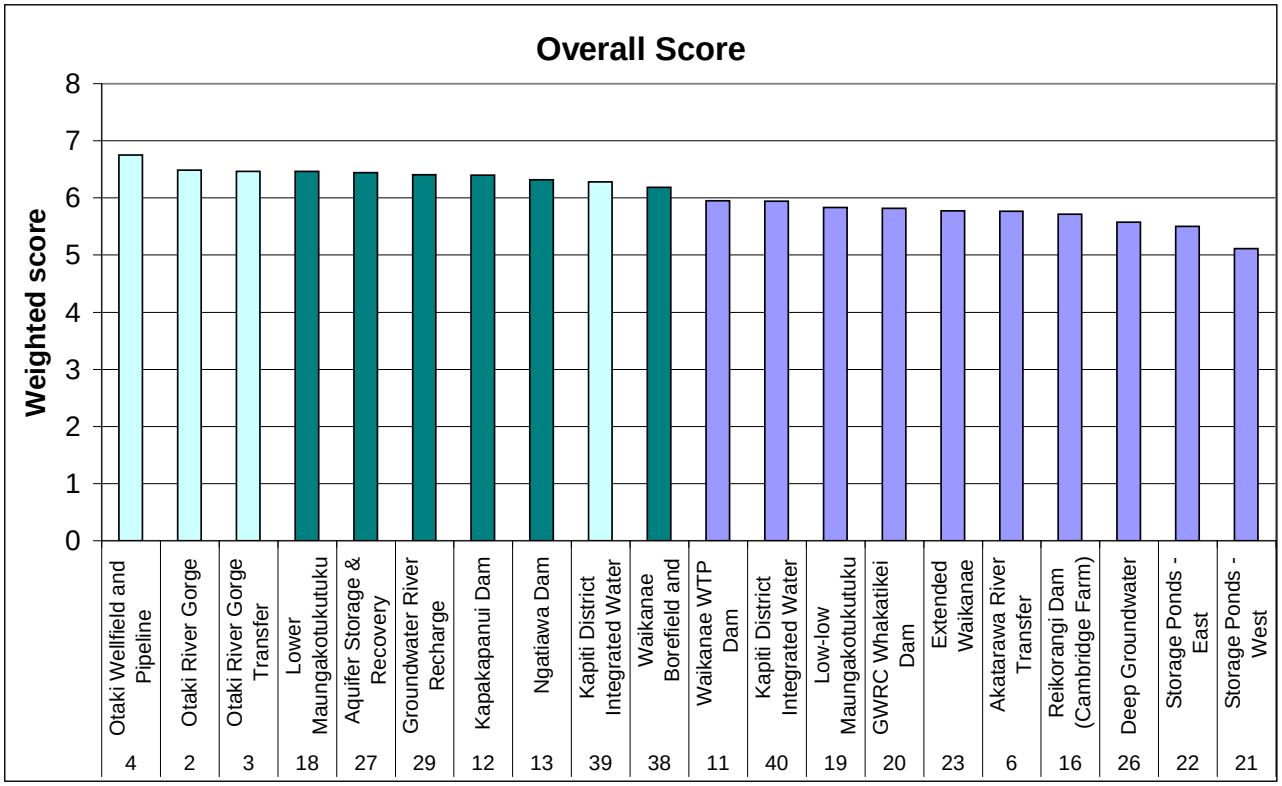


Figure 8 – Overall Weighted Scores

Appendix 5

Survey Comments

Appendix 5 - Comments - Water Review Survey Response

1	Individual metering as a demand management tool is sensible and must not be ignored. It should be a component in any solution. I suggest council start to increase the visibility of individual, suburb and districts water supply costs in every rate bill, even if a general water rate is maintained for the time being. Overtime, metering should be progressively applied starting with high use suburbs or users first.
2	Otaki water is purer than Waikanae water. We find Waikanae has a treated taste – not pleasant to drink.
3	Having lived in Wales for a large number of years, I can see the benefits of reservoirs, when they are also used for leisure – sailing, swimming, fishing, campsites nearby etc. I personally think this is a positive long term approach.
5	Please give us water meters so we are not subsidising high users and so people are motivated to reduce consumption.
6	I cannot over-emphasise the importance of water metering. If you can't measure it you simply can't control it. Why shouldn't the person with a pool and who uses more water than me pay extra for the facility? Each user needs to know the amount they use.
7	Don't waste time, as was done with the Link Road. Get on with it. I attended meetings and wanted the Otaki River option. It got away from us. Make sure it does not happen again.
9	I do not agree that water meters would solve any current problems. More effort should be made to contain the river waters which now are allowed to flow out to sea.
11	What does "Ability to meet community growth management aspirations" mean?
12	I would oppose a water take from the Otaki River for the Southern Catchments. I see dams as a possible solution for those areas. Maintain water conservation for all areas, which KCDC are currently dong their best at.
13	Given our relatively low population and enormous resources in the eastern ranges, it's bordering on scandalous that there is a water shortage. Bore water should only be regarded as a temporary solution.
14	Strongly disagree with water being viewed on cultural or spiritual grounds. Water is an equal resource for everyone, not a select minority.
16	People generally do not waste water. An area can only sustain so many people as water is not unlimited. Population growth is a problem world wide.
18	Too many items are included under each heading, eg Performance/technical covers THREE items each of which may have differing importance values, similarly Social/Cultural. I suggest that a more meaningful and comprehensive survey be issued to those answering this one in order to get a more precise idea of what does matter.
22	We have a significant catchment area in the hills around the Kapiti Coast. The logical solution to sustainable water supply is a dam to create a reservoir and capture and store water. Not only would this provide a water supply, It would also reduce the risk of flooding during periods of very heavy rain. The reservoir could also be used for 'clean' recreational purposes and be a potential source of revenue for the Kapiti Coast.
23	I think that household/business usage above the allocation for each member (eg above 400 litre/person/day) should be metered, with some flexibility for specialised needs and for community usage such as hospitals, schools, etc. I think this would help people conserve water while not adding the type of additional financial expense flat out water metering would create. Getting people to conserve the water they are already supplied with is a good place to start. I think the idea of the water conservation improvement plan is excellent and support the requirement of rainwater tanks and grey water usage. Perhaps some sort of assistance or financial incentive for installation of these in existing properties as well?
29	Cost of water should be separated from construction and operation. Too many are likely to rank cost eg construction – as an important issue and can thus be used to justify/misconstrue the desire to meter and rate accordingly. Water and its use should be free and rates should only cover costs as they do now.
30	What is the consequence of water being taken from shallow aquifers? This water would normally flow into the river thereby keeping the river level up. Is there a cap on the number of bores being sunk?
34	There is no water shortage just a storage problem. Build a dam in the Maungakotukutuku valley, or similar location, and make it big enough for the future. Just do it.

38	The Council and the Community should take a strong line to keep the Otaki River pipeline an option despite possible consenting opposition from Iwi. A possible pipe alignment could be the proposed NZTA expressway designation through Peka Peka.
39	The most critical issue is long term security of supply which has no main prerequisites, large scale storage and /or access to the Otaki River, and retention of water supply in public ownership and control. Successive Councils have simply sidestepped the bulk storage issue and individual household tanks would not provide any security of supply for more than a few weeks in a dry spell. Metering, while it can be used to limit demand, does not ensure the continued supply of water in a long dry spell, especially with continued growth. Private ownership of utilities has been shown to be risky in times of stress, mainly because the primary driver becomes profit, rather than public need. Is there a sound reason for not using the Otaki River, which has a much higher and more sustainable flow? In the "Social/Cultural" value what does the issue of "iwi values" and "catchment solutions" mean and what constraints do they impose on ensuring a reliable, cost effective and quality water supply?
41	The social/cultural criteria is poorly worded. It is so broad it is devised to illicit a high score for political reasons than identify and deliver what the community needs in a reasonable timeframe. Growth management is more suitably addressed under performance/technical criteria.
46	I am totally against water meters.
50	I do not believe that water meters should be compulsory, possibly a system of voluntary putting them in your home (for some people this would save them water costs), and then once a meter is in it can not be removed. This way it is a choice when buying.
51	In question number 2, Social/Cultural, you ask if we have any respect for Maori Culture, then you negate this question using an umbrella question – Are you able to meet community growth. We strongly disagree with installing water meters when the average income here is at below the national level. Community is a pretty broad term. It effectively over-rides Maori completely! I am not partial to Maori sensitivity, but I do believe in meeting the needs of the community.
53	To have a fairer 'User Pays' water system water meters should be installed. Free of charge especially to those on Super. Water costs should be set that the cost for 2 residents in a property should be less than the current water rates. With meters the cost is directly proportional to the number of people living in a dwelling. The current system is unfair.
54	My husband and I both believe that you should be building a dam (like Upper Hutt) in the hills above Kapiti, which would be built to sustain projected growth in the region in the next 20 years. Water falls from the sky for free and if the proper storage was completed now, it would sustain everyone for a long period of time at today's cost. We also believe that education at schools is really important, educate our primary population now and you will reap the rewards in the future.
56	Very concerned about future of our river.
57	Read the iwi submission that was submitted to the commissioner hearing. The reports cover most of the concerns by Ngā Hapū o Ōtaki on water.
58	Values and criteria not in favour of pipeline, just thinking of generations of next millennia.
59	Use the Otaki River it is Obvious.
60	There is enough water. The Council should catch it in dams or Reservoirs where it can be piped to a Central Store. Stop being held hostage by minority Group.
63	Thank you very much for the opportunity to submit this form as I am unable to attend any of the community meetings in early Feb. To date, this appears to be an excellent example of genuine consultation with the people of Kapiti – thank you and well done. Sorry I had to double up on priorities above – all extremely important values and factors for an ideal sustainable, water storage supply.
64	Social-Cultural is too diverse to have one ranking and some items may actually conflict. We rank iwi values and in community solutions highly (2-3) but believe growth aspirations need to be tempered to be achievable in the context of environmental sustainability. Waikanae and Paraparaumu need to live within their resource means and contain their growth to what their environment can support. Unless storage capacity to supply several communities is developed.

