

Application for Resource Consent to the Nelson City Council

Under Section 88 of the Resource Management Act 1991

APPLICANT:	Nelson City Council
LOCATION:	Maitai Dam and the Maitai River environment, Maitai Valley Road
THE PROPOSED ACTIVITY:	To operate the Maitai Water Supply Scheme. <i>(A detailed description of the activity is contained within the Assessment of Environmental Effects provided in support of this application).</i>
CONSENTS SOUGHT	Land Use Consents (35 years sought) Water Permits (35 years sought) Discharge Consents (35 years sought) <i>(NB Full descriptions of the consents sought are provided in Sections 1.1, 2.5 and 3.0)</i>
ASSESSMENT OF EFFECTS	Attached is an assessment of the environmental effects that the proposed activity may have on the environment in accordance with Sections 88 and the Fourth Schedule of the Resource Management Act 1991. Consideration has been given to the Nelson Resource Management Plan.

Signed for and on behalf of *Nelson City Council* 17 June 2016.



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Attachments

A	Graphics Bundle	Nelson City Council	June 2016
B	Land Titles Map and Certificates of Title	Landlink Agency Ltd	
C1	Engineering Plans and Elevations – Maitai Dam – North Branch Dam	Tonkin & Taylor	June 1998
C2	Engineering Plans and Elevations – South Branch Weir	Tonkin & Taylor	March 1986 & August 2005
D	Maitai Pipeline Service Points (Scour discharge points)	Nelson City Council	June 2016
E	2014 Valuation of Major Assets	Opus International Consultants Ltd	2014
F	Water Abstraction and River Flow Graphs	Nelson City Council	June 2016
G	Water Use and Loss Report	CGW Limited	4/11/2014
H	Life Expectancy and Durability Assessment	CGW Limited	19/12/2014
I	Maitai River Municipal Supply Aquatic Ecology – Summary of Environmental Effects – Updated Report (Report 2810)	Cawthron Institute	June 2016
J	Managing Potential Water Temperature Effects of Discharges from the Maitai Reservoir (Report 2732)	Cawthron Institute	July 2015
K	Feasibility Assessment for Destratification Mixing and Hypolimnetic Aeration in the Maitai Reservoir (Report 2720)	Cawthron Institute	Sept. 2015
L	Fish Passage Assessment of the Maitai River North Branch Dam and South Branch Weir (Report 2601)	Cawthron Institute	Sept. 2014
M	Maitai South Branch Weir Fish Passage Remediation Efficacy Monitoring (Report 2730)	Cawthron Institute	June 2015
N	Influence of changes of Maitai Dam operations on water quality in the Maitai River and Reservoir (Letter ID: 1620)	Cawthron Institute	2 June 2016
O	Cultural Impact Assessment Report	Chetham Consulting Ltd	April 2016
P	NCC Roding and Maitai Rivers User Survey 2015	Rob Greenaway & Associates Ltd	3 June 2015
Q1	Maitai Dam 2013 Comprehensive Safety Review	Damwatch Engineering Limited	26 June 2014
Q2	Maitai Dam – Intermediate Dam Safety Review	Tonkin & Taylor	May 2015
Q3	Maitai Dam – Intermediate Safety Inspection	Tonkin & Taylor	Oct 2014
R	Current Consents & Conditions		

Glossary

Aeration	The addition of atmospheric air to a waterbody, often for the purpose of increasing the dissolved oxygen content of the waterbody
Anoxic	Water that is devoid of dissolved oxygen
Backfeed	Water that is taken from the Maitai Reservoir and piped to a discharge point at the South Branch weir
Compensation Water	Water supplied via the backfeed pipe to compensate for that water extracted at the South Branch intake weir. This will be equal to or greater than the abstraction at this site.
Cone Discharge Control Valve (CDCV)	An automated valve that is designed to release large volumes of water, in as short a time as possible, from dams. As it releases water from the base of the Reservoir, it is a scour valve and the discharge of water from the CDCV is a release of scour water.
Destratification	The act of mixing a waterbody that is stratified to allow complete mixing of the waterbody. This is usually done to allow the waterbody to aerate by enabling deep waters to aerate at the surface of the waterbody.
Diadromous	Fish that spend portions of their life cycles partially in fresh water and partially in salt water. As a result these fish often require the ability to migrate to complete their lifecycle.
Enhancement Water	Water supplied from the upper levels of the Maitai Reservoir over and above the South Branch abstraction rate, to maintain those minimum flows specified within the consent.
Epilimnium	The top-most layer in a thermally stratified lake, occurring above the deeper hypolimnion. It is warmer and typically has a higher pH and higher dissolved oxygen concentration than the hypolimnion.
Flushing Flow	Flows of sufficient magnitude that they mobilise fine sediment layers on the river bed and often scour attached periphyton from large cobbles and boulders.
Hypolimnium	The lower layer of water in a stratified lake, typically cooler than the water above and relatively stagnant.
Macroinvertebrate	The invertebrate community living on the bottom of the waterbody (river or lake) that are large enough to be retained in sampling apparatus, usually with a sample mesh-size of 0.5 mm.
Macrophyte	Aquatic plants that grow on the bottom of waterbodies, typically attached to the bed with rooted or rhizomes, and large enough to be seen by visual assessment.
MALF	Mean annual low flow, typically expressed as the lowest flows per annum over a seven-day measurement interval (7-d MALF)
Mixing Box	A tank where water from different sources (i.e. Reservoir and South Branch) are combined. The tank has a free-to-air surface.

Mixing Box Overflow	Since mixing box valves need to be closed slowly to avoid damage to pipework, inflow to the mixing box may exceed outflow for a short period of time, resulting in water overflowing the mixing box to the North Branch channel.
Oxic	Containing oxygen; with oxygen; oxygenated
Periphyton	The microbial community growing on the river-bed, typically comprised of algae, bacteria, and fungi.
Phytoplankton	Microalgae and bacteria that grow suspended in the water column of lakes and large slow-moving rivers
Scour / Scour valve	Any device that removes water from the bottom of a pipe or tank. Controlled by a valve that is normally manually operated but may be capable of automatic operation.
Stratification	The presence of a density gradient (usually associated with temperature) over depth in the water column that acts to prevent mixing between depth layers (see Thermocline)
Surge chamber / tower	Safety device to protect the pipeline from excess pressure and may vent from time-to-time, as flows change due to changes in demand at the treatment plant.
Thermocline	Thermocline (sometimes “metalimnion” in lakes) is a thin but distinct layer in a large body of fluid (e.g. water, such as an ocean or lake, or air, such as an atmosphere) in which temperature changes more rapidly with depth than it does in the layers above or below.
Trace Metals	The occurrence of (and often its associated concentration) heavy metal elements that are rare in the environment (e.g., copper, iron, cadmium, zinc) in the waterbody or associated bed sediments
Surplus Water	Water that is surplus to requirements that is released from the upper levels of the Maitai Reservoir to increase flows in the river above those minimum values specified within a consent. May be discharged to the South Branch via the backfeed pipe and/or discharged from the base of the dam into the North Branch channel.
Zooplankton	Small animals that grow suspended in the water column of lakes and slow moving rivers typically comprised of small crustaceans, amphipods and rotifers.

1. Introduction

1.1. Maitai / Mahitahi Terminology

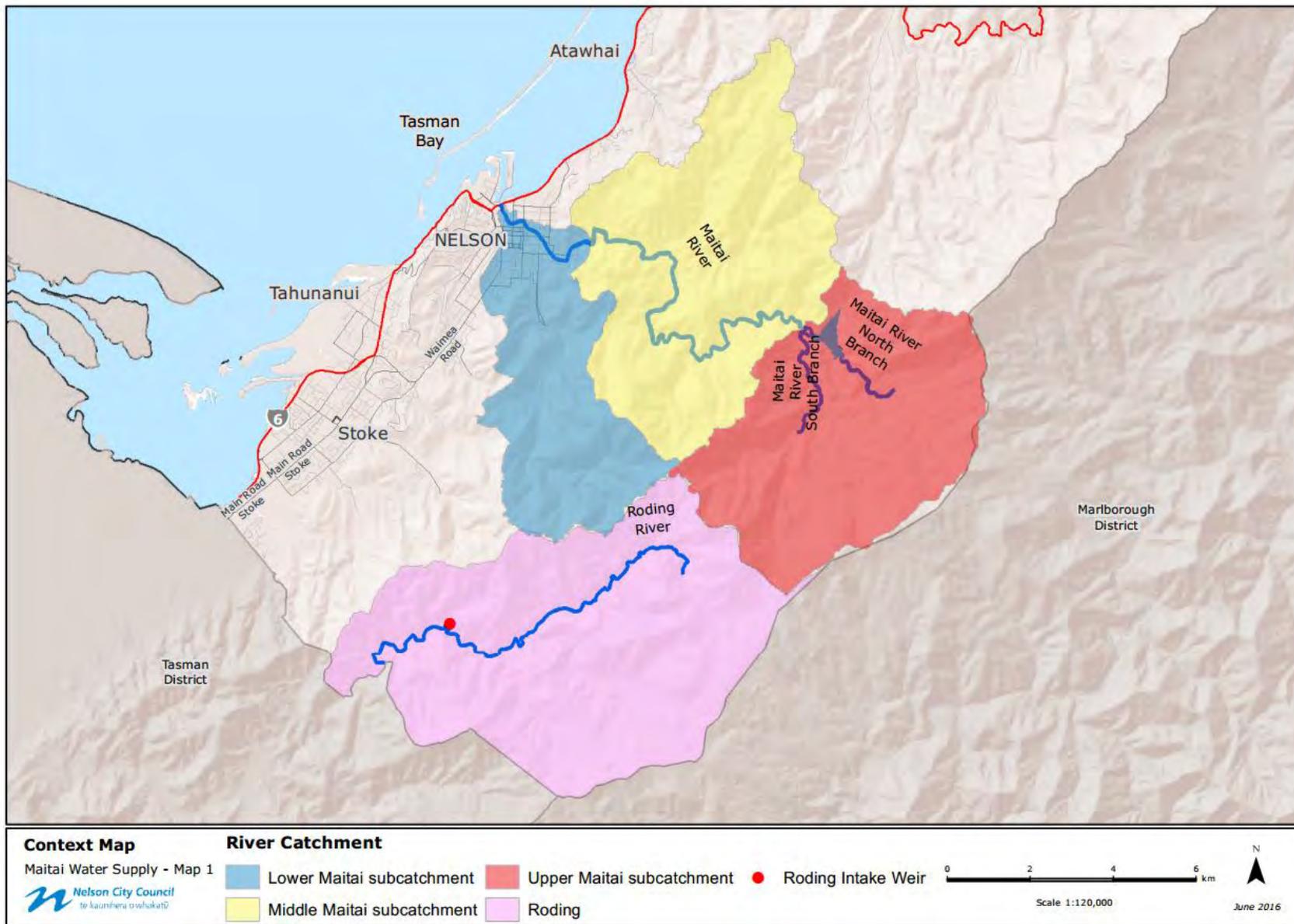
- 1.1.1. The official gazetted name of the waterbody at the centre of this application is the “Maitai River”. However, in consultation with local Iwi (Ngati Kuia) it is evident that that name does not have a meaning in Te Reo, and one of the original names for the river was “Mahitahi”. The Cultural Impact Assessment Report (Attachment O) states in relation to the name Mahitahi:

There are two naming traditions identified in the Statutory Acknowledgements in relation to the Mahitahi River, one describes “Mahitahi” as an old name for whitebait (inanga) which was once found in abundance in the river. While referring to this resource it also evokes working together in unison just as the whitebait appear to follow the same path. Another naming tradition is that “Mahitahi” also relates to tūpuna working as ‘one’ with the pakohe to produce tools. Mahitahi also means ‘hard’, or ‘excellent’ in Maori. The waters of the Mahitahi were considered to have spiritual and healing properties because of their connection to Maungatapu. (CIA, p13)

- 1.1.2. Despite “Mahitahi” having no formal status it is recognised that it holds a greater cultural significance than “Maitai”. But nevertheless, the name “Maitai” is the common parlance with the vast majority of residents within the Nelson area.
- 1.1.3. For this reason the common name “Maitai” is generally used throughout this application, but the most likely original name is recognised and acknowledged for its significance.

1.2. Location and Maps

- 1.2.1. A set of maps is provided in **Attachment A** which provides spatial information at a range of scales to orientate readers as to the locations and features of the site and application. The structures, water take and discharge locations, monitoring sites and other features that are shown in these maps are referred to regularly throughout this application. The following maps are provided:
- **Map 1** provides an overview of the Maitai and Roding catchments, including their location in relation to each other and in relation to Nelson City. The map also shows the lower, mid and upper Maitai catchments as the terminology is used in the Nelson Resource Management Plan and in this application;
 - **Map 2** provides a view of the mid and upper Maitai catchment as it relates to the designation (DN3) and key infrastructure. The topographic setting is also shown;
 - **Map 3** provides an aerial view of the Maitai Dam and Reservoir, and the South Branch Intake along with photo insets;
 - **Map 4** also focusses on the Maitai Dam, Reservoir and South Branch and shows the location of key infrastructure, water take and discharge locations, and monitoring points; and
 - **Map 5** shows the current water classifications for the various reaches within the Maitai catchment.
- 1.2.2. An excerpt of Map 1 is provided below which shows the location of the Maitai River catchment. The coloured zones identify the lower, middle and upper Maitai.



1.3. Overview of the Proposal

- 1.3.1. The Nelson City Council has taken water from the headwaters of the Maitai River since 1961. The scheme was significantly further developed in 1985-1987 with the construction of the Maitai Reservoir and then in 1986 with a new intake on the South Branch Weir. Combined with the wider water supply infrastructure, such as the Water Treatment Plant and supply pipelines, this infrastructure provides good quality and reliable water that is essential for community and environmental well-being. These community assets have a 2014 valuation in excess of \$246,000,000.
- 1.3.2. The current integrated package of resource consents that authorise the Nelson Water Supply Scheme on the Maitai River will expire on 1 February 2017.
- 1.3.3. This application for resource consent seeks to again formalise the existing Maitai Water Supply Scheme. Pursuant to Section 124, the Council (as consent holder) can continue to operate this scheme and serve the needs of the community as this application is made at least 6 months prior to the expiry of these consents (i.e. before 1 August 2016).
- 1.3.4. Since May 2004 the Nelson Resource Management Plan has contained rules that regulate the activities of taking, diverting, damming and discharge of water. These rules are contained within the *Freshwater Plan*. It is under this planning framework that this application for new consents has been prepared and assessed.
- 1.3.5. The Freshwater Plan provides for, as a permitted activity under Rule FWr.4, the Council to maintain and replace any authorised structures. Along with the Maitai Dam and surrounding areas being covered by a designation (DN3 – water supply purposes and works), a significant component of the water supply infrastructure in question does not require resource consent approval. In terms of land uses however, FWr.6 requires resource consent for dams (including weirs). Hence, as existing-use rights do not cover regional rules, a new land use consent is sought for the Maitai Dam and South Branch Weir structures.
- 1.3.6. Along with the land use consent, resource consent is also sought to again formalise the existing water takes from the Maitai Reservoir and from the South Branch. The activities of water takes (and diversions) are regulated under Rule FWr.14.
- 1.3.7. Finally, this application also seeks to again formalise the resource consent to discharge compensation water to the South Branch via the backfeed from the reservoir, as well as discharge flow enhancement water, scour water and mixing box overflow water. The backfeed discharge compensates for the water taken from the South Branch for water supply purposes. This activity of discharge is required pursuant to FWr.20 of the NRMP.
- 1.3.8. In summary, the resource consents sought are:
 - Land Use consents for:
 - The existing dam on the North Branch of the Maitai River; and
 - The existing weir on the South Branch of the Maitai River.
 - Water Permits to:
 - Dam the flow of the North Branch of the Maitai River;
 - Divert the flow of the North Branch of

the Maitai River over the dam spillways and to the South Branch via the backfeed;

- Dam the flow of the South Branch of the Maitai River;
- Divert the flow of the South Branch of the Maitai River over the weir;
- Take up to the full flow of the North Branch of the Maitai River; and
- Take up to 400 litres per second from the South Branch of the Maitai River.

Discharge permits to:

- Discharge up to 400 litres per second of water from the North Branch Reservoir to the South Branch via the backfeed;
- Discharge scour water, mixing box overflow, and enhancement water to the historic North Branch channel below the dam whereafter it flows into the Maitai River at the Forks;
- Discharge overflow water from the Reservoir to the Maitai River via the spillways; and
- Discharge water, sediment and gravel from pipeline service valves and surge towers to water or to land where it may enter water.

1.3.9. This application is to be considered on its merits as a discretionary activity, pursuant to Section 104 of the Act. Section 107 also has particular relevance to the application for discharge consent.

1.3.10. This application for resource consent is supported by a range of technical reports from a range of engineering and environmental consultancies, along with other important assessments that have been prepared as a part of addressing the relevant assessment criteria and section 104 considerations. These supporting document are an integral part of this application and the Assessment of Environmental Effects (AEE).

1.3.11. The existing scheme is described in section 2.1 of this application. There are no other consents required that have not been sought.

1.3.12. While there has been some meaningful consultation with stakeholders during the preparation and planning for this application process, a number of stakeholders have acknowledged that this application will be publicly notified and so have delayed their involvement and time investment until then.

1.3.13. The pre-application feedback received, and the significant technical advice obtained from various experts, has directly influenced the changes proposed to the current activities that make up the water supply scheme. These changes are described in section 2.5 of this application, with an overview provided below.

- 1.3.14. Over and above the critical importance of this scheme to the health and well-being of the Nelson community, this application for resource consent and AEE has identified the opportunity for some improvements to the system that are expected to lead to better environmental outcomes. These improvements generally relate to:
- (a) fish passage, and trap and transfer, to mitigate the adverse effects of the structures (dam and weir) on fish migration;
 - (b) a commitment to increase the minimum flows in the river as a means of enhancing the aquatic habitat so long as the 1 in 60 year drought security can be maintained;
 - (c) a commitment to improve the current adverse effects caused by the backfeed discharge, through the use of backfeed management and/or reservoir aeration;
 - (d) continue to reduce water losses as a part of ensuring water is efficiently used.
- 1.3.15. These changes to the scheme have been volunteered in direct response to the specialist advice received, in particular that from the Cawthron Institute (“Cawthron”). This has followed detailed consideration of alternatives and best practicable options to address the adverse effects. As a part of the process and assessment, Cawthron has outlined the inherent complexity and therefore probability of achieving the desired improvements, particularly in terms of water quality. Cawthron has identified a number of challenges posed by the current operation of the scheme. Chief amongst these is the thermal stratification and resultant anoxia of the deep layers of the reservoir. This in turn leads to concentrations of nutrients and potential toxicants being discharged to the South Branch via the backfeed which may at times be elevated and may result in a reduction in water quality and adverse ecological outcomes. The recommendations of Cawthron principally seek to reverse these adverse outcomes.
- 1.3.16. The NPSFM is currently being implemented as a part of the preparation of the new *Whakamahere Whakatu Nelson Plan*. Until such time as this new Plan is released, the national objectives of improving the quality of water and safeguarding the life supporting capacity of freshwater must be appropriately considered in the decision making process. As outlined above, this application does propose to improve the current system for that purpose.
- 1.3.17. At a regional and local level, the planning framework places considerable weight and importance on the value of the subject water for public water supply purposes. In essence, the NPS and NRMP consistently identify water flow regimes as the tool to ensure this water is secured for this purpose/objective, while using minimum flows to maintain the critical aquatic and recreational bottom lines.
- 1.3.18. Given the value of these assets to the Nelson community and the role they play in meeting the critical water supply needs, it is vital that new resource consents are granted to these activities.

1.3.19. Improvements are however planned to ensure the outcomes remain sustainable in the long term. This includes, for example:

- improving fish passage;
- revegetation of the Maitai River banks;
- juvenile eel and koaro trap and transfer programme;
- trial of obtaining water supply from dam only;
- investigating the options for aeration of dam reservoir;
- potential trout fishery enhancement; and
- management of the backfeed discharge to improve water quality.

2. The Proposed Activity

2.1. The Nelson Water Supply Scheme (NWSS)

- 2.1.1. Historically, the Nelson City Council has been the predominant water provider to the residents of Nelson. The Council's authority to undertake water supply is contained in Sections 11, 11A and 12 of the Local Government Act 2002. Under Section 25 of the Health Act 1956, the Minister of Health may require a Council to provide sanitary services, which includes waterworks. Although it is discretionary whether or not it provides water, the Council has a long term commitment to carrying out this activity.
- 2.1.2. The Nelson City Council and its forebears have been responsible for water supply in the City since the initial Brook Scheme was constructed in 1874. Note: The Brook Scheme was decommissioned in 1999/2000.
- 2.1.3. The following sets out the key milestones:
- The Roding water supply scheme was constructed from 1937 to 1941.
 - The Maitai scheme was commissioned when a low level intake structure was constructed on the South Branch of the Maitai River in 1961 (upgraded to the current concrete structure in 1986). Engineering drawings of this system are provided within **Attachment C2**.
 - The Maitai Dam was constructed on the North Branch of the Maitai River between 1985-1987 for water storage and augmentation of the river flow in dry periods. The dam is 39m high of earthfill construction with a total reservoir capacity of 4,150,000m³. Engineering drawings of this system are provided within **Attachment C1**.
- 2.1.4. The Maitai and Roding Rivers are now widely accepted as being the only reliable sources of potable water capable of meeting the needs of the Nelson community. As such there are not currently considered to be any other alternative viable sources.
- 2.1.5. The Nelson City Council now supplies high quality water to most of Nelson households and businesses through a pipe network. The Nelson City Council Long Term Plan 2015-2025 explains why it has a water supply scheme:

Providing safe water for the city is a major part of Council's core business. A good quality, reliable water supply is essential for community and environmental wellbeing. Human health, tourism and industry rely on having a safe water supply". (p60)

The Supply Area

- 2.1.6. The Nelson City water supply extends from the city side of Gentle Annie at Wakapuaka to Saxton Field in the south. The Nelson City and Tasman District supplies do however overlap to the south.
- 2.1.7. As a consequence of the local government reorganisation in 1989 and the movement of territories boundaries, the Wakatu Industrial Estate, Alliance Group, and ENZA Foods are within Nelson City, but are supplied by Tasman District Council. In addition, Nelson City has a bulk water supply agreement with Tasman District Council for the supply of water to a small residential and commercial areas and school off Champion Road. The agreement also confirms the Tasman District Council

entitlement to water from the Roding River source. This entitlement is for the lesser of 909m³/day or 1/15th of the allowable abstraction from the Roding River.

- 2.1.8. Nelson City Council and Tasman District Council can also connect supply mains in event of an emergency. This allows the supply to the lower levels of Stoke and Tahunanui to be provided by the TDC.

The Physical Infrastructure

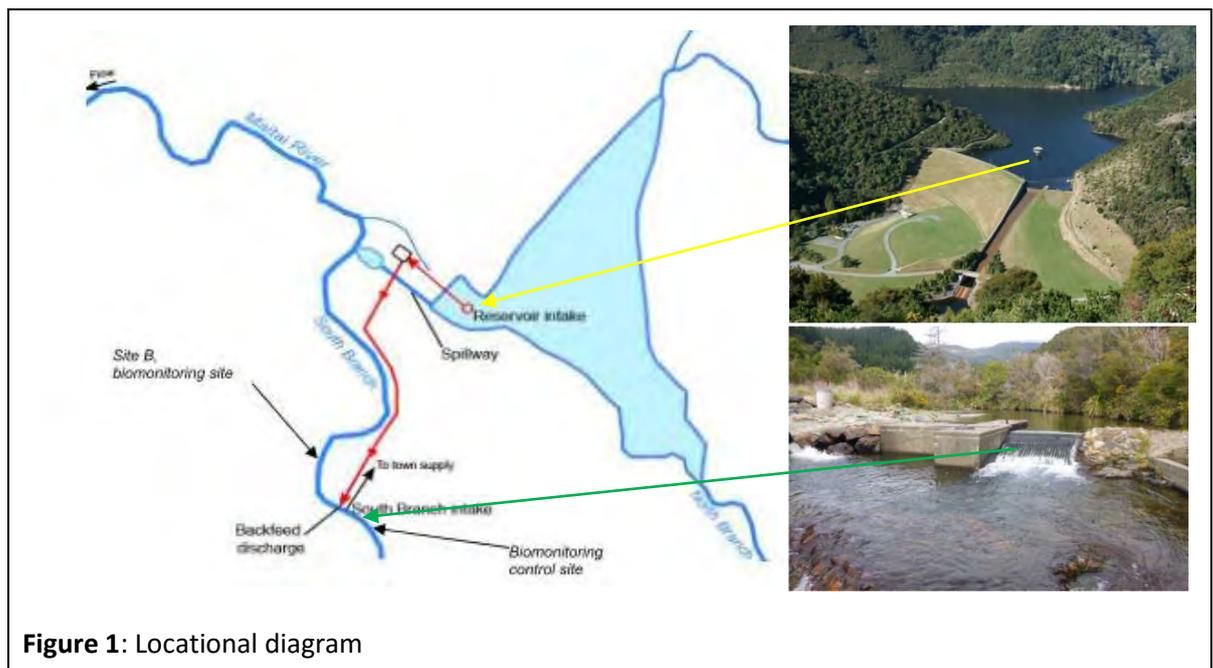
- 2.1.9. The water supply infrastructure draws water from three river sources:

- the North Branch of the Maitai River via an intake tower in a water reservoir;
- the South Branch of the Maitai River via a weir (run of river source);
- the Roding River via a weir (also a run of river source).

- 2.1.10. As set out above, the Maitai Dam was constructed on the North Branch of the Maitai River between 1985-1987 for water storage and augmentation of the river flow in dry periods. The dam is 39m high of earthfill construction with a total reservoir capacity of 4,150,000m³. Refer to **Attachment C1**.

- 2.1.11. Water is abstracted from the reservoir via a steel intake tower anchored into a concrete access culvert that runs beneath the dam. The access tower allows water to be drawn from different levels within the reservoir to take advantage of varying water temperature and quality at depths. See Drawing 6516-121 AB, **Attachment C1**.

- 2.1.12. As shown in Figure 1 below, a backfeed pipeline runs from the dam back to the base of the South Branch weir to allow compensation water to be discharged into the river at the point where water is abstracted from the South Branch. As part of the current resource consent for abstraction any water abstracted from the South Branch must be matched with an equal volume of water from the dam. These operational processes are described later. The discharges, such as to the South Branch via the backfeed, is described later in this section under the heading ‘the nature of the discharge’.



- 2.1.13. A low level intake structure was constructed on the South Branch of the Maitai River in 1961 and upgraded to the current concrete structure in 1986.
- 2.1.14. The intake structure consists of a coarse screen with a collection chamber beneath. There is no appreciable storage capacity in this intake and it is operated as a run of river source that is directly subject to the impacts of weather and river water quality. When silt levels in the water exceed the criteria for the treatment plant this source is temporarily discontinued.
- 2.1.15. Water from the intake chamber on the South Branch of the Maitai River is piped to the mixing box at the base of the Maitai dam on the North Branch and then to the water treatment plant, via one or both of the supply pipelines down the Maitai Valley. The original supply pipeline consists of concrete pipes installed on an above ground bench cut into the hillside, down the Maitai Valley. The most current supply line (constructed in 2012-2014) is beneath the roadway of the Maitai Valley Road. This pipeline is connected to a pump station above the Maitai Motor Camp and from there to the water treatment plant.
- 2.1.16. Along the length of the pipelines there are a number of service points which allow the pipes to be accessed internally for maintenance and other purposes. See **Attachment D**. These points are located at various locations down the length of the pipelines in the Maitai Valley.
- 2.1.17. These service points are also the locations where occasionally scour water is to be discharged. These discharges are described later in this application.
- 2.1.18. At several locations along the pipelines there are also surge towers. These are safety devices to protect the pipeline from excess pressure as flows change due to changes in demand at the treatment plant. The pipeline holds about 785 tonnes of water per kilometre, or about 5500 tonnes over the length. Slowing or stopping this weight takes requires some absorption of the pressure. Closing a valve too quickly without the surge towers could blow the pipeline apart. As a result of absorbing this pressure the surge towers may vent from time-to-time. These discharges are described later in this application.
- 2.1.19. The treatment plant was commissioned in 2004 at the Tanrage Saddle and is capable of treating approximately 50,000m³ of raw water per day, sourced from the best of the sources at the time.
- 2.1.20. The treatment plant utilises five 'trains' of ultra-filtration membranes in cassettes to remove any material in the water greater than 0.04microns. Soluble organic material is treated with ferric chloride to coagulate the organic material with larger flocs settling out and smaller flocs trapped by the membrane filters.
- 2.1.21. These plant filters were not designed to filter silt or organic material from the raw water for any length of time as the reduction in permeability and the constant cleaning this would require would be beyond the plant and waste lagoon design



parameters. As a consequence the best quality water at any given time is selected as the raw water source.