65	Given the amount of time that has already been spent on this project without any definite conclusion being reached, I suggest the Council make this their No 1 priority. Put in a reservoir at the headwaters of the Waikanae River large enough to give ample water supply to present and future users for at least 50 years. Include purification filter and water softening units so that bore water need never be a future option. Make the reservoir large enough to eliminate any further need for water use restrictions. Think outside the square. You have enough expertise within council not to need any further consultation. Bite the bullet and get on with it.
66	I have found that these "values" are difficult to rate. There is, and always has been, only one solution to Kapiti's water supply and that is the construction of a reservoir to retain the large quantities of excellent water from the Waikanae River which daily flows into the ocean. Stop the talking and get on with a long overdue project. What we don't need is another Western Road & link fiasco by Council
67	The one and only major issue here is to provide adequate water storage facility sufficient for the whole of Kapiti. A huge dam or reservoir is needed not some piddling little ponds. Mayors have campaigned in this issue for years. None have done anything about it. This is an emergency – find legislation that will override Iwi, Waitangi, burial ground, Greenies. Just do it.
69	Greatest wastage modern washing machines – NZ wide competition needed to invent/patent storage system w/m where water is not flushed away after one use. Today's people will not tolerate multiple handling of clothes eg old copper and tubs system, but indoor technology must be able. Communities in future will be in danger by taking neighbour's water and pumping it for many Kms. Not scientific, please consider help from water diviners before expensive earthworks! We have much experience of how it works.
70	I think it's important to emphasise to people the difference between drinking water and clean water – water for showing, clothes washing and garden watering can be clean grey or rain water, and keep treated water for drinking and cooking. Maybe there could be some kind of subsidy for people to put in rainwater collection systems and tanks.
72	Following MANY YEARS of Council spending on consultations and consulting it is clear that a storage lake is the appropriate solution. By siphoning off water from the Waikanae River during the many times a year of high FLOW – into a storage lake and returning it to the treatment plant during droughts.
73	The lower criteria I've applied to quality and implementation is due to the fact I supply my own water from tank and sand trap not public water supply.
74	Just get on and DO – IT Build a dam or a holding pond Stop all the Waikanae River water running out to Sea! NO MORE CONSULTANTS NO MORE CONSULTATIONS Just DO IT!
76	Do the job without further procrastination.
77	Need to reduce wastage – reduce consumption per head of population. Install meters – reduce water charge in rates (Help pay for meters over say 3 years). In mid 1920's this halved water consumption in Whangarei. Implement a supply from Otaki River in stages with connecting mains. Small intake and treatment. Increase capacity. Build a Dam.
78	Too many subdivisions being developed.
79	As in most large areas, Wellington for example, dams have been built up in the hills. If this was done for Kapiti the natural fall to the treatment station could be used to generate electric power for the plants operation and the storage of abundant water for Kapiti into the future.

80	Hugely worried about the tidal wave of new comers to the area. We are drowning in people. I have discovered the more people we have the more expensive things are, harder to get necessary services, you can't move for people, lowered quality of life, thrashed beach, huge traffic with no relief. We shoot roosters but allow massive traffic with the resulting noise and fumes even most of the night. Many of our water problems are caused by too many people. Please discourage advertising all over NZ and the world for yet more people to come and live here we are overwhelmed with them!
84	Long term sustainability and renewal is crucial, eg Dams/Reservoirs are better than boreholes. Discretionary use should be better managed, eg there should be a permanent Summer ban on sprinklers.
86	Part components of values given need to be considered most important ie Ability to meet standards In catchment solutions given priority Reliability and security of supply over time however, everything about water is important but they cannot all be winners. Strive to provide the best possible given the parameters within which you are having to work.
87	Maintenance of high quality drinking water to our community is of paramount importance. This is NOT a subject where Treaty issues, respect for iwi issues, tino blah blah has any relevance.
92	The construction of a dam or provision of additional sources of water must go hand in hand with penalties for wasteful use of water. Water meters seem to be an obvious option.
94	The water supply must be of sufficient volume that it will provide for a lot of expansion in the future.
95	Economic: Guaranteed asset to all citizens.
96	Land was offered at a reasonable cost some years ago for construction of storage facilities but was rejected by Council at the time. Bores were sunk in Waikanae and are not entirely satisfactory. A dam or some type of bulk storage is the best option to save those millions of litres of water that flow out to sea every time it rains. Whatever is decided, get on with it, every delay costs more money on the rates
97	It is unreasonable to expect the low Summer flow of the Waikanae river to meet Summer demand. While the annual flow is more than sufficient, water storage is essential. Stock, swimmers and runoff into the catchment is unacceptable. I want riparian strips, at least, in the water catchment.
99	For goodness sake get on with building a dam. The Kapiti Coast's water problems stem from not storing our rainfall when we get it. A dam would offer water storage and flood protection. We live on the Waikanae River flood plain and would be more than happy to have a dam upstream.
100	Unless you stop the regions "growth" tomorrow, the only practical long term solution is building large storage lakes that make more water available. Fill the lakes in winter when we have a surplus of water supply for use in Summer when we run short – it's common sense – no wonder the Council hasn't done it already. Though good on the Council for supporting rainwater tanks and grey-water reuse.
101	Vitally important that minorities not be out-voted (tyranny of the majority). eg iwi, vegetable gardeners, population of Otaki. Re tankers taking free water – Riverbank Rd, Otaki needs night inspections to prevent this. Sprinklers every 2nd day, 7-9pm is inefficient because: Pressure drops when whole street using at once; more often and longer watering required. Water lying on leaves overnight causes fungal diseases. Gardeners are advised to water in mornings. A good soak every 4 days better than every 2 days – take longer but encourages plant roots to follow the water down towards subsoil. Better root systems, less total watering required. A good soak is better achieved by soak hose than sprinkler, but this system is slower-requires more time (every 4 days) than the 2 hrs presently allowed. All the above points express my frustration over 2 decades of Council restrictions not allowing me to garden with the most efficient use of water. Disabilty prevents me from watering (veg gardening) altogether if hoses only are allowed.
103	Encouragement of water conservation with the compulsory use of metering.
104	No water meters. Subsidies for people wanting to install rain collection devices, all new builds having to collect water.