- 2.1.22. Water from filter back washing and cleaning is pumped to settlement lagoons above the plant. Supernatant from these ponds is re-circulated to the plant and solids are part dried and removed to landfill.
- 2.1.23. Potassium permanganate may be added to the filtered water when necessary to reduce the levels of iron and manganese in the final product. Potassium permanganate achieves the removal of iron and manganese by oxidising the metals into their insoluble states.
- 2.1.24. Chlorine is added to the water prior to it leaving the plant to provide residual disinfection in the reticulation.
- 2.1.25. From the treatment plant treated water is supplied directly to Stoke and Nelson City. The supply to Stoke is via a return pipeline, following the route of the Marsden Valley raw water pipeline. The supply to Nelson is via an existing trunk main on an above ground bench from the treatment plant to Hillside Lane in the Brook Valley. From these two main trunk mains water is reticulated to all parts of Nelson that are connected to the network. A replacement / auxiliary water main from the treatment plant to the Brook Valley is due to be constructed from June 2016.
- 2.1.26. The primary purpose of the reticulation system is to distribute water to customers throughout the city and provide a constant source of fire-fighting water. In many locations the need to meet minimum fire flows dictates the size of the reticulation. Because Nelson has limited areas of flat land many of the residential properties are established on the surrounding foothills. The variation in height between the upper levels and sea level presents a real issue for maintaining reasonable pressures in the reticulation. Council endeavours to provide water to the city at the lowest practical pressure to avoid damage to residential fittings and reduce losses. Pressures falling in the range between 30 and 90 metres of head have been adopted for the Level of Service.
- 2.1.27. The Nelson City Council operates 14 water pump stations throughout the city. The majority of these are lift stations that supply water to reservoirs at higher levels for storage as well as pressure enhancement. The Wasney Terrace pressure pump boosts supply pressure to the reticulation. A new pressure pump station at Ariesdale Terrace is also planned. Pressure pumps are generally used where the cost to install a reservoir would not be justified for the small numbers of users affected.
- 2.1.28. There are 37 reservoirs and tanks connected to the network. Seven of these hold between 2,500m³ and 5,500m³ of water with the remaining holding volumes ranging from 25m³ to 900m³.
- 2.1.29. All but one of the seven larger tanks are constructed from pre-stressed or reinforced concrete, with the remaining tank being of bolted steel plate construction.
- 2.1.30. When full the tanks will hold approximately one day's supply of drinking water for the city.
- 2.1.31. Currently the larger tanks are positioned close to the central city area and Stoke. To provide a better level of security for the North of the city a further larger reservoir is proposed for the Bayview/Marybank area within the term of this consent.

Value of Assets

- 2.1.32. Full asset replacement valuations are prepared every two years. The 2014 replacement value of the water supply infrastructural assets has been assessed by OPUS International Consultants Ltd at \$246.6million. A copy of this Valuation is provided within **Attachment E** of this application. Table ES2 contained in this Opus valuation is provided below as a summary of how this asset valuation is made up.
- 2.1.33. In 2015 the duplicate Maitai raw water pipeline was commissioned. This pipeline runs from the Maitai Dam to the Water Treatment Plant and was constructed at a cost of approximately \$13.22M. This figure needs to be added to the \$247 million valuation to give a comprehensive replacement value of the network.

Table ES2: Summary of Water Services Assets (June 2014)

Asset Category	Quantity	Unit	Replacement Value \$,000s
Reticulation High Pressure	104.1	km	32,399,508
Reticulation Low Pressure	219.9	km	61,301,794
Trunk Mains	39.9	km	18,455,112
Maitai Pipeline	9.3	km	17,666,517
Roding Pipeline	3.9	km	2,160,916
Maitai Water Supply Scheme			20,670,500
Roding Dam			2,859,900
Treatment Plant			20,191,669
Tunnels	3	No	11,677,100
Reservoirs and Tanks	37	No	13,155,170
Pump Stations	11	No	2,544,228
Pressure Reducing Valves	32	No	383,922
Air & Non Return Valves	136	No	324,224
Gate Valves	3,349	No	7,273,282
Manholes	94	No	343,288
Hydrants	2,481	No	6,323,027
Meters	20,252	No	3,037,432
Customer Connections	20,161	No	25,913,634
Total			246,681,222

- 2.1.34. The Nelson City Council Long Term Plan 2015-2025 also provides an account of the operation and maintenance costs:

... Operating and maintaining these assets costs approximately \$6.2 million annually, which is approximately 50% of the total water utility budget, with the remainder of the budget going towards depreciation (34%) and financing costs (14%). (p60)

Scheme Operation

- 2.1.35. For the purposes of day to day operation, the Nelson Water supply is split into two parts - the scheme headworks and the city reticulation. The scheme headworks, consisting of the Maitai Dam, Maitai South Branch Intake, Roding River Intake, raw water supply lines, tunnels and water treatment plant are under a day to day management contract with Fulton Hogan Ltd. The reticulation including pipes, pump stations and reservoirs is under the day to day management of the Nelson City Council. Maintenance of the reticulation is also carried by a contractor (Nelmac).
- 2.1.36. The operation and management contract with Fulton Hogan Ltd allows that company to generally manage the headworks, under a performance contract, in such a way that resource consent conditions and treated water specifications are met. Decisions as to which raw water source to use are made by the contractor on a daily basis reflecting the quantity and quality of the various sources at the time.
- 2.1.37. Fulton Hogan Ltd also maintain full time caretakers at both the Maitai and Roding dam sites.
- 2.1.38. The following are relevant parts taken from the Operation and Maintenance section of the contract:

4.2 Scope of Works

Scope

The term of this Separable Portion is 3 years, renewable for a further 3 year term at the Principal's option.

The Contractor is responsible for:

- *operation and maintenance of all equipment and facilities constructed under this contract.*
- *disposal of all wastes generated*
- *all duties set out in the document 'Caretakers Responsibilities' including catchment activities (attached in Appendices).*
- *operation, maintenance and management of all equipment and facilities upstream of the Water Treatment Plants including:*
 - ⇒ *Maitai dam outlet works*
 - ⇒ *Maitai South Branch offtake works*
 - ⇒ *Maitai control valves including backfeed system*
 - ⇒ *Roding Dam, diversion tunnel and offtake system*
 - ⇒ *Roding pipeline and tunnel*
 - ⇒ *Complying with new and existing Resource Consents*

Exclusions

The following works are not included in the scope of work:

- *The annual dam inspection. This is undertaken by Tonkin and Taylor and is facilitated internally by the Principal.*
- *The 5 year SEED inspection (Safety Evaluation of Existing Dams). This is undertaken by an independent consultant and is handled internally by the Principal.*
- *The annual inspection of the Maitai Dam tower and plunge pool. This is undertaken by specialist divers and is handled internally by the Principal.*
- *Major emergency repairs to existing assets owned by the Principal including the Maitai Dam, Roding Tunnel and pipeline etc provided that these are necessitated by factors outside the Contractors control.*

4.5 Performance Requirements

Water Quality

- Achieve the requirements set out in Table 3.1.

Water Quantity

- Ensure the plants are operated to meet demand from the Nelson system and are able to achieve the net production capacities specified. In particular ensure that:
 - ⇒ Thompson Terrace tanks water level does not fall below a depth of 3 metres.
 - ⇒ any part of the supply pipelines downstream of either treatment plant do not empty.

Other Requirements

- Comply with all other requirements set out in this specification.

4.6 Transfer of Staff

The Principal currently employs caretakers at Maitai and at Roding.

The employment of these staff shall be transferred to the Contractor from the completion of Separable Portion B and for at least the term of Separable Portion C.

Table 3.1: Treated Water Quality Specification

Parameter	Unit	Performance Criteria		Sample location	Method	Performance Measurement Frequency Note ⁽³⁾
		Value Note ⁽¹⁾	Limiting Value Note ⁽²⁾			
Filtered Water						
1. Turbidity	NTU	≤ 0.1 @ 98 percentile	≤ 0.2	Combined filtrate	on-line instrument ⁽³⁾	Continuous ⁽⁴⁾
2. Particle removal (>2 microns)		See note (5)		Depends on supplier	on-line method	At least daily
3. Taste & odour		Not objectionable in terms of taste/odour characters and sensations to a majority of tasting panel ⁽⁶⁾		Prior to chlorination	See note 6	Normally monthly but weekly when taste & odour evident in raw or treated water
4. UV absorption (254nm)	% per cm	See note (8)		Combined filtrate	on-line instrument ⁽³⁾	Continuous ⁽⁴⁾
Treated Water						
5. Free available Chlorine	mg/L as Cl ₂	±0.3 of Principal-nominated setpoint @ 98 percentile	-	CWS inlet	on-line instrument ⁽³⁾	Continuous ⁽⁴⁾
6. Free available Chlorine	mg/L as Cl ₂	-	> 0.4	CWS outlet	on-line instrument ⁽³⁾	Continuous ⁽⁴⁾
7. Total Iron	mg/L	-	<0.1	CWS outlet	As per DWSNZ2000	Daily ⁽⁷⁾ on site measurement
8. Total Manganese	mg/L		<0.03	CWS outlet	As per DWSNZ2000	Daily ⁽⁷⁾ on site measurement
Parameter	Unit	Performance Criteria	Sample location	Method	Performance Measurement Frequency Note(3)	

Parameter	Unit	Performance Criteria		Sample location	Method	Performance Measurement Frequency Note ⁽³⁾
		Value Note ⁽¹⁾	Limiting Value Note ⁽²⁾			
		Value Note(1)	Limiting Value Note(2)			
9. True Colour	TCU	≤5 @ 90 percentile	≤10	CWS outlet	As per DWSNZ2000	Daily(7) on site measurement
10. pH		-	7 to 8.5	CWS outlet	on-line instrument(3)	Continuous(4)
11. Total trihalomethanes		-	50% of DWSNZ2000 Maximum Allowable Value (MAV)	End of Nelson System Reticulation at: <ul style="list-style-type: none"> • Monaco • Glen township 	As per DWSNZ2000	Monthly(7)
12. All other parameters with MAV's listed in the DWSNZ2000	-		MAV	Raw sources and CWS	As per DWSNZ2000	Six monthly unless 50% of MAV is exceeded in CWS sample thereupon monthly for parameter in question. Revert to six-monthly after twelve consecutive measurements below 50% of MAV
13. Chlorine CT	mg/L.min		As per DWSNZ2000	To be agreed	To be agreed	monthly

Notes to Table

- (1) The method for calculating achievement of performance is set out in Clause 4.9.
- (2) The limiting value for a parameter is the identified performance limit(s) for each and all test results obtained.
- (3) Installed, calibrated, cleaned and maintained in accordance with manufacturers recommendations.
- (4) See clause 4.9 for periods when instrument is not available.
- (5) Demonstrated achievement of 4-log particle removal in accordance with DWSNZ2000
- (6) See Clause 4.9 for performance measurement.
- (7) Samples shall be taken at a consistent and pre agreed location, time and schedule on week days.
- (8) To develop correlations in anticipation of superseding testing for true colour and total trihalomethanes.

Note CWS = Clearwater Storage Tank

Current Supply and Future Demand

2.1.39. In 2014/15 year Nelson City directly supplied a total of 4,974,000 cubic metres of water to 18,847 residential and 1,850 commercial/industrial/educational/service customers. As shown in the following table, approximately 40% of the water supplied (2,079,000 cubic metres) is used by a wide range of commercial / industrial / educational / service customers in the city.

NCC		Whole System		1-Jul-14	to	1-Jul-15	=	365	days	
Water Balance: Components of Authorised Consumption (excluding Water Exported)										
Components of Authorised Consumption (excluding Water Exported)		Consumption in 10 ³ m ³ per year					Comments and Details Relating to Data			
Item	Description	Billed Metered	Billed Unmetered	Unbilled Metered	Unbilled Unmetered	95% conf. Limits (+/-)	E = Estimated R = Based on recordings			
1	Billed Metered Consumption, registered customers									
1.a	Billed metered residential properties	2895.00				2.0%	R	From records of 18847 residential properties		
1.b	Billed metered non-residential properties	2079.00				3.0%	R	From records of 1850 non-residential properties		
1.c	Other billed metered consumption (specify)						R	see A923123 for the #'s above		
1.d	Other billed metered consumption (specify)						R			
1.e	Other billed metered consumption (specify)						R			
Total of Billed Metered Consumption Items 1a to 1e		4974.00				1.7%				

(Source: A1406236)

- 2.1.40. The 18,847 residential connections represent approximately 92% of households in the city, comprising population of approximately 44,000 (total of 49,740).
- 2.1.41. Using the following information from Statistics New Zealand, the Nelson City Council Long Term Plan 2015 estimates that the Nelson City population will increase to around 53,000 in the period of 2015-2025. This involves a 6% increase over the next decade. Approximately half of this growth is expected to be accommodated in the residentially zoned areas of Stoke.
- 2.1.42. Both the Roding River and the South Branch of the Maitai River are considered very high quality sources of water for the treatment plant as they consistently show very low levels of turbidity, organic material and iron and manganese. These parameters allow the contractor to minimise the amount of chemical used in the treatment process and maximise the time between cleaning of the membranes.
- 2.1.43. Conversely the water in the Maitai Dam reservoir contains higher levels of organic material (both free and in solution) and elevated levels of dissolved iron and manganese in the lower levels of the reservoir.
- 2.1.44. As set out above, raw water sources are chosen on a day to day basis to provide the best quality water to supply the treatment plant.
- 2.1.45. Criteria for selection of water from the sources generally reflect those in table 3.1 above plus the resource consent conditions applicable to each source.
- 2.1.46. The relative abstraction volumes, both as absolute take volumes (cubic metres) and as percentages of the total daily take, are shown on graphs in **Attachment F** for the years 2011 to 2015. A typical example year (2014) is shown in Figure 2.



Figure 2: (top) water abstraction from sources displayed as percentage of total; **(middle)** water abstractions displayed as absolute volumes; **(bottom)** water abstractions displayed against Maitai South Branch flow.

- 2.1.47. In general terms, it can be seen from the graphs that during water is generally sourced approximately evenly from the Maitai South Branch and from the Roding River. At these times there is a generally smaller and background use of water from the Reservoir. There are, however, punctuations where Roding River water is not used and most or all water is sourced from the Reservoir. These times are generally when a rain event has made the water sourced directly from the run-of-river takes in the South Branch of the Maitai and the Roding Rivers unsuitable. This can be seen from the graphs that show river flow against take volumes from the various sources.
- 2.1.48. In general it is concluded that approximately 40 percent of the water for the Nelson supply is taken from the Maitai South Branch, a further 40 percent is taken from the Roding, and the final 20 percent is taken from the Reservoir. These percentages are shown in Figure 3.