107	I'm not particularly interested in rating the Council. I'm far more interested in them getting on with a sustainable water supply for the Kapiti Coast. I would like you to build dam/s suitable for the area, similar to the Kaitoke Dams in Upper Hutt to capture the excess water running out to sea via the Waikanae River. You have also rather sneakily installed household water meters despite saying you don't intend to use meters. The water from the bores is unacceptable to taste and a useless form of obtaining water. Finally, stop procrastinating and get on with building some dams for the Kapiti people. Thank you.
108	Water metering so that there is an incentive for lower water use and benefits for people taking action to reduce water consumption, water supply and sewage.
109	The wording in your 'issue' boxes is ambiguous and could mean different things to different people. The present council were elected as most councillors stated they were in favour of a water storage system. As they were elected on that basis, arguably that is what they should be doing rather than delaying the process with yet more consultation processes.
110	It is obvious to everyone that plentiful water falls on the catchment during the year. Catch it, store it, treat it, and pump it. That is what every other normal Council does. We do not need to pay for yet another review or consultants report. When major commercial users of town supply water are charged appropriately for their use, and this cost is factored into their pricing, the cost of a suitable scaleable scheme will be easily managed over time.
118	Stop authorising new subdivisions until the water supply is finally fixed. This problem has been going on too long and more properties are being built with swimming pools and numerous toilets.
124	Priority is high quality water with minimal environmental impact and respect for iwi values. Along with emphasis on conservation and rainwater collection/grey water recycling by households and industry.
125	I find that the combination of several questions into one for each part of the survey makes it very difficult to provide sensible answers and believe that this seriously undermines the credibility of the survey results. Furthermore we received our paper version of the survey, (the only method of response which a majority of older people are likely to use), less than two days before the deadline date. I suspect that many other people had the same experience and will not respond at all due to the short timescale. I believe that the Council should, at the very least, extend the deadline date for a reasonable period by means of a newspaper announcement. Better still, the survey should be scrapped and replaced with simple questions which include the main issues (such as my example above) which are important to the people being surveyed. These should replace the ambiguous questions on the survey which seem more designed to sanitise whatever approach the council wish to adopt than to elicit the view of the population. If you truly wish to take account of peoples views ask the questions which are important to them (as discussed at length during the last election).
126	Council should return to the hearing, only this time contest the submission of objectors, pointing out the false claims etc. The failure to do so invited the commissioner to support false or inaccurate details. The former has cost Council 18m so far.
128	At times the quality of the water is poor and undrinkable. Even when boiled and flavoured with tea. The writer has an under bench filter and an electric distiller. All extra time and money. I have had trouble with my hot water tank and electric jugs.
131	I would like to see ratepayers subsidised for putting in rainwater tanks and grey water systems, perhaps through a reduction in rates.
132	The Council should have done better in terms of solving issues of the taste of the bore water. The technology is readily available (ionic exchange beds) to completely remove the offending elements (Fe, Mn, Mg, zeolites etc) and I don't know why this was not employed. The whole question of piping water from the Otaki River should be re-visited, with the highest priority. This time any objection from the local Iwi regarding "cultural sensitivity" re the mixing of water from the Waikanae and Otaki Rivers should be actively pursued in the Environment Court, in the greater public interest. It is a shame to see all the tonnes of water in the Otaki gong to waste into the sea.
133	We all depend on a reasonable supply of water. History has shown that water "supply" was always the top priority. I lived in Nelson where droughts were common and eventually we had to put in a Dam and then meters. No problem from then on. Fail to understand the lack of action here.
135	Distil it from the sea, then you will not have to put all the chemicals in it.

136	Surely everyone wants clean fresh water at a reasonable cost, please just get on with the job. This should have priority over new pools, sports grounds, fancy offices etc. What did we put the bores in for? Please do not consult with Iwi, we are all equal and every 'life form' needs WATER – god giveth.
137	Drinkable water which doesn't ruin kettles, hot water cylinders, etc has to be the top priority for Council above pretty much everything else. Water is essential to life – swimming pools (and even roading) are not.
139	We need a consistent storage facility so we don't run low on water.
140	For goodness sake get Meters and make users pay – it is the only fair way to make customers respect water supply.
141	If a little stream like the one that serves Paekakariki is so successful, then why are we not making use of the many other streams from our hills. Water must be a Regional Effort and the greater the region the better.
142	Give positive weighting to storage dams. Also: Less consultation and review, more action from council. Less turgidity and more plain English in consultation documents would be appreciated.
144	Yes. These can't in my opinion, be ranked against each other because they are all critical success factors for an acceptable water supply. Balancing these different needs is always going to be a challenge – it won't be solved by trying to rank them. A systemic view is needed so you can understand the interdependencies and the effects of change in one part of the system on the other part. (NB: the first 'issue' in the first value is a legal requirement ie it is not a choice. Needs reframing). My additional issue has been discussed at various times and is one way in which we can ALL help with the water supply. Council could do more to encourage this (eg assistance to get old water tanks tested and fitted with pumps).
145	Under "Social and Cultural Issues" you have included 2 totally different matters. Sensitivity to Maori issues cannot be considered in the same breath as the overwhelming drive of Council to grow. Several of our statements are incompatible and sensible ranking is impossible.
146	Kapiti Coast has needed a dam for 20 years that I know of, so each year it doesn't happen is just making the water situation here more critical. I now understand we are prepared to spend circa $20m on a new swimming pool complex, which makes me think our priorities are wrong again.
Just water now.	
147	I favour some form of storage, preferably by using a series of low Dams to minimise risk of damage from earthquake and floods.
148	There is plenty of water in Kapiti, both above and below ground, to support a much bigger population. The key issue is the cost of sustainable storage, retrieval and treatment.
149	Water meters should be brought in but never privatised. There is excessive use of water on private lawns for example.
150	Solutions must be tried and proven elsewhere first. Do not be a guinea pig or a pioneer for new ideas. It does not pay to be the first up. Build a dam behind the Maungatuks. Store in times of plenty or rainfall – use in times of drought. There is plenty of pure water available from mother nature but we do not harness it, we just let it flow out to sea. How intelligent is that????
151	You need to consider water meters so that demand can be managed and heavy users pay their fair share.
154	We simply can't rely on having adequate rainfall each and every year, and the lack of water discipline and the negative reaction to the idea of water meters further exacerbates the issue.
156	Don't be rushed. Community must pay for best environmentally sustainable long term solution. Appointment of TAG brilliant.
158	The Otaki River and the Waikanae have between them enough water to service ten times the current population of Kapiti/Horowhenua: combine the water of the Otaki with the Waikanae and fix this problem forever!
159	Until KCDC obtain/procure/build ongoing sustainable water supply eg Dams etc there should be no such luxury as an Aquatic centre and a drastic cut back on new subdivisions. Get the ground rules right before spending anymore time/effort/money on reviews that are largely ignored as Council does what they like anyway. Happy to be quoted!!!
159	We feel that the drinking water standard should be higher than "just met" as the standard is not consistent and the taste of the water is frequently unacceptable. It tastes too often of chlorine even when boiled.
162	With so much rain each year why does Council not implement storage Dams for times when rainfall is low. Why not encourage existing homes to provide grey water facilities and water tanks.

166	Water should be metered. I know that it is controversial but water is a valuable commodity and people do not value what they get for free (or think they do) just as they pay for electricity so it should be for water.
167	Well I do not really understand all these!! I know Paekakariki has its own water supply which is adequate and I wouldn't like to change this. Paekakariki cannot expand much owing to its geographical situation.
168	1A Wanganui has 3 new bores to 600 metres deep with an estimated life span of 30-40 years with large storage tanks which we should be building between Waikanae and Paraparaumu. Why is Kapiti Water not graded??
169	Household Water to stay free – not metered. Businesses – Commercial especially new industrial businesses to be charged for using resources. Incentives for homeowners to install water tanks and adapt systems for grey water discharge to property grass/gardens etc.
170	The main thing to study is what method we use to retain the abundant water we get ie Dams, Reservoir, Ponds etc.
171	The values marked are really the same issue. Whilst the taste when bore water is in use is not the best it is much exaggerated as is the effect on appliances and not a real problem for short periods of use in droughts.
172	Secure water in huge ponds at river's source, for emergency in drought.
173	Otaki River. Storage Dam
175	A main responsibility of any local Council has been for decades to provide pure clean water, paid for by our rates. This shouldn't be an issue. I object to additives such as fluoride being added "for our good". It benefits a small number and is surely a breach of human rights (dictators do this sort of thing).
176	We go to Petone for our water meet lots of people there from the Coast who go there for water, you should try it, makes a good cuppa. Stop building houses till you can meet the needs of the population up the coast now.
177	There is a serious need to think toward the time when the Kapiti Coast will be a CITY. The present sources of supply will be totally inadequate then.
180	Iwi considerations given too much weighting in previous discussions/consideration. Best feasible long term answer: pipeline from Otaki sources (enough to supply Mana and Wellington even!). Whatever you decide won't please everyone. Don't try. USE commonsense.
182	Instead of endless consultation, get on with it and build a reservoir. Water meters should not be needed.
186	Use the Otaki River as a source and pipe to the existing infrastructure. The probability is that water could be extracted from bore(s) into river gravels rather than a dam. The Otaki has a huge catchment compared to the Waikanae River.
187	NO FLUORIDE PLEASE!!!!!!!!!!
188	How can we attend a meeting in Otaki on 30th Jan 2010 when we only get this notice 1 Feb 2010???
189	Just don't let Waikanae pinch our water
190	The time for faffing around on this matter is long since passed. Bulk storage is the obvious answer – storage in times of plenty to cater for times of shortage is not rocket science – it is as old as Biblical times. Extract digit and get on with it please.
191	Use clearer language – avoid infrastructure, affordable – to whom? Implementation??? Are you referring to values to me personally, or to Kapiti Council? The values stated confuse the householder and KCDC "ability to meet standards" is a Council issue. "Economic" – for consumer? Is the Consumer secondary to the Council in values?
192	I support water meters and consumer pays for consumption over a basic needs allowance – generous, I hope. I favour an option where water from Waikanae River is stored when plentiful.
193	It's about time the Council acted and stopped pissing around. Kapiti needs a Dam! Bore water is unacceptable in the 21st Century in an OECD Country! To continue the development and attract more people with expendable money to the area, Kapiti needs to guarantee water supply without meters for the next 50 years.
194	If you think that a Dam wouldn't be a solution build huge underground water tanks next to the river, everything is possible but stop adding poison in the drinking water that's evil.
196	Continue to educate the public on water conservation – (as PTO)
198	Action asap