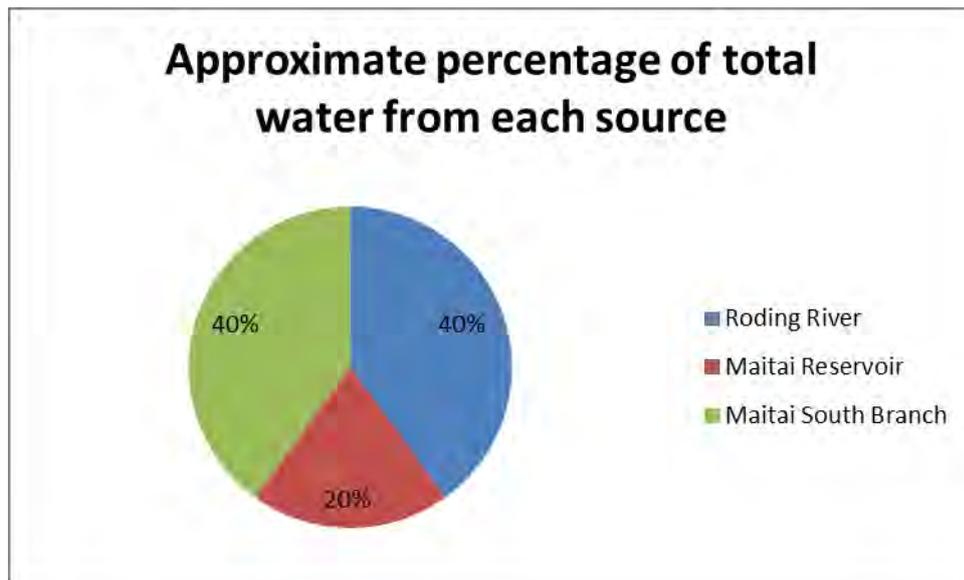
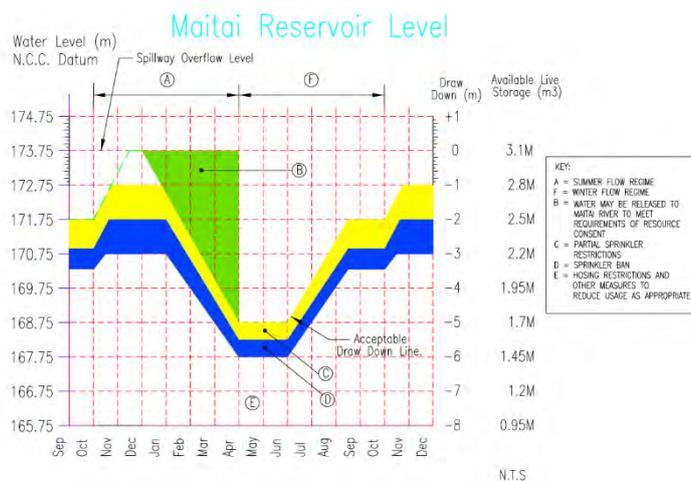


Figure 3: approximate percentage of water taken from supply sources

Efficiency of Use

Rationing

2.1.49. In times of drought, the Council limits or restricts the ‘non-essential’ portion of the urban water supply through its Water Supply Conservation Strategy. This Strategy is currently located within Appendix B of the Water Supply Asset Management Plan (2012-2022).



2.1.50. For the Maitai Water Supply Scheme, various rationing measures are imposed when the water level in the reservoir reaches identified trigger levels, such as sprinkler bans and hosing restrictions. These triggers are shown graphically in Figure 2 of Appendix B (Water Supply Asset Management Plan).

Leak Detection (losses)

- 2.1.51. Water metering (and charging on a per unit basis) was installed in the mid-1990s in recognition of the limitations of the existing sources and the importance and need to ensure water abstracted is managed and used efficiently. Likewise, the Council is actively seeking to enhance efficiency and the reliability of the water supply through investigating and reducing the losses (leaks) from the system.
- 2.1.52. Council has commissioned CGW Ltd to review the Nelson City water uses and network losses and compare these with other supply authorities of a similar size. Refer to **Attachment G**.
- 2.1.53. For administration and invoicing purposes Council records water supplied to residential and non-residential customers. Non-residential customers include commercial, industrial, educational and service activities. The latter includes government departments, public hospitals and public service facilities such as parks, swimming pools, libraries and the like.
- 2.1.54. Council records water supplied to customers meters and compares these totals with the water supplied to the network from the water treatment plant. The difference in totals is described as unbilled usage and includes such things as unlawful connections to the network, water lost through network breaks, fire-fighting activities, network testing and cleaning and meter inaccuracy.
- 2.1.55. Council has an ongoing programme to trace losses from the network. Council prepares an annual water balance that compares volumes of water processed through the treatment plant with volumes of water recorded from all customers' meters. This balance allows us to track differences in these values over time to gauge the integrity of the network. Council analysis has consistently shown that more water is treated than shown to flow through customers' meters. The difference between the two is classed as 'unaccounted for water'. There are a number of circumstances that result in this shortfall:
- (a) leaking pipes and fittings;
 - (b) broken pipes;
 - (c) un-authorized access to the network (such as unauthorised connections and contractors filling water trucks);
 - (d) un-metered access to the network (such as fire-fighting and street cleaning);
and
 - (e) testing and maintenance of the network; potential meter inaccuracy.
- 2.1.56. As well as tracing water losses, the NCC also has an ongoing programme to reduce water losses from the network with \$200,000.00 each year for the identification and repair of leaks on the water supply network (see pages 72-73 of the LTP). The project comprises the following stages:
- (1) making changes to the network to establish District Metered Areas (DMA's) – these will allow the city network to be broken up into smaller areas for monitoring and investigation.

- (2) night flow monitoring – areas with higher night flows indicate a higher likelihood of network leakage which allows prioritisation of the areas for further investigation.
 - (3) Active Leak Detection – a contractor is engaged to locate leaks on the network using sensitive listening equipment.
 - (4) Repair the leaks as and when they are identified.
 - (5) Phase 5 is to determine the effectiveness of the leak detection and repair. This is done by repeating the night flow monitoring and comparing to the initial results.
- 2.1.57. As this programme of works is ongoing, Phases 2 – 5 will be repeated on a cyclical basis. At the time of drafting this application, 42 DMAs have been identified with 13 due to progress through Phases 2 – 5 over the coming winter months.

2.2. The Nature of the Discharges (Section 105(1) RMA)

- 2.2.1. The water abstraction from the South Branch and the discharge of at least the same volume of compensation water via the backfeed was described above. It is under this subheading that the quality and characteristics of this discharge (and other discharges) is described.
- 2.2.2. Firstly in terms of volume, the current consent (described in section 2.3 below) allows up to 300 litres/sec to be taken from the South Branch and up to 400 litres/sec discharged back into the South Branch from the reservoir. This is to compensate for the water taken.
- 2.2.3. Volumetrically, the backfeed discharge is able to match or often exceed the volumes of water taken at the South Branch weir. Backfeed water comprises a large proportion of the total Maitai River flows during low flow periods when the spillway is not spilling.
- 2.2.4. Cawthron has described the existing effects of the backfeed discharge in section 2.5 of its Report 2810 (**Attachment I**). In the context of this application for discharge consent, the backfeed water is a ‘contaminant’ as it changes some of the physical, chemical and biological conditions of the South Branch below the weir.
- 2.2.5. The backfeed is sourced directly from the reservoir without any form of treatment. Therefore, it is essentially the characteristics of the reservoir water that determines the nature of the discharge. However, there is some internal variability within the reservoir that leads to variations in the discharge, and also allow the operators of the water scheme to adapt to changing environmental conditions.
- 2.2.6. The intake tower in the reservoir has three intake points at different depths; essentially shallow, middle and deep. There is also a scour water intake which receives the water from the very base of the reservoir. Refer to **Attachment C1**.
- 2.2.7. The reservoir water is extensively described in the Cawthron Report 2810 in **Attachment I**. A summary is provided here. Because the reservoir is deep it thermally stratifies between October and April, and this contributes to deoxygenation in its bottom waters. This anoxic water renders the reservoir susceptible to internal recycling of trace metals and dissolved nutrients (phosphorus and nitrogen) from reservoir sediments. The trace metals are more soluble in anoxic environments and therefore remain in solution within the deep water. Only limited solubilisation of particulate bound nutrients (nitrogen and phosphorus) occurs and

the internal recycling of nutrients is considered less of a concern for the quality of the backfeed discharge.

- 2.2.8. The thermal stratification presents a particular challenge as the options for discharge are, at a basic level, between discharging surface reservoir water that is relatively warm but also relatively well oxygenated, compared with discharging deep water from below the thermocline that is cool but anoxic. Both high temperatures and low dissolved oxygen are deleterious to aquatic ecological values, but with exposure to a turbulent river environment anoxic waters will reasonably rapidly reoxygenate.
- 2.2.9. As described below, condition 8 of the relevant resource consent authorising the backfeed discharge (RM960396) imposes restrictions on temperature changes as a result of the discharge. There is a very high level of compliance with this condition, but to achieve these outcomes it is necessary that deep (cool), but anoxic, reservoir water makes up the backfeed flow.
- 2.2.10. As a result the backfeed contains high concentrations of dissolved trace metals, particularly iron and manganese, but also other metals depending on supply from the catchment. The backfeed also contains higher nutrient concentrations.
- 2.2.11. Due to the humic content of the North Branch flowing out of a beech forest environment the backfeed discharge commonly has a lower clarity than the receiving South Branch waters.
- 2.2.12. It has also been reported that odours have been detected in the backfeed discharge (pers. comm. David Kelly). This is due to the anoxic conditions that can give rise to odourous compounds.
- 2.2.13. The effects after reasonable mixing of these discharge characteristics will be discussed later in this application.
- 2.2.14. At various locations along pipeline the South Branch and main stem of the Maitai River are service valves. The water take points include screening of the flows to reject most gravel and silt that could enter the pipeline system. However, there is inevitably a slow accumulation of gravel and silt in the pipeline. Once every two months each Service Point is opened and approximately 1 cubic metre of scour water is discharged from the pipeline back into the bed of the Maitai.
- 2.2.15. The three Service Points within the South Branch (prior to the pipeline reaching the mixing box) will discharge only water entrained into the pipeline at the South Branch intake. Therefore the water will be of Class A quality but may contain minor quantities of sediment and gravel that is discharged back into the bed of the South Branch.
- 2.2.16. The scour water released from the service points below the mixing box is a mix of South Branch water and Reservoir Water. The volume of water will contain small volumes of gravel and silt from inside the pipeline.
- 2.2.17. In addition to the intermittent discharges of scour water from the pipeline are the surge towers which, as previously described absorb pressure from the pipeline when water velocity is slowed. These towers will vent varying volumes of water back to the bed of the Maitai River from time to time. The discharge will be of clean water that would otherwise be destined for the water treatment plant.

2.3. Current Resource Consents

2.3.1. The current package of resource consents were primarily granted in March 1997 and 2002. These consents, set out in table format below, replaced those which originally authorised the Maitai Water Supply Scheme in July 1982. As with this application for new consents, the current consents were also sought and granted at the time of the impending expiry of the original consents.

960396	<p>Water Permit & Discharge Permit (s14(1) & s15(1))</p> <p>To take up to 300l/sec from the Maitai South Branch and discharge a maximum of 400l/sec back to the South Branch water from the Maitai North Branch.</p> <p>(NB. Also replaced NN831560 which enabled the new weir structure)</p>	27/3/97	01/2/17
025151/1	<p>Water Permit & Land Use (s14(1) & s13(1))</p> <p>Water Permit to dam and divert the North Branch of the Maitai River and a land use consent to place structures, namely the dam and ancillary structures on the bed of the North Branch.</p>	2/7/02	01/2/17
025151/2	<p>Water Permit (s14(1))</p> <p>To take surface water, being the full flow of the Maitai River for both storage and use, subject to maintenance of specific minimum flows at the junction of the North and South Branches (“the forks”) below the dam.</p>	2/7/02	01/2/17
025151/3	<p>Discharge Permit (s15(1))</p> <p>To discharge scour water, mixing box overflow water and compensation water* from the North Branch Reservoir into the North Branch below the dam at a maximum rate of 1500 l/sec.</p> <p>(* the term “compensation water” in this description is a misnomer and is better referred to as “enhancement water” as it is for the purpose of enhancing the instream flows. This terminology is used for the remainder of this application.)</p>	2/7/02	01/2/17

025151/4	Discharge Permit (s15(1)) To discharge water from the Reservoir overflow spillways into the South Branch of the Maitai River.	2/7/02	01/2/17
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- 2.3.2. In October 2012 approvals for the existing flow meters on the backfeed, the dam intake tower and on the South Branch intake were granted pursuant to Regulation 10 of the Resource Management (Measurement and Reporting of Water Takes) Regulations 2010. These approvals were required to allow recording devices to be installed as near as practicable to the location from which water is taken instead of at that location. No changes or additional consent conditions were imposed. These approvals expire in line with the associated resource consent RM960396 on 1 February 2017 and therefore renewal is sought as set out in Section 3 of this application below.
- 2.3.3. RM960396 involved the renewal of two previous water rights (NN820520 and NN831560) while RM960567 sought to renew various conditions in former water right relating to minimum flows below the Maitai Dam (NN820540), all of which were to expire on 10 February 1997. This application was publicly notified and drew four submissions, one in support and three in opposition. The concerns raised by a Mr Olorenshaw were satisfied during a pre-hearing meeting while the concerns raised by Nelson-Marlborough Fish & Game Council were addressed prior to the hearing by way of further work undertaken by Cawthron. Opposing submissions from Mr Brown, a local angler, were also considered at the hearing.
- 2.3.4. The four consents granted in 2002 followed the public notification process and the receipt of four submissions. The opposing submissions from DOC and Fish & Game were subsequently withdrawn following a set of consent conditions being agreed and volunteered by the applicant.
- 2.3.5. A copy of each of the above listed current consents is provided within **Attachment R** of this application. A summary of the current consent conditions is also provided below. These consent conditions determine the operating parameters, along with the monitoring and review requirements.

RM025151/1: To place physical structures – dam and divert Maitai River North Branch

- 2.3.6. Aside from standardised review conditions and the requirement to maintain and supply good records, and provide for access to the site for inspections and information gathering, conditions imposed on RM02151/1 also require the consent holder to:
- ensure the structural integrity and safety of the dam and associated structures are appropriately monitored and maintained, with 5 yearly safety inspections (conditions 3 and 4);

- relocate up to 200 eels from the lower reaches to the reservoir, and continue to seek scientific advice from Cawthron (if required by DoC) in terms of eel monitoring (conditions 6 and 7);
- carry out environmental enhancement (including planting of native species and rock protection and bank enhancement) along the Maitai below the dam to a value of not less than \$30,000.00 (conditions 8-11).

2.3.7. Enhancement planting along the Maitai has been ongoing since 2002, with \$10,000.00 per year continuing to be committed in the Long term Plan 2015-2025.

RM025151/2: To take the full flow of Maitai River North Branch; and

RM960396: To take 300l/s from the South Branch and discharge 400l/s to the South Branch

2.3.8. RM025151/2 authorises the water take from the dam reservoir (Water Take Point #2 on Map 4). The conditions of this consent include standardised maintenance, and access and review conditions. Conditions 4 to 8 however require particular mention.

2.3.9. Condition 4 imposes specific winter and summer Minimum Flow Requirements in the river below the forks. These are summarised in table format below, the Figure 1 in this consent also showing this graphically (refer to **Attachment R**).

South Branch Instantaneous Flow	Minimum Instantaneous Flow at the Forks
Winter (1 May to 31 October)	
> 140 l/sec	300 l/sec
Less than or equal to 140 l/sec	225 l/sec
Less than or equal to 130 l/sec	190 l/sec
Summer (1 Nov – 30 April)	
	175 l/sec

2.3.10. Condition 5 clarifies how ‘*Instantaneous Flow*’ is to be interpreted and that adjustments to the backflow may be made during the day subject to compliance with the minimum flow requirements.