200	Good process to get community values clear before analysing range of options. Would be keen to see report (via local papers or regular KCDC mail out) of what the community set of value rankings are, and assessment of each option against/in terms of the value rankings. Would also useful to sub-divide value rankings by group such as regular (prob not well informed) public myself included and informed parties (such as environmentalists with interest in water, technical experts etc) and also be clear what weighting KCDC is going to give to each subset in combining value rankings.
202	I do feel water meters would reduce water usage and make people (esp. here in Waikanae) consider an alternative supply of their own for gardens.
203	Store the water. Reservoir top priority.
205	Concerned that there is not enough STORAGE from the catchments to meet present demands. Making houses put in tanks is a good start but more is needed.
207	To have a dam that could also be used for recreational use – rather like Kaitoke Regional park.
208	Please could the Council stop giving out more and more building permits to contractors – agreeing to subdivisions etc, until the water problem is sorted! What is the point in allowing further expansion if there isn't the infrastructure to support it!
209	Restricting use of sprinklers is good idea – it should run for the whole year. I manage to plant new plants with only a bucketful of water the 2nd day and thereafter one watering per week, if it hasn't rained. Only a few plants have died and they weren't suited to the terrain. Advocating less water use is obviously not enough. People need to trust the hardiness of their plants.
210	"Our water is precious" so precious that you allow it all to flow out to sea. Stop that happening and half your selection criteria would not be necessary!!. BUILD RESERVOIRS and stop wasting everybody's time.
211	It was very difficult to rank these (so ranking quite arbitrary) as supply is dependent on an integrated approach that takes account of all of these factors.
212	Rather than answer 1-6 priorities to your issues – a query to Technical Advisory Group: "food for thought" question: As an alternative to additional rating system costs, is it, in any way possible – or even probable to float a loan for the chosen water solution costs and pay investors quarterly interests???
214	I suggest that we stop wasting the Waikanae River water by letting it just run out to sea. A Dam must surely be the only long term answer, and should have been done years ago. Other infrastructure may have to go "on hold" in the meantime to meet the cost.
215	As far as Paekakariki is concerned, I believe KCDC should leave our water supply as it is and let us continue to impose our own set of restrictions when necessary, as has been the case formerly, and concentrate on areas North of here, less fortunate than Paekakariki, whose residents do not wish to become involved with water problems not applicable to Paekakariki.
216	Every time I drive across the Otaki Bridge, I think of the millions of gallons of fresh water that goes out to sea and is wasted. Why can't this water be utilised.
220	Very difficult to rank as all vital to successful water supply for district.
222	They are appropriate in today's climate. I think it is really important to ensure older generations leave a sustainable legacy for the young and generations to come.
225	If the final choice is the Otaki water, all treatment requirements are given to the Otaki work force to help the local employment situation.
226	Have a good look at rain water tanks with rates rebate for putting one in and a must for new houses.
227	Please no more compromises with the health of our rivers and their ecology. Conservation should be a priority. Congratulations on consultation & information campaign.
229	Believe water supply should be metered
230	Council should consider trying to connect to the Otaki River again, or if approval cannot be obtained, by providing more storage by means of a Dam on the Waikanae River or a Reservoir in the hills above, which could also be used for recreation purposes (no more bores please!)
231	Get on with it.
232	Main importance 1: storage capacity for summer usage, provision of storage ponds.
234	Cut the paper and garbage and do the job – NOW. There has been too much talk and no ACTION over the years and costs keep rising.

235	KCDC has made one big costly mistake already – bore water. Kapiti Coast has an excellent water catchment area – Otaki River or stored water. KCDC need to supply water during dry spells or a permanent reliable supply (The squirrel stores its food for the Winter!) if Councillors don't know by now water should be collected from where it runs or falls, they should not be in a position of decision making. Why do KCDC require so much input from various sources.
236	I think we should be very grateful to have clean water and should conserve and use supply carefully. We desperately need storage of quality water; earthquake secure. NB regards Otaki River – Tribes do not own River. We all pay River Rates. I do not have a dishwasher – use phosphate free dishwash liquid. In the kitchen use a simple water filter. This most necessary for drinking water and early AM kettle as periodically get a strong smell of chlorine and various chemicals. I am told this has happened in Seven Oaks at the end of line in cul-de-sacs!
238	Iwi are only a minority in the Kapiti area but have been given a disproportionate weighting in considering feasible solutions to the problem of supply. The best solution to long term needs is : A pipeline from the Otaki South Well field (low cost 100% reliable, feasible and potentially could be on sold to Wellington/Mana areas). Old Maori proverb: Water loses its "Life Force" – when it is piped away from one area to another. No Iwi worries!!!
240	Regarding performance/technical above. I live in a cul-de-sac and since October 2008 I have experienced low pressure problems at peak periods (mornings, and evenings too, during Summer). i.e at 9:30am last Saturday (30/01/2010) my toilet cistern took 3 minutes to refill, similarly at 9pm this evening (01/02/10)! Weak flow very noticeable when I used the taps to wash tea dishes this evening, too. I am reluctant to use my washing machine at such times – a real inconvenience. Would also be a nuisance should I have visitors to stay. Service request No 0907877 (reported after labour Weekend 2009) – still unresolved. January 2010 my plumber checked out my house/fittings, etc – reckons it is a Council problem. Please can you rectify this? Thank you
241	The water survey – all quality questions, iwi consultation, community management, flexible expansion and reliability, environmental and cost (needs to be free to households) – score 1. Recycling grey water etc – score 2.
243	Rampant and low quality development, coupled with lack of foresight by successive councils has fuelled our water crisis. Developers have basically rolled the council and got away with imposing huge costs on our district. A vast, bland urban sprawl between Mazengarb Rd and the sea is a disgrace. Our infrastructure, including water, sewage, schools, medical services, roading, etc has been under severe strain. Any monies developers have paid in mitigation seem to have vanished into general, perhaps, wasteful expenditure. Perhaps revenue has been grossly insufficient. This area of revenue and expenditure is not obvious and should be ring fenced in an audited account. The district is not high income (median about 24kK per annum). There is limited scope for imposing additional costs on existing households by enforcing retrofitting of tanks and expensive plumbing adaptations to conserve water, unless by reverse mortgage deals at peppercorn interest rates. For new housing these conservation measures can be mandated into the purchase price and development costs. We need a show home with every bell and whistle, including energy conservation. This home must have realistic solutions for existing home owners and in the case of water conservation water storage solutions of at least 5000 litres per dwelling. These little compact tanks currently being pedalled look sexy but are virtually useless. Costs should be upfront with cheaper alternatives suggested. Subdivision developers should be required to have a demo house on site for a period of 6 months. Products should be BRANZ approved and advisory staff on deck at weekends, or by arrangement. The council building office should think in terms of having a bright, young architect to work with clients at no charge in order to get better quality and more original habitat solutions. An intern at an advanced stage in an architecture degree, perhaps. Some housing is so old and decrepit it should be demolished – and we may well have pockets of essentially, slum enclaves. The house and its neighbour may be sitting on almost an acre of land, valuable far beyond the dwellings. Let's try to see this as a community asset so that better development will prevent urban sprawl. Let's consider water storage under communal driveways in the case of higher density and cluster housing. Let's also consider a communal garden for cluster housing. This could be managed under a body corporate structure. The benefit would be relatively large open space instead of a lot of hanky patch plots. People will have to co-operate for maintenance and this would be good for community. The water issue will not be solved by just one big bang solution. It will be a whole host of small things and the way to sell it will be how to save without reducing your lifestyle. The council for its part must not tolerate any more low-grade development. Paraparaumu is very workaday, and that is being polite. Waikanae infill is slowly wrecking its charm. If you want to have the "nature coast", then for God's sake protect and enhance it.