2.3.11. Condition 6 relates to the installation and maintenance of flow recorders.

2.3.12. Condition 7 requires that surplus water be released from the dam over the summer when the flow at The Forks drops below 300 l/sec and the lake level is above the acceptable draw down line. The graph that is referred to in this condition is shown in Figure 4 below.

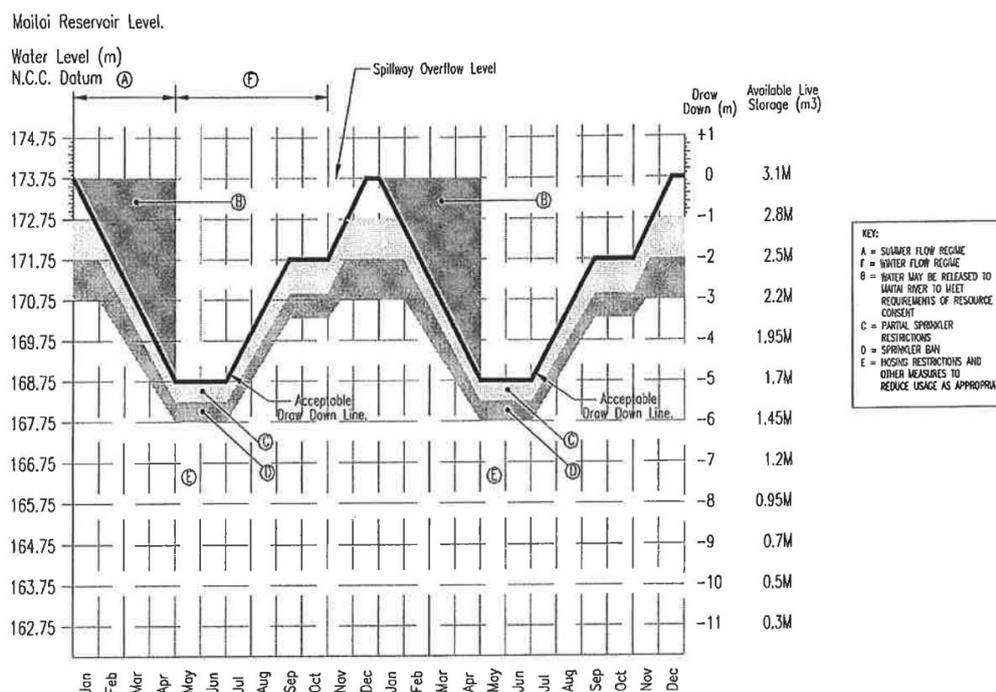


Figure 4: Surplus water release

- 2.3.13. Condition 8 also requires water conservation measures to be applied over the winter when the South Branch instantaneous flows drop below 140 l/sec (condition 4.1.2) or below 130 l/sec (condition 4.1.3).
- 2.3.14. RM960396 authorises the South Branch take (Water Take Point #1 on Map 4) and the backfeed discharge (Discharge Point #1 on Map 4). Very similar record keeping, access for staff, and review conditions are required (conditions 1-3). Condition 4 requires that structures are operated, maintained or modified to facilitate fish passage. Condition 6 relates closely to condition 5 of RM025151/2 in that the discharge to the South Branch is to be not less than the abstraction rate.
- 2.3.15. Condition 5 requires ecological monitoring of the effects of the abstraction and discharge at Site B (see Map 4 in **Attachment A**) on an annual basis, with an annual report provided to the Director of Resource Management and any interested parties on request.
- 2.3.16. Conditions 7 to 12 of RM960396 relate to the discharge to the South Branch and so impose performance standards on this discharge (when measured at Site B (condition 7)). The other conditions require the standards summarised in table format below:

<p>Condition 8 Water Temperature</p>	<p>Not change river water by more than 3°C when the water temperature above the intake is between 8°C and 18°C.</p> <p>Not reduce river water below 15°C when the water temperature above the intake greater than 18°C.</p> <p>Not increase river water above 11°C when the</p>
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	<p>water temperature above the intake is less than 8°C.</p> <p>The rate of turning on or off the discharge shall be progressive over a minimum period of 2 hrs.</p> <p>No discharge shall increase temperature of the river above 20°C or reduce it below 6°C.</p>
<p>Condition 9 Dissolved Oxygen</p>	<p>Not less than 6mg/m³</p>
<p>Condition 10 Turbidity</p>	<p>Not increased by more than 10 nephelometric turbidity units (NTU) – except in extreme cases when the reservoir is highly turbid, in which case the cleanest water available shall be discharged</p>
<p>Condition 11 Iron concentration</p>	<p>Not exceed 1.0gm/m³</p>
<p>Condition 12 Manganese concentration</p>	<p>Not exceed 1.0gm/m³</p>

2.3.17. In practice the physical determinands (temperature, dissolved oxygen, turbidity and metal concentrations) are monitored at Site A (see Map 4 of the Map Bundle) which is the point where the NRMP anticipates that the discharge will have undergone reasonable mixing. Monitoring at this location provides a conservative assessment of compliance with the consent conditions.

RM025151/3: To discharge scour water, mixing box overflow water and compensation (enhancement) water from the North Branch Reservoir into the North Branch

2.3.18. The discharge of scour water, mixing box overflow water and enhancement water occurs at Discharge Point #3 on Map 4. This is a discharge into the historical North Branch Channel.

2.3.19. There are few conditions imposed on RM025151/3 also. In terms of scouring events, condition 2 requires that the consent holder notify the consent authority, with the authority determining the minimum flow in the river and maximum duration of the discharge. Condition 2 also states that, other than in emergencies, the discharge of scour water shall only occur when the river is in fresh and naturally discoloured, and at time when there will be no detrimental effects on fish spawning.

2.3.20. Condition 3 relates to responsibility for erosion or deposition. The historical North branch channel (now largely dry due to the consented diversion down the dam spill way) is rock-lined and becoming increasingly vegetated. As such erosion is highly unlikely since the flows are a controlled release and the channel will not experience flood flow volumes. With deposition, again this is a controlled release of water and does not contain a high sediment content that could result in any build-ups.

2.3.21. Conditions 4 and 5 relate to the discharge of enhancement water. Enhancement water is to be taken from the supply pipeline to ensure appropriate water quality.

RM025151/4: To discharge water from the Reservoir overflows to the South Branch

2.3.22. The discharge of reservoir overflow water down the spillways occurs at Discharge Point #2 on Map 4.

2.3.23. Condition 2 requires the consent holder to be responsible for any adverse erosion or deposition in the river as a result of the discharge down the spillways. With a fully concrete lined spillway and plunge pool there is little potential for either erosion or deposition.

2.3.24. The only other conditions imposed on RM025151/4 relate to access for staff and review under section 128.

Compliance with Conditions

2.3.25. The Cawthron Report 2810 (**Attachment I**) outlines general long-term compliance with consent conditions under each of the relevant subheadings throughout the report.

2.3.26. In addition, compliance reports have been produced by Cawthron each year to provide a record of compliance with resource consent conditions. These reports have not been attached to this application as they provide only annual snapshots of compliance for each year and a better summary is provided by the Cawthron Report 2810 referred to above.

2.3.27. This application is not seeking a renewal of the existing consent conditions; rather it is seeking replacement consents and it is anticipated that through the process new conditions of consent will be drafted, refined and ultimately applied to the activities. It is anticipated that through this process there will be a full review of the consent conditions, both in relation to structure and approach, and the numerical compliance limits imposed.

2.3.28. Nevertheless a brief summary of the most recently available compliance report (for 1 July 2014 to 30 June 2015) is provided as follows. The report is identified as 2780.

2.3.29. The report examines compliance with the consented conditions for flow, temperature and water quality in relation to the operation of the intake and backfeed of reservoir water in the South Branch of the Maitai River. It also presents results of biomonitoring conducted over the period.

2.3.30. Minimum flow conditions were not breached during 2014–2015. Temperature consent 'condition (a)' was breached on four occasions for less than 1 hour. All condition (a) breaches occurred because the river temperature was reduced by more than 3°C. There were also two breach periods of condition (b), the longest of which occurred for 45 minutes. All breaches of condition (b) occurred because river temperature upstream of the outlet weir was > 18°C, while the temperature downstream of the outlet was below 15°C.

- 2.3.31. Monthly water quality sampling indicates that consent conditions for turbidity, iron and manganese concentrations were not breached in 2014–2015.
- 2.3.32. Periphyton scores were higher at Site B (impacted site) than at the Control Site in November 2014, but lower in May 2015. Nonetheless, scores at each site indicate ‘Good’ water quality conditions for both monitoring occasions. More fish (eels and trout) were found at the Control Site than at Site B on both sampling occasions (with the exception of brown trout in May 2014). Numbers were low relative to historical records.
- 2.3.33. A declining trend in macroinvertebrate metrics (%EPTabundance, %EPTtaxa, MCI and QMCI) measured since 1989 at Site B continued to be evident. During the 2014–2015 monitoring, Macroinvertebrate Community Index (MCI) and Quantitative Macroinvertebrate Community Index (QMCI) scores at the upstream Control Site indicated excellent water quality and were higher than scores at Site B. This has been the case on all 15 monitoring occasions since monitoring began at the Control Site in May 2008.
- 2.3.34. The report also comments that

“The decline in macroinvertebrate metrics measured at Site B may be related to the operation of the Maitai Reservoir backfeed discharge.”

2.4. Consultation

- 2.4.1. The applicant has undertaken consultation with:

- Local iwi,
- Department of Conservation,
- Friends of Nelson Haven & Tasman Bay Inc.,
- Nelson-Tasman Fish & Game,
- Nelson Tasman Forest & Bird, and
- Friends of the Maitai Inc.

Iwi consultation

- 2.4.2. The iwi consultation process was managed by Chetham Consulting Limited on behalf of the Council, being a part of the preparation of a ‘Combined Cultural Impact Assessment’ (CIA) for the water supply activities. The process followed is explained in full in the CIA provided within **Attachment O** of this application for resource consent.
- 2.4.3. The Purpose of the CIA is set out in Section 1 of the report:

To provide a ‘Combined Iwi Cultural Impact Assessment’ (“CIA”) to NCC to assist them in meeting their statutory obligations under various legislation including the Resource Management Act 1991 (“RMA”), the Local Government Act 2002 and a range of Settlement Acts.

The CIA includes:

- *A description of the site and summary of the technical aspects of the proposal;*
- *A brief Whakapapa (history) of the site and surrounds;*
- *Identification of areas of cultural significance and mana whenua/tangata whenua values;*

- *An assessment of the nature and scale of any impacts of the proposal on manawhenua/tangata whenua values;*
- *An assessment on whether Iwi are considered to be adversely affected by the proposal; and*
- *Recommendations to avoid, remedy or mitigate any impacts to provide for the protection of Maori/Iwi values.*

The CIA is based on a consultative process aimed at facilitating affected Iwi to understand the proposal, provide input into this assessment of the consent application and to collate their feedback on the cultural impacts of the proposal. The CIA provides a set of recommendations to the NCC arising from the assessment and the review of the supporting documentation supplied.

- 2.4.4. The methodology followed in obtaining the above listed information and engaging with Iwi is further outlined in Section 2.1 of the CIA. Of the 8 Iwi identified as having associations with the area and Maitai River, only Ngati Kuia kit e Ra To Trust provided feedback and a formal response (and report), however Ngati Apa kit e Ra To Trust advised it would support Ngati Kuia engagement.
- 2.4.5. The feedback received from Ngati Kuia is summarised in the CIA report which also contains a list of *'potential measures to avoid, remedy or mitigate adverse effects'*. The draft CIA report was circulated back to all 8 Iwi for feedback prior to the CIA being finalised. This involved step 6 of the methodology.
- 2.4.6. In summary, the applicant sought and engaged a suitably qualified and experienced specialist (Chetham Consulting Limited) to help it fulfil its obligations and to undertake genuine and meaningful consultation over this significant project. The process followed and the feedback received is set out in the *Cultural Impact Assessment* provided within **Attachment O**.
- 2.4.7. In November 2015 the applicant wrote to each of the following listed stakeholders to initiate discussion about the forthcoming renewals process:
- Department of Conservation,
 - Friends of Nelson Haven & Tasman Bay Inc.,
 - Nelson-Tasman Fish & Game,
 - Nelson Tasman Forest & Bird, and
 - Friends of the Maitai Inc.
- 2.4.8. A summary of the feedback received from each of the parties contacted is provided below.

Department of Conservation

- 2.4.9. On 20 January 2016 the applicant met with Lionel Solly from the Department of Conservation. This meeting was followed by an email from Lionel setting out the following feedback:

Hi Mark & Jeremy

Further to this afternoon's meeting, here's a brief note confirming DOC's main interests in respect of the permit renewals:

1. *Maintenance of fish passage, including on-going provision for trap & transfer of up-stream migrating eels at the Maitai Dam, or other methods that provide for effective upstream passage.*
2. *Flow regimes downstream of the Dam / intake structures, both in terms of minimum residual flows and flow variability – e.g. provision for release of freshes*

or flushing flows to manage build-up of periphyton and to avoid long periods when flows are 'flatlined'.

3. *Maintenance (and where necessary enhancement) of water quality, particularly for backfeed to South Branch of Maitai River.*
4. *Management (and enhancement) of water quality in Maitai reservoir, both to improve habitat quality within the reservoir itself, and to assist in management of water quality in South Branch (from backfeed) and downstream of the Dam.*
5. *Compliance with (and effectiveness of) existing consent conditions in respect of the above, including results of any monitoring programmes on ecological effects of the dam/water abstractions, and any recommendations arising therefrom.*

Items 1, 2 and 5 relate to both the Maitai and Roding Rivers, whilst items 3 and 4 are more specific to the Maitai.

Where there are adverse effects that cannot be adequately avoided, remedied or mitigated through management of the water takes themselves, then other measures to improve habitat quality (e.g. riparian planting) may be considered; although NCC already has non-regulatory programmes in place that support this (Project Maitai/Mahitahi and Nelson Nature).

As noted this afternoon, DOC had relatively little involvement when the consents were last renewed (in the 1990s); and although DOC initially opposed the Maitai Dam consent renewals, the submission was withdrawn after agreement was reached in respect of matters relating to eel passage and provision of funding for a habitat enhancement programme in the Maitai River.

I also noted that the matters currently of interest to DOC have been (or are being) addressed in the various reports prepared for [N]CC by the Cawthron Institute (and others); and there's probably little that we can add to that body of work.

I don't see any particular need for further consultation ahead of the application being prepared/lodged in March, but I will be happy to have a look at a draft of the application and any volunteered consent conditions (checking with our fw [freshwater] team as necessary) once they're further developed, if that would be helpful.

2.4.10. On 10 April 2016 the applicant made available the comprehensive Cawthron Report 2810 to DOC.

2.4.11. Further feedback was received from Martin Rutledge from DOC on 20 May 2016:

I think the reports provide strong scientific evidence to support increased minimum flows and improvements to fish passage in both rivers. In the case of the Maitai River improved water quality and ecosystem health downstream of the dam and within the dam itself is also dependent on the installation of an aeration system to break down stratification which currently is degrading water quality with adverse effect on aquatic life.

Maitai: for at risk native fish such as the torrentfish (a flow demanding species) increasing the minimum flow to at least 220lps would provide significant benefits, as well as improving ecosystem health more generally (including the fish and invertebrate fauna). Besides achieving higher quality water for release from the dam into the Maitai, significantly increasing the proportion of the relatively pristine South Branch water released into the river will further enhance water quality and the invertebrate fauna (the food engine for the system). The level at which water is taken from the reservoir should also be managed to optimise temperature, oxygen and other water quality regimes for ecosystem health.

The sooner an aeration system could be installed the better – with the necessary trials to confirm its effectiveness.

The report suggests that flushing flow releases are not likely to provide significant mobilisation of periphyton, however when cyanobacterial growths develop this might provide an opportunity for some trials when the public (and ecosystem) would derive maximum benefit.

Some fish passage improvements have been made in getting elvers and koaro up the dam, but the recommendation for a trap and transfer system to get greater numbers of these and additional species upstream is supported. At the same time other options for further improving passage could be investigated. This also applies to the S. Branch weir where trap and transfer is recommended to augment upstream native fish populations with a monitoring programme to confirm effectiveness and further adaptation as necessary.

Suggestions for trout population augmentation?

This is tricky because more trout from any releases will mean less native fish; so while native fish might respond to improved water quality and quantity allowed by increased flows/aeration, trout predation and competition with native will remove these benefits. Discussions with Fish and Game and the broader community of interest would be needed to discuss merits and options.

Nelson-Marlborough Fish & Game (NMF&G)

- 2.4.12. NMF&G informally advised late in 2015 that it would await the public notification before getting involved and providing feedback. However, in April 2016 the applicant again contacted NMF&G to discuss the option of undertaking fishery enhancement. Only informal feedback has currently been received.

Nelson-Marlborough Forest & Bird (F&B)

- 2.4.13. While expressing a strong interest in this application the NMF&B decided it would be happy to wait for the application to be publicly notified before becoming involved and giving feedback. Notwithstanding this the Council also provided NMF&B with a copy of the final Cawthron Report 2810 well in advance of the application for resource consent being completed.

Friends of Nelson Haven & Tasman Bay Inc. (FNHTB)

- 2.4.14. On 10 April 2016 FNHTB made contact with Landmark Lile via telephone in response to the consultation letter of November 2015. FNHTB then clarified that it would appreciate receiving a copy of the final Cawthron reports, which were emailed out to all stakeholders on the same day.
- 2.4.15. FNHTB also confirmed on 10 April 2016 that, aside from receiving the Cawthron reports, no further consultation before lodgement is necessary. They advised that they are happy to wait until the application has been lodged and notified before deciding whether to become involved further.

Friends of the Maitai (FM)

- 2.4.16. Early in April 2016 the applicant contacted FM and made contact by telephone. It was agreed that the final Cawthron Report 2810 would be provided to FM as soon as it became available. This was emailed to FM on 10 April 2016.

Recreational Groups and Users

- 2.4.17. While no specific recreational user group organisations were consulted, the applicant undertook a survey of recreational users and nearby landowners as a part of the work undertaken by Rob Greenaway & Associates Limited. This report is provided in support of this application (see **Attachment P**).

Tasman District Council (TDC)

- 2.4.18. An initial meeting with the TDC was held on 11 December 2015. This meeting was arranged for the purpose of discussing the forthcoming resource consent processes

for the Maitai and Roding water permits. The meeting involved broad discussion about the water issues facing both Councils.

2.5. Overview of the Proposal

2.5.1. This resource consent application seeks new consents to replace the various existing consents that currently authorise the presence and operation of the public water supply scheme on the Maitai River (involving the North and South Branches). In the case of the discharge of scour water from the pipeline, and for water vented from surge towers to water or to land where it may enter water, this is an application for a new resource consent (discharge permit).

2.5.2. It is anticipated and accepted that this is likely to be a “start afresh” assessment process with all relevant resource management aspects of the scheme being considered. It is also accepted that the relevance and appropriateness of the existing consent conditions, including approach, structure and numerical values, be considered.

2.5.3. In section 3 of this application the following required consents are listed:

- Land use consents: The Maitai Dam and the South Branch Weir;
- Water Permits: To dam and divert water, and to take water from the Reservoir and the South Branch in accordance with the flow regime in AP28.3; and
- Discharge Permits: To discharge compensation water to the South Branch via the backfeed. To discharge flow enhancement water, scour water and overflow from the mixing box. To discharge scour water and surge tower water from the pipelines to land and/or water.

2.5.4. In terms of duration (s123), the period for which consent is sought is 35 years from the date that the consent is granted given that the activities have commenced. A 35 year consent is sought in recognition of the value of the investment and the importance of this water supply scheme to Nelson City.

2.5.5. This application seeks consent (where necessary) for the activities associated with the entire water supply scheme, as described under Section 2.1 under the heading ‘*The Nelson Water Supply Scheme*’. The consents required are outlined in Section 3.0 of this application. It is under this subheading that the system is described in terms of changes and improvements now proposed. Following consideration of a range of options (alternatives), each of these are identified by Cawthron (Cawthron Report 2810) as being “*the most relevant for minimising effects of the scheme’s operations*” (page vi, Cawthron, **Attachment I**).

1. **Backfeed management**: *Management of the reservoir outflows through implementing a 50% DO minimum for backfeed waters could also act to reduce the output of dissolved iron and manganese to the Maitai River. This could be considered as an alternative strategy to aeration, but could result in slight warming of the river during late summer, although this is thought to be minor. However some consideration of consent temperature conditions would have to be made for this option.*
2. **Reservoir aeration**: *Reversal of issues associated with deoxygenation (e.g. dissolved metals) would require intervention by increasing DO in the Maitai Reservoir bottom over the summer stratified period. Typically this is done through hypolimnetic aeration or aeration mixing. There are documented cases for reservoirs in New Zealand and internationally which would provide useful background knowledge. Aeration mixing would improve both the water quality for water backfed to the Maitai River, and result*

in a catchment-wide restoration outcome. Nelson City Council has funded a detailed investigation into the technical design and costs of such a system, with two viable options identified.

3. **River flows:** Consideration is suggested around increasing the minimum flow in the Maitai River below the dam, to maintain in-stream values closer to natural levels. Increasing the minimum flow to about the magnitude of the current MALF would substantially increase the level of habitat retention for torrentfish (to 59% of naturalised MALF) and other fish species. Alternatively, the existing practise of maintaining flows above the minimum flow level as much as possible could be continued and perhaps formalised in some way, particularly during years in which water storage in the reservoir appears to be available for this use.

The feasibility of providing additional flushing flow releases from the Maitai Dam during prolonged periods of low flow, to flush fine sediment and periphyton accumulations from the riverbed was considered. Flow releases of up to 3.5 m³/s from the Maitai Reservoir have the potential to increase the flushing effectiveness in the upper river by topping up floods in the 1.5–3 m³/s range; these events occur regularly in most summers. However, they are likely to be less effective in the lower reaches because of the infrequency of natural flow events large enough (> 14 m³/s) to flush the river. Therefore it is unlikely that flow releases from the dam will have much impact on cyanobacterial blooms that occur predominantly in the mid-lower river. Consideration would also need to be made around water-use efficiency, as any water used for flushing-flow releases decreases the amount of stored water in the Maitai Reservoir that are available to augment minimum flows.

4. **Fish passage:** Improvement in fish passage for eels and kōaro over the weir and spillway has partially been completed through installing a spat rope over the length of the spillway face, and a pump to keep the face wetted during periods when the reservoir levels are below the spillway crest. This appears to be facilitating better passage, albeit only low numbers of eels have been observed to date. These improvements could result in greater fish abundances in the reservoir and North Branch tributary. The backfeed weir modifications also appear to facilitate enabling eels to pass the structure, with some minor adjustments needed to minimise fish becoming stranded near the backfeed attractant flow. Given the relatively low numbers observed successfully ascending the spillway, we recommend manual trap and transfer operations be continued to move juvenile fish past the dam. This should also facilitate movement of a wider range of species (kōaro, redfin bullies) past the dam.
5. **Fishery enhancement:** The Maitai River brown trout population has declined over the past two decades and no longer supports a productive fishery. It is unclear what (if any) impact the Maitai Reservoir has had on the fishery - although it is possible that changes in invertebrate communities, observed for some distance below the backfeed discharge, have reduced the quality of the invertebrate food base for trout. The biannual release of 100 'takeable' sized brown trout (i.e. > 500 g) in the mid-catchment could adequately mitigate for the declining value of the Maitai River fishery. The increased predation pressure on native fish populations, as a result of hatchery releases in the midcatchment, could be offset by trout removal in the Maitai Reservoir and North Branch upstream of the dam which is impassable by trout. This action would also support native fish passage improvement initiatives in the Maitai North Branch.

2.5.6. The applicant recognises the importance of the changes and is committed to developing solutions, subject to the further discussion on these items that is provided below.

2.5.7. The strategy of backfeed management provides for some improved outcomes in the backfeed discharge but does not have any effect on the environmental conditions within the reservoir itself. It is a measure that is achievable within a relatively short period of time and will yield some environmental improvements.

- 2.5.8. Council will review options to improve dissolved oxygen levels in the backfeed from the Maitai Dam by implementing one or more of the following alternatives:
- making operational changes to the intake structure; and/or
 - selection of the intake level to source more oxygenated water; and/or
 - aerating the backfeed water prior to discharge.
- 2.5.9. This review will be in conjunction with further analysis of the options for reservoir aeration. Measures that Council identify as practicable and affordable will be implemented as soon as possible while the more detailed review of aeration options for the reservoir is underway.
- 2.5.10. Council has commissioned a detailed engineering evaluation of options to improve oxygenation of the Maitai Reservoir - either generally or in the hypolimnion. This work will take place 2015/16 - 2016/17 and be based on the '*destratification mixing and hypolimnetic aeration*' investigation of Cawthron in September 2015 (refer to **Attachment K**). Should a feasible option be identified the appropriate consultation with the community (*through the Annual Plan process*) will be undertaken as a part of selecting and implementing the preferred option. In essence, this commitment to improving the quality of discharge quality (via the backfeed) is considered to represent the selection of the best practicable option:
- best practicable option, in relation to a discharge of a contaminant or an emission of noise, means the best method for preventing or minimising the adverse effects on the environment having regard, among other things, to—*
- (a) *the nature of the discharge or emission and the sensitivity of the receiving environment to adverse effects; and*
 - (b) *the financial implications, and the effects on the environment, of that option when compared with other options; and*
 - (c) *the current state of technical knowledge and the likelihood that the option can be successfully applied.*
- 2.5.11. Council plans to undertake an assessment of flows from the North Branch and South Branch plus the Roding River with a commitment to increase the minimum flow in the Maitai River at the forks to 228-235l/s if 60 year drought security can be maintained for the raw water supply.
- 2.5.12. Council will continue to undertake fish passage improvements past structures - Maitai dam on the North Branch and Intake structure on the South Branch, in conjunction with the best practice advice from Cawthron, iwi, Department of Conservation and Fish and Game NZ.
- 2.5.13. Council will continue to undertake the 'trap and transfer' programme for eels from the Maitai River into the dam reservoir, particularly juveniles and expand the programme to include native species in consultation with iwi and Department of Conservation. Transfer operations will be reported to iwi. Council will undertake the release of brown trout into the mid-reaches of the river in conjunction the Fish and Game NZ and control brown trout within the Maitai Reservoir and North Branch to the extent this is practicable and affordable.
- 2.5.14. The above listed improvements to the operation of the system are consistent with those measures sought by Ngati Kuia in the Cultural Impact Assessment (**Attachment O**, Section 6, p17-18).

Alternative Methods and Locations of Discharge

- 2.5.15. Schedule 4 requires the identification of alternative locations and methods of discharge.
- 2.5.16. The attached Cawthron report (**Attachment I**) explores the alternative methods of discharge in detail. These are summarised above and in Section 6 below.
- 2.5.17. The location of the existing discharges have been long established. Other locations within the South Brach and Main Stem have been considered but have been discounted as they would not resolve the existing effects and would only replicate the existing effects in a new location.

3. Consents Sought and Activity Status

- 3.1. As set out in Section 2.0, this application for resource consent has sought to canvass all those activities that currently form a physical or operational part of the community water supply for Nelson City involving the Maitai River (North and South Branch). It is the applicant's open intention to avoid the need for any additional resource consents for the operation of this community water supply. There are no additional resource consents needed for the operation of the Maitai Water Scheme that have not been applied for.
- 3.2. The various activities that make up the community water supply in Nelson City are, within this section, linked to Sections 9, 13, 14 and 15 of the Act, along with the relevant rules of the Nelson Resource Management Plan. It is within this section that the various *types* of resource consents (Section 87) are identified, along with the status/classes of the activities sought. For assistance, these new consents are identified as replacements to the various specific existing consents (with relevant current resource consent numbers provided).

Sections 9 and 13 (Land Use Consent)

- 3.3. Sections 9 and 13 of the Act set out the "*Restrictions on the use of land*". These restrictions are then applied within rules of district plans and regional plans. As set out in Section 5 and 7.5, the Nelson Resource Management Plan contains both district and regional rules as a consequence of the NCC being a Unitary Authority and having a combined district and regional plan (NRMP, AB5, 1-p5).
- 3.4. The regional rules that address those activities listed in Section 13 of the RM Act 1991, such as placing a structure in the bed of a river, are contained in the Freshwater Plan (Appendix 28) of the NRMP. The Section 9 land use rules are contained in the Zone Chapters, in this case Chapter 12 for the *Rural Zone*.
- 3.5. In Section 5 of this application the site is described as being the subject of Designation DN3. This designation enables the construction, operation, maintenance and upgrading of existing and future water supply installations and so no resource consent is required under Section 9 or the underlying Rural Zoning. The land use is a permitted activity pursuant to Section 176 of the Resource Management Act 1991.
- 3.6. Section 13 of the Act however remains of relevance as, despite DN3 and the fact that the dam and all associated structures within the bed of the Maitai River North and South Branch were legally established, existing use rights do not apply to regional rules. Therefore, resource consent (land use) must again be obtained for a structure that occupies the bed of the river unless a regional rule says otherwise.
- 3.7. Freshwater Rule FWr.4 is a regional rule and provides for, as a permitted activity, the:

"Maintenance or replacement of any lawfully established structure (as associated deposition and armouring) on, under, over or in the bed of a river or lake" (FWr.4.1, A28-32)
- 3.8. This permitted activity status is dependent on five conditions, each of which relate to the nature and timing of physical works. As no physical works are proposed (other than the intention to continue to improve fish passage), it is assessed that many of the existing structures remain permitted activities pursuant to Section 13 of the Act. For example, the existing water supply pipelines and flow measurement structures were legally established and so can benefit from permitted activity status under FWr.4. The improvements to fish passage are provided for as part of the application for replacement consents for the Maitai Dam and South Branch Weir under rule FWr.6 which is addressed below.