	Wise development also means looking at quality employment with higher incomes. The preponderance of industry based on household goods and hardware retail in our district is dangerous and leaves us economically vulnerable. There is an insanity of having a Bunnings at Paraparaumu next to Mitre 10 and 100m or so from a Placemakers. If one of these fails we will have an empty eyesore with little flexibility for alternative use and a rating shortfall from a bankrupt organisation. The very badly planned Coastlands is a ramshackle mess with quite a number of vacant shops. Given that we have widespread broadband internet available in Kapiti and the ability to video conference, we should be putting in a pitch to attract people who can telecommute – ie: people who can work remotely for much of the week. There will be many civil servants in this category as well as corporate business officials. The mayor should talk to Steven Joyce about this. We need to pepper pot the district with greater employment diversity and higher IQ and income people, to put it brutally. These people need not work from home, if it doesn't suit, but could be set up in empty office and shop space – and there is quite a lot of it around.
244	Top Priority ie 1. Consideration for families, communities and precious ecological sites which would be seriously affected by the building of a dam and flooding of land.
245	User pays charges to promote economic efficiency and to ration consumption of water.
246	I prefer water storage lakes, like "Te Marua in Upper Hutt", built in Waikanae at the turf farm built big enough to last 50 years of future demand.
247	I think a large water holding dam should be managed up the back of Waikanae in the Reikorangi land block which is near Ati Awi Camp. It is Maori owned land (namely Parata Whanau). There has been consultation in the past but no conclusion. This has to be a future consideration for our generations of families to come here and live in this beautiful place. I think this shouldn't be overlooked, if we start now. We would never have to worry ever again. What is more important? Cost or water? Remember this is our future.
248	Suggest a significant 'Koha' to Otaki Hapu will overcome 'sourcing problems' for a guaranteed lowest cost solution for future water supply for Kapiti. Will overcome mixing of rivers problem!!!!
249	The district has got to start taking advantage of water in times of plenty (winter) and use it in times of need. The current situation is unsustainable and illogical.
250	When we arrived here at beautiful (12 years ago) Waikanae Beach, I could find easily 3 Toheroas – I never took more than 3 and cooked fantastic soup; today you lucky if you can find any shellfish at all. The entrances clearly marked no cars, horses, etc allowed on beach. Please explain.
251	The use of water meters is the most powerful tool for conservation of water.
252	The quality of water supplied must be a vast improvement on that from the bore system, which is foul tasting and corrosive. KCDC must take responsibly for damage to HWC elements and appliances. The prevarication of the past in this matter must cease. Water meters are neither wanted nor needed and should be taken off the council's agenda.
253	If social and cultural is addressed first, the environment and quality are factored in naturally. Performance, implementation and economic are decisions for the voluntary group. Seek solutions from the Iwi and Tangata Whenua because they have them.
256	My main priority is for a quality water supply sufficient to cope at all times of the year.
257	Personal responsibility – meters, gutter supply tanks (incentives probably helpful). Mess up the environment and Waikanae will no longer be the appealing place it has always been.
258	I am in favour of a permanent solution such as building a dam-reservoir in the hills even if the upfront cost is higher.
259	Cultural?? Everyone is entitled to respect and equality. We are all a member of New Zealand's multi-cultural society and we pay our taxes, rates and rents for basic necessities of life such as WATER. Cultural values are important for things only related to culture for the individual/tribe. One culture should not have a hierarchy above others especially when there is not one person left in NZ with a pure Maori blood lineage – they are multi-cultural too as we all are. PS in case you are wondering family arrived in NZ in 1800s.
259	No water meters: whatever reassurance is given they invariably lead to some other body owning our water and selling it back to us at ever increasing rates.
260	For some of the 'values' above you have a very mixed bag of issues. It's hard to see what they have in common eg "social/cultural"
261	Continue using "our" experts who are prepared to work for overall good of district; everyone else step back from their platforms and work as a united team. Come on Kapiti we CAN get it right.

262	More self responsibility needed by water users. More law requiring retrofitting of tanks. More law regarding loss of water. More law regarding non use of potable water for toilets (ie retrofitting tanks for roof water to flush toilets.)
265	Just get on with the water, stop mucking around. Dam or holding ponds (Upper Hutt is a good example). We have lived here 16 yr and are starting to get fed up with all the time and money wasted.
266	A very good and informative meeting last evening.
267	Fluoride: get the poison out of my water! It's a chemical waste product.
269	Endeavour to supply water to established residences before new sales and make sure new buildings have water saving appliances of all kinds built in!
270	Bulk water storage (Dams) at both major rivers essential! Stream in Hills behind Mangokotukutuku as new supply. Ocean seawater take and distillation (by solar) needed for future supply. Continue ground water exploration. Stop water use for gardens and outside use (wasting treated water supply).
271	The Otaki River is a god given resource to all New Zealanders, is larger than the Hutt River which supplies all Wellington. There is no excuse to say the Kapiti Coast is short of water.
272	We have an OCD son who washes all the time. Can't pay extra for water, on benefit. I am allergic to chlorine and come out in a rash when showering after bore water is used or the river levels are low and you have to use extra chlorine. So any way to lessen the use of extra chlorine would benefit me. We get all our drinking water from the Petone Spring Bore and meet many from Kapiti doing the same. Petone spring water tastes beautiful. Kapiti water tastes like chlorine and mud – undrinkable; quality – safe tasty drinkable water is a must and it has to be keep FREE. NO WATER METERS.
273	Councils preferred option several years ago was for a borefield at the Otaki River mouth. This would satisfy all the above criteria except maybe the Iwi factor. If handled correctly I am sure this could be sorted. An open storage lake would be subject to contamination /natural disaster. Any dam in the hills would fill with gravel debris in time. The Otaki river has ten times the flow of the Waikanae and should be the primary source of water for the district. A borefield has been in use in Petone for many years and it operates without most people knowing it exists, ie minimal environmental impact.
275	All decisions about Paekakariki water supply should be made by Paekakariki ratepayers – ALL of them (not the board – not the Council) (and not just the few who can and do attend boring meetings).
276	Some type of storage Dam, tanks, etc.
277	An area can only sustain so many people, water is not unlimited. Population growth is a problem world wide.
278	Advantages of a DAM and possibly hydropower and a good road and recreational water facility ie fishing or boating in the Reikorangi, also four lane highway to the Hutt Valley. Waikanae – Paraparaumu would really benefit from this superior Idea! Our greenies could help and results to be proud of. Alternatively maybe the new proposed motorway would help ease demand by people moving North!
279	With this Council led by a drama Queen we will never solve the problem. Storage Lake is the only answer because there is enough rainfall but they let it run to sea.
280	The online version is quite different; only 1 ranking per value is possible. For this reason I am sending both versions since I found the online version impossible to answer clearly. We received this paper on Tues Feb 2; you wanted it back by Friday 5; this is a ridiculous timeframe.
281	Essential to have capacity for water Storage!
282	If a ratepayer has a new water tank they should get a one-off rate rebate of some kind – ratepayers encouraged to purchase affordable water tanks and reward them for doing so. 'We' might be able to avoid water meters if Council encourages affordable water tanks.
283	Suggest all new buildings or sub-divisions required to make a capital contribution to provision of services including water.
286	I am aware that the present water conforms to the Drinking Water standards, but the taste is unacceptable and it is much worse when the bore water is being used. This aspect needs attention asap. Concerning respect for Iwi values, they need water as much as we do, so what applies to us, applies to them.
287	NFN to be taken into account!! No implementation of water metres!! Consideration of "for the common good" of the community ie no one person or organisation to hold this "common good" to ransom!! No swimming pool!! Water supply for a complex like this!!
288	As a consultation document it sucks. The date for returning was 24 hours after receipt. The water quality currently is not the best but undrinkable when the bores are used. We buy in 24-30 litres of water pw for personal consumption.