- 3.9. The more recent maintenance works undertaken as a part of improving fish passage have been undertaken as provided for by the existing consents, and will remain in place under Section 124 of the Act. A future ability to improve fish passage is again sought as a part of the application to dam water under rule FWr.6. FWr.1 provides for the disturbance of the beds of rivers for the purpose of *'restoration or enhancement of natural in-stream or out-of-stream values, including fish passage'*. Any further planned fish passage enhancement works, as described in **Attachments L and M**, will also benefit from these permissive rules. Note: RM960396 explicitly allows such works to be carried out.
- 3.10. Rule FWr.4 is headed *'Maintenance, replacement, upgrade and removal of structures in the beds of rivers and lakes and their margins (excluding dams)'*. While no part of the actual rule refers to dams, it clearly intends that 'dams' be excluded from this regional rule. FWr.6 *'Instream Dams'* therefore applies. For clarification, Chapter 2 *'Meaning of Words'* includes the relevant definition:

"Dam – means any structure which impounds water, including weirs". (Chapter 2, p7)

- 3.11. The weir on the South Branch is therefore also deemed to be a 'dam'.

- 3.12. FWr.6 specifically provides:

"An instream dam (of any height) on the Roding or Maitai rivers, for the purpose of reticulated urban water supply, is a discretionary activity". (FWr.6.3, A28-40)

- 3.13. The Explanation to this rule provides further context:

"A dam on the Roding River is listed as discretionary rather than as a non-complying activity to acknowledge that there is an existing designation on the land adjacent to the Roding River for water supply purposes in the Conservation Zone and water supply purposes and works in the Rural Zone.

The reason for dams on some rivers being listed as a non-complying activity is that a more rigorous consent process is considered necessary for construction of dams where rivers have high ecological values.

Dams less than two metres are generally less likely to have adverse effects than larger dams.

The effects of dams depend on what fish are in a river, but generally out-of-bed dams are more acceptable than those in river beds.

While dams and reservoirs have the potential to improve the efficient use of water (through water harvesting), as physical structures they also have the potential to: affect fish passage, disturb water quality (during construction), affect water chemistry (such as oxygen levels), trap sediment and starve the downstream reaches of sediment, and cause a safety hazard if not engineered to specific standards".

- 3.14. Land use consent for the existing dams on both the North and South Branch is therefore again sought, with this component being a *discretionary activity* pursuant to FWr.6.3. FWr.4.1 provides that all other authorised structures can benefit from the permitted activity status.**

Section 14 (Water Permit)

- 3.15. Section 14 of the Act contains the *"Restrictions relating to water"*. This section relates to the taking, using, damming or diverting of water, including fresh water, with reference to the rules contained in a regional plan, proposed regional plan, or a resource consent.

- 3.16. The NRMP regulates these activities within rules of the Freshwater Plan, contained within Appendix 28 of the NRMP. Freshwater Rule FWr.12 is the relevant rule as it regulates the “Take, use, or diversion of surface water”. The Plan permits taking up to 1m³ per residential and up to 0.5 litres per second for reasonable domestic use. As a *restricted discretionary activity*, FWr.12.3 provides for:

Any take, use or diversion of surface water that contravenes a permitted condition is a restricted discretionary activity if:

- i) the relevant conditions in Appendix 28.3 are met, and*
- ii) the take or use does not exceed, individually or cumulatively, the allocation limits specified in Appendix 28.2, and*
- iii) the diversion does not cause any river to drop below the minimum flow specified in Appendix 28.2, and*
- iv) the distance between intake and return of the water does not exceed 500 metres, and*
- iv) the diversion of water is not from one waterbody to another.*

- 3.17. Setting aside the water diverted from the North branch to the South Branch (the compensation water), the current water takes comply with clauses (i)-(iii) above and so are entirely anticipated by the Plan and so inherently provided for. The diversion of compensation water from the North Branch to the South Branch exceeds 500m, being approximately 685m, and is also from one waterbody (the reservoir) to another (the South Branch). As such, this activity cascades to the *discretionary activity* status.

- 3.18. In summary, the applicant seeks a Water Permit for the taking, use, damming and diversion of water from the Maitai River (both North and South branches) as described in detail in Section 2 above. These two locations are identified as Water Take Point #2 and #1 on Map 4, respectively. The Plan provides for the take from both the North and South branch as a restricted discretionary activity. With the exception of the diversion, the proposed takes are entirely contemplated by the Plan, in recognition of the significance of the abstraction for public water supply purposes. If it weren't for the diversion from the North to South Branch, FWr.12.3 states that the application is to be processed non-notified and without approval of affected persons.**

- 3.19. The activities that exceed the allocation limits in Appendix 28.2, take water below the specific minimum flow regime, or involve wetlands, each trigger the non-complying status. Of note, ‘Prohibited’ status is identified for:

All takes downstream from the NCC urban water supply intakes in the Maitai River and in the downstream reach of the Roding River within the NCC boundary, which did not exist prior to 9 October 2004 are prohibited.

Section 15 (Discharge Consent)

- 3.20. Section 15 is headed ‘Discharge of contaminants in environment’ and it is here that the Act establishes that no discharge of contaminants to water, land or air is permitted unless expressly allowed by a NES, regulations, regional plan or a resource consent. In terms of the discharge of water to land and fresh water, the Freshwater Plan (Appendix 28 of the NRMP) also contains these regional rules.
- 3.21. Freshwater Rule FWr.20 is headed ‘Point source discharges to freshwater bodies (other than stormwater)’. Rule FWr.20 provides that the discharge, after reasonable mixing, to Class A

water is a *permitted activity*, the discharge to Class B is *controlled activity*, and the discharge to Class C is a *restricted discretionary activity*. Other discharges, excluding those listed as non-complying or prohibited, are to be assessed as discretionary.

- 3.22. In Section 2.2 of this application the current nature of discharges to the South and North Branch are described, being a summary of the detailed ecological assessment undertaken by Cawthron. After reasonable mixing, the South Branch discharge (the backfeed) at Discharge Point #1 on Map 4 is currently considered to be a *discretionary activity* as a consequence of a variety of reasons set out in the Cawthron Report 2810. Despite the applicant proposing some improvements to the system to improve the quality of the backfeed water discharged to the South Branch, consent is sought as a *discretionary activity* as there remains some uncertainty as to whether these best practicable methods will, at all times, maintain the existing Class C water quality standards. Refer to Table 25 of the Cawthron Report 2810 (**Attachment I**)
- 3.23. As set out in section 2.2 above, the current discharge of scour water, mixing box overflow, and enhancement water from the Reservoir to the historic North Branch channel below the dam (Discharge Point #3 on Map 4) is currently considered to be a Restricted Discretionary Activity. This is because the discharges are into Class C water and will retain the Class C water quality standards.
- 3.24. The current discharge from the overflow spillway to the South Branch (Discharge Point #2 on Map 4) is currently considered to be a discretionary activity. The primary adverse effect that the spillway has on water properties is to increase water temperature. The Cawthron Report 2810 in **Attachment I** reported an average temperature increase of 1.11°C from above to below the spillway discharge point. No changes are proposed to that activity, but it is observed that the potential magnitude of warming may be reduced to some extent if the reservoir water was kept well mixed during summer. The report also observes that shading of the spillway may also help reduce the heating influence of the spillway discharge.
- 3.25. The occasional discharges of water and gravel and sediment to land and/or water is considered to be a *restricted discretionary activity*. The discharges are very infrequent and involve very small volumes but nevertheless require authorisation by discharge permit.

Resource Management (Measurement and reporting of Water Takes) Regulations 2010

- 3.26. The regulations impose minimum requirements on the holders of certain water permits to keep and provide records of fresh water taken under the permits. The regulations apply to permits that allow fresh water to be taken at a rate of 5 litres/second or more.
- 3.27. Approvals are required under Regulation 10 for three meter locations to allow these to be near (instead of at) the location from which water is taken.

SUMMARY

3.28. The following Table summarises the consents sought and how these relate to the Act, the NRMP and the current consents.

ACTIVITY	NRMP Rule & Status	Section (RMA)	Current Consent(s)	Details
Dam water	FWr.6 Discretionary	14	RM960396	Dam the South Branch
			RM025151/1	Dam the North Branch
Divert water	FWr.12	14	RM960396	Divert the flow of the South Branch over the weir
			RM025151/1	Divert the flow of the North Branch over the dam spillways and to the South Branch via the backfeed
Take	FWr.12 Discretionary	14	RM960396	Take up to 300l/sec from South Branch
			RM025151/2	Take full flow of the North Branch
Discharge	FWr.20 Discretionary	15	RM960396	Up to 400l/sec to South Branch
			RM025151/3	Scour water, mixing box overflow, enhancement water from the Reservoir to the historic North Branch channel below the dam whereafter it flows into the Maitai River at the forks
			RM025151/4	From the Reservoir overflow spillways to the South Branch
				Water, sediment and gravel from pipeline service valves and surge towers to water or to land where it may enter water
Land Use	FWr.4 Permitted	13	RM025151/1	Maintain structures on the North Branch
			RM960396	Maintain structures on the South Branch
Land Use	DN3 Permitted	9 & s176	-----	Construction, operation, maintenance and upgrading of existing and future water supply installations

3.29. This application must be considered overall as a *discretionary activity*. The relevant statutory framework and considerations are outlined in Section 4.0 below.

3.30. Approvals are sought under Regulation 10 of the Resource Management (Measurement and Reporting of Water Takes) Regulations 2010 to allow water measuring devices to be installed near the location from which water is taken (instead of at that location). The approvals

required are not resource consents but are to be provided by written notice from the consent authority under Reg 10(2).

3.31. The three flow measuring devices are:

- the South Branch flowmeter, measuring water taken for urban water supply from the South Branch of the Maitai River;
- dam supply flowmeter, measuring water taken for urban water supply from the dam; and
- Backfeed flowmeter, measuring water drawn from the dam for the purposes of replacing water taken from the South Branch to maintain minimum flows in the Maitai River.

4. Statutory Framework and Considerations

- 4.1. This application for resource consent for the Nelson City community water supply is made pursuant to Section 88 (Part 6) of the Resource Management Act 1991. It is within Part 6 of the Act that the statutory framework and relevant considerations are set out.
- 4.2. Section 88 and the Schedule 4 of the Act require an application to be in the prescribed form of an application and the information that must be included. These specific matters are listed in Section 4.12 of this application, with a linkage to where the necessary information is located within this application for resource consent.
- 4.3. The status/class of the activities are outlined in Section 3 of this application as follows:
- Land Use: Discretionary Activity
 - Water Permit: Discretionary Activity
 - Discharge Consent: Discretionary Activity
- 4.4. Section 87A of the Act 'Class of activities' requires that for discretionary activities:
- (4) *If an activity is described in this Act, regulations (including any national environmental standard), a plan, or a proposed plan as a discretionary activity, a resource consent is required for the activity and—*
- (a) *the consent authority may decline the consent or grant the consent with or without conditions; and*
 - (b) *if granted, the activity must comply with the requirements, conditions, and permissions, if any, specified in the Act, regulations, plan, or proposed plan.*
- 4.5. Section 104 of the Act contains those matters that the Consent Authority must have regard to when considering applications:

104 Consideration of applications

- (1) *When considering an application for a resource consent and any submissions received, the consent authority must, subject to Part 2, have regard to—*
- (a) *any actual and potential effects on the environment of allowing the activity; and*
 - (b) *any relevant provisions of—*
 - (i) *a national environmental standard;*
 - (ii) *other regulations;*
 - (iii) *a national policy statement;*
 - (iv) *a New Zealand coastal policy statement;*
 - (v) *a regional policy statement or proposed regional policy statement;*
 - (vi) *a plan or proposed plan; and*
 - (c) *any other matter the consent authority considers relevant and reasonably necessary to determine the application.*
- (2) *When forming an opinion for the purposes of subsection (1)(a), a consent authority may disregard an adverse effect of the activity on the environment if a national environmental standard or the plan permits an activity with that effect.*
- (2A) *When considering an application affected by section 124 or 165ZH(1)(c), the consent authority must have regard to the value of the investment of the existing consent holder.*
- (2B) *When considering a resource consent application for an activity in an area within the scope of a planning document prepared by a customary marine title group under section 85 of the Marine and Coastal Area (Takutai Moana) Act 2011, a consent authority must have regard to any resource management matters set out in that planning document.*

- (2C) *Subsection (2B) applies until such time as the regional council, in the case of a consent authority that is a regional council, has completed its obligations in relation to its regional planning documents under section 93 of the Marine and Coastal Area (Takutai Moana) Act 2011.*
- (3) *A consent authority must not,—*
- (a) *when considering an application, have regard to—*
 - (i) *trade competition or the effects of trade competition; or*
 - (ii) *any effect on a person who has given written approval to the application:*
 - (b) *[Repealed]*
 - (c) *grant a resource consent contrary to—*
 - (i) *section 107, 107A, or 217:*
 - (ii) *an Order in Council in force under section 152:*
 - (iii) *any regulations:*
 - (iv) *wāhi tapu conditions included in a customary marine title order or agreement:*
 - (v) *section 55(2) of the Marine and Coastal Area (Takutai Moana) Act 2011:*
 - (d) *grant a resource consent if the application should have been notified and was not.*
- (4) *A consent authority considering an application must ignore subsection (3)(a)(ii) if the person withdraws the approval in a written notice received by the consent authority before the date of the hearing, if there is one, or, if there is not, before the application is determined.*
- (5) *A consent authority may grant a resource consent on the basis that the activity is a controlled activity, a restricted discretionary activity, a discretionary activity, or a non-complying activity, regardless of what type of activity the application was expressed to be for.*
- (6) *A consent authority may decline an application for a resource consent on the grounds that it has inadequate information to determine the application.*
- (7) *In making an assessment on the adequacy of the information, the consent authority must have regard to whether any request made of the applicant for further information or reports resulted in further information or any report being available.*

4.6. Section 104B states that

After considering an application for a resource consent for a discretionary activity or non-complying activity, a consent authority—

- (a) *may grant or refuse the application; and*
- (b) *if it grants the application, may impose conditions under section 108.*

4.7. Section 108 sets out the wide range of conditions that may be imposed on the grant of resource consents. Of particular relevance to this application for discharge consent, Section 108(2)(e) allows a condition to require the holder to adopt the best practicable option to prevent or minimise any actual or potential effect on the environment, while Section 108(8) imposes a further matter to consider before such a condition under 2(e) is imposed:

- (8) *Before deciding to grant a discharge permit or a coastal permit to do something that would otherwise contravene section 15 (relating to the discharge of contaminants) or 15B subject to a condition described in subsection (2)(e), the consent authority shall be satisfied that, in the particular circumstances and having regard to—*

- (a) *the nature of the discharge and the receiving environment; and*
- (b) *other alternatives, including any condition requiring the observance of minimum standards of quality of the receiving environment—*

the inclusion of that condition is the most efficient and effective means of preventing or minimising any actual or likely adverse effect on the environment.