289	Please build a Dam/Reservoir that will solve our water problems now and in the future. This should also be a recreational facility that we can all use – boating, fishing, swimming etc. Stop trying to fool us with false water usage figures.
290	Question? Economic comparison between Council providing more water and or water tanks and ratepayers required to do so (a big profit for suppliers installers). Surely providing water is a core Council service. Feel council is calling ratepayers to make do and mend but not itself, eg the expensive Aquatic Centre versus upgrading Raumati Pool. Strongly urge Paekakakariki against separate "we are all right we have our own water". We are and should be a community. Isolating would be very short-sighted. We could very quickly become the "Poor Relations".
292	Re-think the options of extra supply of water from the Otaki River.
293	This is a very poorly designed questionnaire. The question and meanings are often ambiguous ie social/cultural: In catchment solutions given priority. What are you really trying to convey?
294	The last submission I said we want water storage. NO water meters. As well as a pipeline from Otaki River perhaps now you can just get on with it. If all major projects were affordable we wouldn't have any.
295	Otaki River should be utilised. Enough of Iwi nonsense! All ratepayers should be treated equally with no preference for Iwi who have been and allowed to be an unnecessary expense. The bore water is a disaster. Look at what area the Hutt River supplies. The Otaki River is as large if not larger. The Aquatic Centre should never have been entertained before an adequate water supply.
296	Drinking Water Standards NZ cannot be absolute yardstick to measure water quality - rather a place to start from. Look at the bores - it might satisfy the DWNZ but is undrinkable to most residents. DWNZ is pathetic compared to some other countries. When are the technicals and politicians going to realise everything on this planet is finite (not limitless) - this includes water - do better with what we're presently using, growth must be sustainable and not a political tool.
297	All swimming pool property owners should have water metres and should pay for water use in excess of the volume regarded as a reasonable upper unit for a property in our district.
298	District is at least 30 years behind providing year-round storage for what is normally adequate rainfall over a year. This is fault of successive ratepayers as well as councils. My No 1 PRIORITY; STORAGE. Any other provisions are merely SUPPLEMENTARY.
299	Water meters probably lose water – simply for the rich.
302	In some Greek Islands drinking water is towed in large rubber containers (made in Southampton). These could be used in upper reaches of the Waikanae River, inserted in the river bank to act as a reservoirs during ample rainfall, and could be added to over years as population grows. This would avoid Otaki pipeline and inundation of areas by creating a dam.
304	Stop prevaricating make a decision and implement it.
305	Wanton wastage of water should be discouraged (metered?) but any public/private partnership, where profit becomes a priority, should not be considered – to writ the Auckland experience – ditto grey water. If development threatens to outstrip the water infrastructure, then it (development) should be managed to suit. i.e. reduced accordingly.
306	The obvious answer is a reservoir.
309	Water needs to have storage capacity. Our rivers flow into the sea. This Council was elected to fix Kapiti's water shortages. Just Do it. Endless consultations with the public are not helpful.
312	There has been too much money wasted on findings solutions and doing nothing we need to build dams.
315	Do not allow any more sub-divisions until a new supply is added.
317	Further storage of water is required to meet the demands of the growing population in the area. Rain is free – do something with it!!
318	It is essential to find ways of catching and retaining the rainfall which is more than adequate IF it is not wasted by running straight out of the Waikanae River into the sea.
320	Why are the Wellington Regional Council not responsible for water supply in their area?
321	Get on with it make decision and ACT PDQ. We have owned our house property at 115 Seaview Road for 30 YEARS AND THIS SUBJECT OF WATER SUPPLY HAS BEEN UNDER DISCUSSION ALL THAT TIME.
322	Too difficult to rank – have made comments or ticked most important aspects.

323	Those requiring to water sections over 1 acre, and do not have a bore – should be required to have a METER and therefore pay extra.
324	Support the use of water meters
325	Council must adopt a "no more growth/development policy" straining infrastructural resources. PRN is basically a residential/urban development. Ratepayer goodwill will be lost if these meetings result in savings and next year the goal posts are changed.
328	1st choice – Dam the Waikanae River
330	We need a dam or a reliable draw off from the Otaki River NOW not years away. The longer we wait the more it will cost.
331	Bore water tastes awful. My kettle had to be replaced. I endeavour to conserve water in the home and the garden.
332	Build a reservoir or dam for storage.
334	Why can't Paraparaumu and Raumati find their own water-supply and let Waikanae have its small river for itself. We first had a bach in 1956 and water was a problem then. It wasn't until the last Mayor got cracking with the bores that the Council did anything. Disgraceful.
335	Water Meters: If objectives can be met satisfactorily without meters, they need not be installed. But if security of supply and conservation thereof cannot be achieved at a reasonable cost by all means install them!
336	Maori opinions should not have any more degree of influence on decisions made than those of any other New Zealand citizens and who are rate payers of this District.
337	There needs to be a focus on minimising use of water as first step. Research is required into how much we could reduce our consumption and avoid costs and environmental impacts of additional supply development. There is a need for the economic value of water to users to be clean through metering and charging after the 450L allocation is used.
339	Am not certain whether you were asking for the above 6 items to be ranked 1-6 (which I have done), or if each of the items could be graded 1-6 i.e. more than one 'value' with the same ranking, in which case they would be 2,5,1,3,2,2.
340	Two standards of treatment acceptable if dual supply system available (new users only?) Domestic water is wasted through heating systems being located away from points of supply. A gas infinity heater requires wasteful volumes of water flow to activate the system.
341	Protection and maintenance of existing waterways eg stream in our garden – ideally a partnership with land owners and a shared responsibility.
343	It is critical that every new home has a big water tank, to supply their own water from rain.
344	Pipe water from Otaki River which then means you can supply the growing communities between Waikanae and Otaki. Or build storage ponds at Waikanae. We don't have a water supply problem for 10mths of the year. We just need to store it for the 2 months it's required.
345	A Dam up the Reikorangi Valley would solve all supply problems and create a recreational area for all.
346	Dam storage at both major rivers essential! Pylon track (Campbells Maungakotutuku) stream supply. Sea harvest distillation by solar osmosis investigation.
347	We DO NOT want metered water supply We DO NOT want our water privatised. There should be no more subdivisions until (particularly the water) the infrastructure is in place. We have just returned from holiday sorry this is late.
348	Don't allow this issue to become a political football as council allowed (and exacerbated by Council) the roading issue.
349	Prefer the idea of storage solution dams.
352	Drinking quality water is not required for gardens and industrial use.
353	All above issues are of equal importance to me.
354	Plentiful supply of free drinking water at good pressure that exceeds health standards.
355	Can Otaki have water from its river? I've been told it comes from bores at present.
356	No to water metering.

357	Do not use water metering. It is just another way of adding unjust cost to people who cannot afford it.
358	Stop mucking around with stopgap measures and get a decent water supply – demand will grow. Borrow some money.
359	First and most important that all approvals for all future developments insist that the actual costs associated with water (supply, storm water, sewage disposal) are borne by the actual developer. That the district has adequate water supply to meet the 400 litres per person per day requirement.
360	During the "summer water restrictions", you sometimes switch us onto 'BORE WATER' however, it tastes unsavoury (or unpleasant, should I say). Some reckon it tastes like toxic (or nasty) CHEMICALS! DON'T SHORTEN LIVES, OR HARM PEOPLE'S LIVERS, thanks!!
361	In past years local businessmen have offered to supply storage at no initial cost. Why? Was this not done? Waikanae should have meters!
362	Remove all (even minute) amounts of Sodium-monofluro-silicate from all town water! That substance is more toxic than lead and almost as toxic as ARSENIC! KEEP THIS IN MIND! It's POISON! Don't shorten people's lives and damage people's livers!
363	I would like to see a reservoir built in the hills behind Waikanae toward the Tararua Range where there is the likelihood of rain most of the year! It is probably a very costly exercise but it will be a more permanent source of water than all the other schemes so far. I hate the taste of the bore water added to the Waikanae river. As the size of the district is growing fast it's time something was done to improve our water supply.
364	This form is very difficult to follow and fill in Some general comments Water storage will be needed in some areas Water tankers taking Otaki's water is of concern – needs to be metered and monitored Ideal would be for each area to be self sufficient for water needs.
365	I believe the only solution for Waikanae and Paraparaumu is to have an adequate storage dam somewhere upstream on the Waikanae River system. Pipeline from Otaki out of the question as it would be drawing off water when the levels are low (A storage answer would collect water at the time when there is plenty).
366	As we must have clean, safe drinkable water. The cost needs to be affordable, but quality of water takes priority. Plans to provide above water must be agreed and put in place as soon as possible. Collecting rainwater off every roof on Kapiti Coast is a must.
367	A dam full of water exists on the Roaring Meg-Otaki Forks. A road was constructed into this dam some years ago. The builder, the late Charlie Arcus obtained resource consent so no consent required. I understand the land was sold after Mr Arcus' death. In my opinion this constant supply of fresh water could be piped to holding ponds somewhere in the Te Horo area, and held in reserve.
368	Kapiti has had more than its share of less than ideal outcomes for major developments ie sewerage and bore water. We should be looking for a risk free solution for water this time. Dams in New Zealand carry a high risk for not being completed at the estimated cost and for leaks or destabilising surrounding ground. Therefore the supplementary supply of water for Waikanae, Paraparaumu and Raumati should come from the Otaki River system. Population growth in Kapiti will more than likely take care of the benefits of conservation and immediate action should be taken to reticulate water to as many of the 2400 households which are not on community supply in Kapiti at present.

369	Many thanks for your letter of 30 November. Unfortunately I will not be able to attend the scheduled meetings and while I appreciate the council now appears to be moving on this most important subject there are 2 questions that I would like a response to. After so many years of consultations, review after review, and constant expenditure – when is the council going to stop the procrastination and get on with actually fixing the problem before a major drought catches up with us? With all previous reviews and consultant's reports suggesting that a dam is not practicable for one reason or another, why has the Council not built a storage Lake? Having put up with unsatisfactory bore water for years prior to the public supply; the obvious solution is a storage lake. If developers can meet council requirements to build lakes within a short period why can't this council build a storage lake of suitable size as close as possible to the existing treatment plant. This would enable water to be diverted from the Waikanae river during times of high flows and return it through the treatment plant back to the ratepayers during times of drought. I look forward to your return email addressing the above questions.
370	I was somewhat incensed to find the values paper requesting feedback in our local paper. This level of decision is what we elect our Council to do – not shilly shally around consulting in areas in which you will never get agreement. The exercise only adds to the confusion and cost. The most urgent issue is to address the storage of water from the Waikanae river – so that we have some, without it all going out to sea in times of plenty. To focus on metering and rationing without increasing supply is to divide an inadequate resource amongst an ever increasing number of people.
371	Bores are not a good idea – we really do not know where the water comes from or know how long it will last.
372	Otaki is the main source of future water supply. Water meters are out of the question. A weir or dam and storage of water will be needed. Do not use greywater. There is a risk of heavy metals and other poisons going into the soil. Rainwater collection and storage is a good idea.
375	Glad to see section (overleaf) on conserving water. Another Advisory Group for conservation. Incl. a school teacher, Rotarian, Chamber of Commerce, Te Whakaminenga, Sports Club rep, Elders Council, Grey Power, farmer, Community Boards.
376	Combine with WRC, connect Otaki Water to Wellington system giving a reliable supply to Levin, Kapiti, Wellington and Hutt Valley.
377	There are people on the Coast who have heard spurious arguments against a dam behind Waikanae. People believe this is the logical place for water storage for the region. Whenever council(s) are challenged on the subject, smokescreens of one liners are used against further factual consideration. Somewhere at some time the region will have to bite the bullet. Procrastination is not the answer neither are costly and time wasting consultations.
378	No water meters please. Put in a holding pond back up Reikorangi way. Thanks
379	This form is very ambiguous and trying to rank the values is crazy. They are all very important. Comment. Look to the water source that gives you the quickest and best supply – named the Otaki River. Do the job properly this time.
380	Use Otaki River
381	All issues are of high importance to me.

382	Why is our water pouring from the Tararuas into the sea. A dam could be the answer. Also Otaki Forks The bore water from the Ngarara Road drill is disgusting not to mention electric jugs rotting, hot water cylinder needing replacement. This has happened to many people in Waikanae (elderly) who are encouraged to stay in their own homes.
383	My preference is for the Waikanae river to be dammed in the Reikorangi area to whatever the chosen advisory water group believe is necessary. I can imagine the dismay of people where land would be included. I believe that among them are people well able to protest (convincingly?) I am grateful that a person of the calibre of Mayor Jenny Rowan leads KCDC. (my writing exasperates me – it is not always as out of control as this!)

Appendix 6

Characteristics of a Good Option
Selection Criteria

Appendix 6: Characteristics of Good Option Selection Criteria

One of the key aims of the multi-criteria analysis process is to involve a range of stakeholders in the evaluation of options. To achieve this, the criteria against which options are assessed by should meet certain characteristics. These are defined as follows:

- Unambiguous, meaning that a clear and accurate relationship exists between the criteria and the real consequences.
- Comprehensive but concise, meaning that they cover the range of relevant consequences but the evaluation framework remains systematic and manageable and there are no redundancies.
- Direct and ends-oriented, meaning they report directly on the consequences of interest and provide enough information that informed value judgments can reasonably be made on the basis of them.
- Measurable and consistently applied to allow consistent comparisons across alternatives. This means the criteria should be able to distinguish the relative degree of impact across alternatives. It does not exclude qualitative characterisations of impact, or impacts that cannot be physically measured in the field.
- Understandable, in that consequences and trade-offs can be understood and communicated by everyone involved.
- Practical, meaning that information can practically be obtained to assess them (i.e. data, models or expert judgment exist or can be readily developed).
- Sensitive to the alternatives under consideration, so that they provide information that is useful in comparing alternatives.

Each criteria has been evaluated on the following basis:

✓	Proposed Criteria meets the characteristic
O	Proposed Criteria is neutral or may not meet the characteristic
X	Proposed Criteria does not meet the characteristic

Each criterion must achieve at least five ✓ and no more than one *X*.

		Unambiguous	Comprehensive but concise	Direct and ends-oriented	Measurable	Understandable	Practical	Sensitive to the alternatives
1	Water Quality							
1.1	Public health: Risk associated with not meeting the Drinking-water Standards for NZ (DWSNZ).	✓	✓	O	✓	✓	✓	O
1.2	Taste, Odour and Aesthetics: Risks associated with water not being acceptable to most consumers.	✓	✓	✓	✓	✓	✓	✓
1.3	Hardness: Level of hardness in water supply.	✓	✓	✓	✓	✓	✓	✓
2	Social							
2.1	Impact on landowners/ affected parties/ water users during construction	✓	✓	✓	O	✓	✓	✓
2.2	Impact on landowners/ affected parties/ water users for ongoing operation	✓	✓	✓	O	✓	✓	✓
2.3	Social impact of catastrophic failure	✓	✓	✓	O	✓	✓	✓
2.4	Has other social benefits (e.g. recreation)	✓	O	✓	O	✓	✓	✓
3	Cultural							
3.1	In catchment solutions given priority for WPR supply	✓	✓	✓	✓	✓	✓	✓
3.2	Water conservation - supports the importance of water conservation and responsible water use by not giving an impression of limitless water being available	✓	✓	✓	O	✓	O	✓
3.3	Identity - respects the value of water/ rivers/ places in defining identity	O	O	✓	✓	✓	✓	✓
4	Environmental							
4.1	Impact on in-stream ecology	✓	✓	✓	✓	✓	✓	✓
4.2	Impact on vegetation/ terrestrial ecology	✓	✓	✓	✓	✓	✓	✓
4.3	Impact on groundwater	✓	✓	✓	✓	✓	✓	✓
4.4	Impact on natural and/or urban landscape	✓	✓	✓	O	✓	✓	✓
4.5	Impact on future use of land	O	✓	✓	✓	✓	✓	✓
5	Performance							
5.1	Ability to make best use of existing infrastructure	✓	✓	✓	✓	✓	✓	✓
5.2	Ability to be staged over time	✓	✓	✓	✓	✓	✓	✓
5.3	Ability to expand for additional supply if needed	✓	✓	✓	✓	✓	✓	✓
5.4	Security of supply over time	✓	✓	✓	✓	✓	✓	✓
6	Implementation							
6.1	Difficulty in obtaining resource consents	✓	✓	✓	O	✓	✓	✓
6.2	Difficulty in acquiring land and/or access	✓	✓	✓	✓	✓	✓	✓
6.3	Level of uncertainty in water resource and design/ technology	✓	✓	✓	O	✓	✓	✓
7	Economic							
7.1	Cost to Construct	✓	✓	✓	✓	✓	✓	✓
7.2	Operational Costs	✓	✓	✓	✓	✓	✓	✓
7.3	Impact on opportunity cost of other potential water users	O	O	✓	✓	✓	✓	✓

Appendix 7

MCA Evaluation Workshop

Attendee List

Appendix 7 - Multi-Criteria Evaluation Analysis Workshop

Held at the offices of CH2M Beca, 85 Molesworth Street on Tuesday, 9 February 2010 commencing at 9am.

Name	Company
Phillip Stroud	Kapiti Coast District Council
Sean Mallon	Kapiti Coast District Council
Travis Wood	Kapiti Coast District Council
David Bassett	Kapiti Coast District Council
Andrew Watson	CH2M Beca
Greg Pollock	CH2M Beca
Nicky Egyed	CH2M Beca
Lesley Hopkins	CH2M Beca
Nathan Baker	CH2M Beca
Doug Stirrat	CH2M Beca
Kirsten Mandeno	CH2M Beca
Julie Meade Rose	Social & Environmental Ltd
Astrid van Meeuwen-Dijkgraaf	Wildland Consultants Ltd
Charlotte Cudby	Nimmo Bell & Company Ltd
Brian Bell	Nimmo Bell & Company Ltd
Stephen McInerney	DamWatch Services Ltd

Appendix 8

Water Forum Invitees & Attendees

Appendix 8 - Water Forum Invitees and Attendees

Held at the Paraparaumu Community Centre on 17th February 2010 commencing at 6.30pm.

Invited Stakeholder Group	Attendance
Kapiti Coast Mayor	1
Kapiti Coast Councillors	3
Kapiti Coast District Council Management	
Community Board – Paekakariki	
Community Board – Paraparaumu/Raumati	1
Community Board – Waikanae	
Community Board – Otaki	
Council of Elders	
Technical Advisory Group (TAG)	3
Greater Wellington Regional Council	1
Department of Conservation	1
Regional Public Health	1
Water New Zealand	
Kapiti Chamber of Commerce	
Kapiti Environmental Action	
Iwi (Ngāti Raukawa, Āti Awa ki Whakarongotai, Ngāti Toa Rangatira)	2
Forest and Bird Incorporated – Main	
Forest and Bird Incorporated - Kapiti-Mana Branch	1
Raumati South Residents' Association	
Fish and Game New Zealand	
Otaki Recreational Fishing	
Kapiti Club Fishing Section	
Kapiti Fly Fishing	
Raumati Fishing Club	
Friends of Wharemauku Stream	
Waitohu Stream Care Group	2
Waikanae Estuary Care Group	
Friends of Queen Elizabeth Park	
Te Horo Beach Water Working Party	
Mangaone Stream Care	
Whareroa Guardians	
Friends of Waikanae River	1
Friends of Otaki River	4
Waikanae Estuary Guardians	
Keep Otaki Beautiful	3
Kapiti Coast Grey Power Association Inc	
Kapiti Water Action Group	3
Federated Farmers	
Probus Club of Kapiti Coast	
Probus Club of Raumati	
Probus Club of Waikanae	

Appendix 9

Survey Form

Appendix 9 - Survey Form

What is important to you? Have your say

Stakeholders feedback to date has identified a number of values that are important to local residents when considering water supply options. These are listed below and we want your opinion on which of these values are most important to you. We want you to rank these values from 1 - most important - to 6 - least important. If you feel there are values not listed here which are important to you, please add them below and rank them accordingly.

Value	Type of issue	Your ranking?
Quality of Water Supplied to Consumer	Ability to meet Drinking Water Standards for New Zealand. Acceptable taste to most consumers. Level of hardness in water supply (impact on appliances).	
Social / Cultural	In catchment solutions given priority. Respect for iwi values / Treaty of Waitangi / tino rangatiratanga. Ability to meet community growth management aspirations.	
Performance / Technical	Ability to use existing infrastructure. Ability to expand and be flexible for additional supply if needed. Reliability and security of supply over time.	
Environmental	Low overall environmental impact – ecological, rivers, groundwater, vegetation, natural amenity, visual impact.	
Economic	Affordable Construction Cost. Affordable Operational Cost. Cost of water.	
Implementation / Ability for action	Ability to obtain approvals. Ability to action in timely manner.	
Other:		
Other:		
Other:		

Please fill out this form and send it back by **5th February.**

Send to:
Kāpiti Coast District Council
175 Rimu Rd
Private Bag 60 601
Paraparaumu, 5254

Alternatively you can fill the form in online at:
www.kapiticoast.govt.nz

Or email your comments to:
preciouswater@kapiticoast.govt.nz

Your Contact Details

Name: _____

Address: _____

_____

_____

_____

Phone: _____

Do you have any other comments on selection criteria for water supply solutions?

_____

_____

_____

_____

_____

www.kapiticoast.govt.nz

KĀPITI COAST DISTRICT COUNCIL
me huri whakamuri, ka titiro whakamua

Appendix 10

Scenario Options

Scenario 1: Community Values Survey and Consultation

This scenario is derived from the results of the community values survey. Over 380 responses were received, in which people were asked to rank the values from greatest to least importance. Combined with the results from other consultation, this provides a picture of the community values that should be considered when evaluating options.

The weightings of the criteria have been determined based on the feedback and issues raised at the consultation meetings held in December 2009 and January/February 2010.

The weightings are as follows:

Value		Value Weighting	Criteria	Criteria	Criteria Weighting
1	Quality of Water Supplied to Consumer	34%	1	Public health: Risk associated with not meeting Drinking-water Standards for NZ	30%
			2	Taste, Odour and Aesthetics: Risks associated with water not being acceptable to most consumers	50%
			3	Hardness: Level of hardness in water supply	20%
2	Social	3%	1	Impact on landowners/ affected parties/ water users during construction	35%
			2	Impact on landowners/ affected parties/ water users for ongoing operation	35%
			3	Social impact of catastrophic failure	20%
			4	Has other social benefits (eg. recreation)	10%
3	Cultural	3%	1	In catchment solutions given priority for WPR supply	35%
			2	Water conservation - supports the importance of water conservation and responsible water use by not giving an impression of limitless water being available	50%
			3	Identity - respects the value of water/ rivers/ places in defining identity	15%
4	Environmental	14%	1	Impact on in-stream ecology	35%
			2	Impact on vegetation/ terrestrial ecology	10%
			3	Impact on groundwater	35%
			4	Impact on natural and/or urban landscape	10%
			5	Impact on future use of land	10%
5	Performance	22%	1	Ability to make best use of existing infrastructure	15%
			2	Ability to be staged over time	15%
			3	Ability to expand for additional supply if needed	30%
			4	Security of supply over time	40%
6	Implementation	9%	1	Difficulty in obtaining resource consents	40%
			2	Difficulty in acquiring land and/or access	30%
			3	Level of uncertainty in water resource and design/ technology	30%
7	Economic	15%	1	Cost to construct	40%
			2	Operational cost	30%
			3	Impact on opportunity cost of other potential water users	30%

The top ten ranked options arising from this scenario are as follows:

Rank	Option	Option Type	Option Number
1	Otaki Wellfield and Pipeline	Run-of-River	4
2	Otaki River Gorge Transfer	Run-of-River	3
3	Otaki River Gorge	Run-of-River	2
4	Kapiti District Integrated Water Supply	District Wide	39
5	Waikanae Borefield and storage	Other	38
6	Lower Maungakotukutuku Dam	Dam	18
7	Kapiti District Integrated Water Supply (Otaki Gorge)	District Wide	40
8	Aquifer Storage & Recovery	Groundwater	27
9	Ngatiawa Dam	Dam	13
10	GWRC Whakatikei Dam	Dam	20

Scenario 2: Water Forum #1

A water forum was held on 17th February 2010 with stakeholder groups. The attendance at the workshop was recorded, and while 80 invitations were sent, turn-out was relatively low. An exercise was undertaken at the water forum to gain stakeholders input to the value weighting, and the results are presented below. The weighting of criteria is even within each value.

The weightings are as follows:

Value		Value Weighting	Criteria	Criteria	Criteria Weighting
1	Quality of Water Supplied to Consumer	19%	1	Public health: Risk associated with not meeting Drinking-water Standards for NZ	33%
			2	Taste, Odour and Aesthetics: Risks associated with water not being acceptable to most consumers	33%
			3	Hardness: Level of hardness in water supply	33%
2	Social	7%	1	Impact on landowners/ affected parties/ water users during construction	25%
			2	Impact on landowners/ affected parties/ water users for ongoing operation	25%
			3	Social impact of catastrophic failure	25%
			4	Has other social benefits (eg. recreation)	25%
3	Cultural	16%	1	In catchment solutions given priority for WPR supply	33%
			2	Water conservation - supports the importance of water conservation and responsible water use by not giving an impression of limitless water being available	33%
			3	Identity - respects the value of water/ rivers/ places in defining identity	33%
4	Environmental	29%	1	Impact on in-stream ecology	20%
			2	Impact on vegetation/ terrestrial ecology	20%
			3	Impact on groundwater	20%
			4	Impact on natural and/or urban landscape	20%
			5	Impact on future use of land	20%
5	Performance	12%	1	Ability to make best use of existing infrastructure	25%
			2	Ability to be staged over time	25%
			3	Ability to expand for additional supply if needed	25%
			4	Security of supply over time	25%
6	Implementation	5%	1	Difficulty in obtaining resource consents	33%
			2	Difficulty in acquiring land and/or access	33%
			3	Level of uncertainty in water resource and design/ technology	33%
7	Economic	12%	1	Cost to construct	33%
			2	Operational cost	33%
			3	Impact on opportunity cost of other potential water users	33%

Rank	Option	Option Type	Option Number
1	Extended Waikanae Borefield	Groundwater	23
2	Aquifer Storage & Recovery	Groundwater	27
3	Deep Groundwater	Groundwater	26
4	Groundwater River Recharge	River Recharge	29
5	Waikanae Borefield and storage	Other	38
6	Kapakapanui Dam	Dam	12
7	Otaki Wellfield and Pipeline	Run-of-River	4
8	Waikanae WTP Dam	Dam	11
9	Storage Ponds - East	Storage Ponds	22
10	Kapiti District Integrated Water Supply	District Wide	39