4.8. Section 107 is as follows:

107 Restriction on grant of certain discharge permits

- (1) *Except as provided in subsection (2), a consent authority shall not grant a discharge permit or a coastal permit to do something that would otherwise contravene section 15 or section 15A allowing—*
- (a) *the discharge of a contaminant or water into water; or*
 - (b) *a discharge of a contaminant onto or into land in circumstances which may result in that contaminant (or any other contaminant emanating as a result of natural processes from that contaminant) entering water; or*
 - (ba) *the dumping in the coastal marine area from any ship, aircraft, or offshore installation of any waste or other matter that is a contaminant,—*
if, after reasonable mixing, the contaminant or water discharged (either by itself or in combination with the same, similar, or other contaminants or water), is likely to give rise to all or any of the following effects in the receiving waters:
 - (c) *the production of any conspicuous oil or grease films, scums or foams, or floatable or suspended materials;*
 - (d) *any conspicuous change in the colour or visual clarity;*
 - (e) *any emission of objectionable odour;*
 - (f) *the rendering of fresh water unsuitable for consumption by farm animals;*
 - (g) *any significant adverse effects on aquatic life.*
- (2) *A consent authority may grant a discharge permit or a coastal permit to do something that would otherwise contravene section 15 or section 15A that may allow any of the effects described in subsection (1) if it is satisfied—*
- (a) *that exceptional circumstances justify the granting of the permit; or*
 - (b) *that the discharge is of a temporary nature; or*
 - (c) *that the discharge is associated with necessary maintenance work—*
and that it is consistent with the purpose of this Act to do so.
- (3) *In addition to any other conditions imposed under this Act, a discharge permit or coastal permit may include conditions requiring the holder of the permit to undertake such works in such stages throughout the term of the permit as will ensure that upon the expiry of the permit the holder can meet the requirements of subsection (1) and of any relevant regional rules.*

4.9. Section 105 also contains further considerations for the consideration of discharge consents:

105 Matters relevant to certain applications

- (1) *If an application is for a discharge permit or coastal permit to do something that would contravene section 15 or section 15B, the consent authority must, in addition to the matters in section 104(1), have regard to—*
- (a) *the nature of the discharge and the sensitivity of the receiving environment to adverse effects; and*
 - (b) *the applicant's reasons for the proposed choice; and*
 - (c) *any possible alternative methods of discharge, including discharge into any other receiving environment.*
- (2) *If an application is for a resource consent for a reclamation, the consent authority must, in addition to the matters in section 104(1), consider whether an esplanade reserve or esplanade strip is appropriate and, if so, impose a condition under section 108(2)(g) on the resource consent.*

4.10. The following table lists the above relevant considerations and identifies where in this application for resource consent the assessment is undertaken.

Section (RMA)	Consideration	Section of this application
88, 104(1)(a), 104D(1)(a)	Actual and potential effects on the environment	Section 6
104(1)	Part 2 Purpose and Principles	Section 8
104(1)(b)	National Environmental Standards	Section 7.3
104(1)(b)	Regulations	Section 2.1 (<i>Regulation 10, Measurement and reporting of water takes</i>)
104(1)(b)	National Policy Statement	Section 7.2
104(1)(b)	Regional Policy Statement	Section 7.3
104(1)(b), 104D(1)(b)(i)	Nelson Resource Management Plan	Section 7.4
104(1)(c)	Other matters	Section 9
104(2)	Permitted activities	Section 3
104(2A)	Value of the investment	Section 2 and 9.9
Section 107	Discharge of contaminants	Section 2, 4, 5, 6
105(1)(a)	nature of the discharge and the sensitivity of the receiving environment	Section 2 and 5
105(1)(b)	applicant's reasons for the proposed choice	Section 2.3
105(1)(c)	any possible alternative methods of discharge	Section 2.3

4.11. In combination, along with the supporting information and technical reports provided within the Attachments, this application is considered to be in the prescribed form (Section 88(2) and Form 9) and satisfy the information's requirements of Section 88 and Schedule 4 of the Act.

5. The Site and Environs

5.1. The Physical Setting

5.1.1. The Maitai Dam is located at the end of Maitai Valley Road, and is some 15km from the Nelson City urban boundary. The location of the Maitai Valley and Maitai Dam is shown on the following topographical plan. The dam location is shown in Figure 5 below, with Figure 6 providing a more localised scale. (NB a more detailed set of maps is provided in **Attachment A**)



Figure 5: Location Plan



Figure 6: Aerial Photo of the dam (in the North Branch) and South Branch.

- 5.1.2. With the construction of the dam on the North Branch of the Maitai River the North branch flow is now split into (a) a virtually constant flow down the backfeed pipe to the weir on the South Branch and (b) the spillway, which flows intermittently, into the plunge pool before merging with the South Branch.
- 5.1.3. The following series of photos (Figures 7 to 10) also serve to support this description of the site and the water supply infrastructure that has been developed and operates in this location.



Figure 7: The Maitai Dam, Reservoir and Spillway



Figure 8: The plunge pool and spillway at the forks. The South Branch enters from the right



Figure 9: The South Branch weir, the intake screen, chamber and backfeed discharge

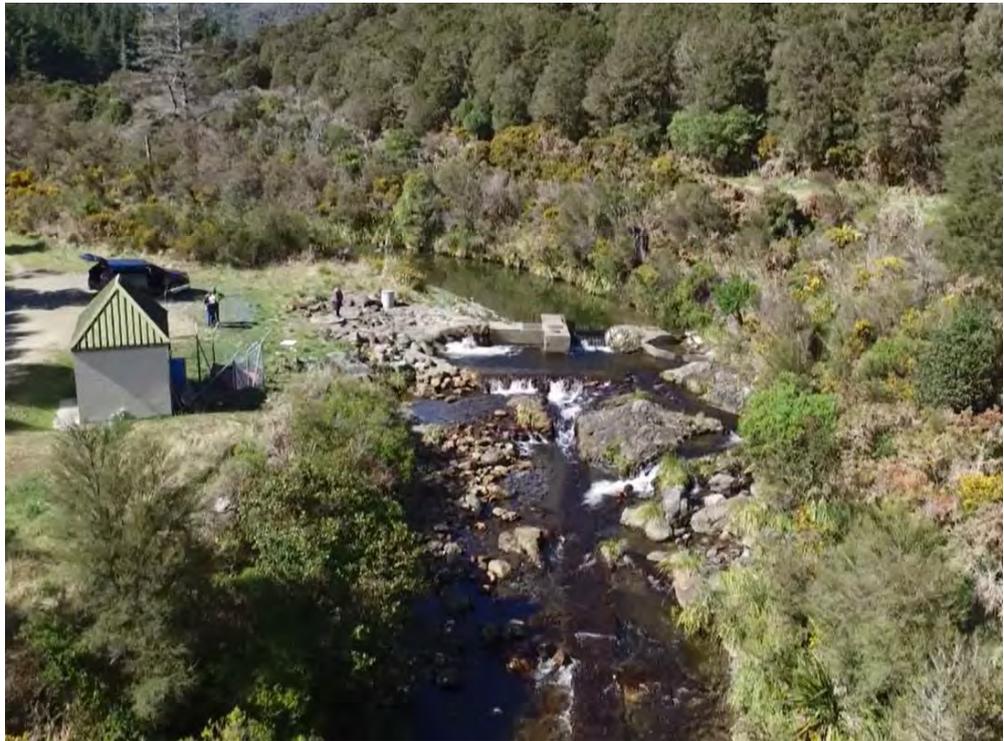


Figure 10: A view up the South Branch across the weir

- 5.1.4. The land occupied by the Maitai Dam and the associated water supply infrastructure is contained within a number of separate Certificates of Title, all owned by the Nelson City Council. Recent copies of these Titles are provide within **Attachment B** and listed in table form below.

	Title	Legal	Size
6	168/99	Section 44 & Section 46-47 Square 18	52.2044ha
7	133/45	Lot 1-2 DP5441	1561m ²
8	133/55	Pt Sec 7, Pt Sec 48-50 and Pt Sec 52 Square 18	80.9724ha
9	1A/267	Sec 60-62 Square 18	6.0867ha
10	69/207	Pt Sec 48-50 Square 18	8094m ²
11	8B/61	Lot 3-4 DP 5441	731m ²
12	133/46	DP3465	26.3299ha
13	74/230	Sec 1 Blk II Maungatapu SD	1178.0399ha
14	88/245	Pt Sec 6 & Pt Sec 8 Sq 18	140.5600ha
15	69/208	Pt Sec 50 Sq 18	8220m ²
16	69/209	Pt Sec 50 & Pt Sec 52	4047m ²
17	None	Sec 1 SO 13551	2.18ha

5.2. The Planning Framework (Nelson Resource Management Plan)

NRMP Maps

- 5.2.1. The site is located on Planning Maps 52, 53, 55 and 56 of the Plan. In terms of the Zoning Maps, the *Rural Zone* extends over the dam and to the eastern boundary of the dam waterbody. The land beyond is located in the Conservation Zone.
- 5.2.2. The Rural Zone also extends up the catchment of the North Branch of the Maitai River and so includes the land up to and slightly beyond the location of the South Branch intake and backfeed.
- 5.2.3. The Zoning Maps also contain other information such as Heritage Overlays and Landscape Overlays. No Landscape Overlays apply to the subject site. Below the dam the Plan does however identify a small cluster of Archaeological Sites (Heritage Overlay), listed below:

Site Number	Description
MS44	Probably kainga area
MS50	Argillite workings under Maitai Dam
MS51	Argillite workings junction of the North and South branches of the Maitai River
MS52	Argillite workings, banks of the Maitai River

- 5.2.4. The left hand side of the Planning Maps contains the same map series but with Overlay information. This split of information is to avoid each planning map containing too much information and so being difficult to read.
- 5.2.5. The subject site is identified on the Overlay Maps as being the subject of Riparian Overlays (covering both the Main Branch and also the South Branch), being the

subject of Designation DN3, and having a 100kV ETL (Electricity Transmission Line) passing down the valley and running south of the Dam. Here is no Hazard Overlay (i.e. Fault Hazard) over the site.

5.2.6. The Riparian Overlay relates directly to Appendix 6 of the NRMP which contains the riparian values (Table 6.1) and also the priority values (Table 6.2) in terms of esplanade requirements. The upper section of the Maitai River (above Poleford Bridge – ~5.2km downstream) is identified in Table 6.1 as having Priority 1 Conservation (aquatic habitat and water quality) Values, Access along River, and Recreation Values.

Water Quality Classifications

5.2.7. The use of water quality classifications are also a significant component of the planning framework. These classifications are provided in Appendix 28.4 of the NRMP. The classifications were applied to the waterbodies through the promulgation of the freshwater plan which was notified in 2004. They were since reviewed in Plan Change 24.

5.2.8. It is important to understand the role and status of the water classifications set out in Appendix 28.4 of the NRMP. The relevant parts of the table in AP28.4, which classifies Nelson waterbodies, is provided in Figures 11 and 12.

Figure 11: Water classification excerpt from NRMP (from page AP28-14)

River	Reach	Riparian margin management values (from Appendix 6)	Associated land uses and values	Water quality classification (2007)	Priority for improvement
Maitai River	The Haven to Jickells Bridge	Conservation Access Hazard mitigation	Lower (Riverside to seaward boundary) <ul style="list-style-type: none"> • stormwater drainage • swimming (health issue) • trout, whitebait and eel fishing • dog swimming • kayaking • whitebait spawning • lwi values • high amenity and recreational value • walkway 	D	First
			Mid (from Riverside to Almond Tree Ford) <ul style="list-style-type: none"> • stormwater drainage • swimming (health issue) • dog-swimming • trout and eel fishing • lwi values • native fisheries • high amenity and recreational value • walkway 	C	First
	Jickells Bridge to Conservation Zone boundary	Conservation Access Hazard mitigation	Mid-Upper (from Almond Tree ford to Motor camp) <ul style="list-style-type: none"> • swimming • trout and eel fishing • dog-swimming • native fisheries • trout fisheries • walkway • lwi values 	C	Third Maintain Upgrade to B where practicable

Figure 12: Water classification excerpt from NRMP (from page AP28-15)

River	Reach	Riparian margin management values (from Appendix 6)	Associated land uses and values	Water quality classification (2007)*	Priority for improvement
Maitai River	Sharlands Creek/Maitai confluence to headwaters	Conservation Access Hazard mitigation	Upper (from Maitai camp and upstream - South branch) <ul style="list-style-type: none"> • native fisheries • urban water supply • trout and eel fishery • trout spawning • Iwi values 	A (South Branch only)	Preserve
	Groom Creek/Maitai confluence to Tanragee Saddle	Access Conservation		B (other reaches)	

5.2.9. The first two columns are clearly for the purpose of identifying the relevant river reach. Columns 3 and 4 then identify the values that are relevant on the riparian margins of the waterbody and for the waterbody itself, respectively. The fifth column identifies the actual classification that is relevant to the reach in question. As set out below it is important to note that this fifth column is intended to identify the actual classification that applies to the waterbody, not the aspirational target or rule based target of what is trying to be achieved. This distinction is further discussed and explained below. Finally the sixth column provides the aspirational target that is relevant for ongoing management and potentially as a policy statement for considering resource consent applications that may seek to reduce the water quality.

5.2.10. It is stated above that the water classification as set out in the plan is not intended, and does not function, as a rule or an aspirational value. Instead it is a record of the actual water quality at the time of writing (or updating) of the NRMP. Although this is not explicitly stated in the NRMP it is clear from the context and also the decision of Plan Change 24. Evidence for this interpretation is set out as follows.

5.2.11. Firstly, the footnote that appears on every page of the AP28.4. The asterisk referencing the footnote can be seen in the fifth column shown in Figures 11 and 12. The footnote reads:

“ Where a water body is not listed in Appendix 28.4, its water quality classification should be determined by assessing a range of physical, chemical and biotic parameters as described in Cawthron Report No. 774 (October 2002). The revised classifications and the reasons for them are shown in Cawthron Report No. 1349 (September 2007).” (emphasis added)*

5.2.12. Secondly, the water classifications were originally determined from the Cawthron report No. 774 entitled “Recommended Freshwater Classification for Nelson” dated 2002. Recommendation 3 of the report states:

“The final step in the classification process is to allocate an appropriate classification to each of the surface waterbodies in the region (Figure 2). In the Nelson region, this involved the use of recent (but limited) background water quality data for many of the waterbodies (Appendix 3) and local knowledge, landuse maps and expert opinion, for others.”(emphasis added)

This passage suggests that the classifications are determined from their biophysical characteristics and not community aspirations for improved water quality. Cawthron report 744 also noted that the classifications initially identified should only be adopted as an interim guideline prior to more data being obtained.

- 5.2.13. Thirdly, NRMP Plan Change 24 updated the classifications (reflecting actual water quality) based on the Cawthron Report No 1349 entitled “*Updated Freshwater Classification for Nelson 2007*” dated 2007. In the *Decisions on Submissions* (on NCC website) Commissioner Allan stated in the discussion section:

“I understand that the listed water quality classification reflects the results of monitoring. That is, the classification represents the existing measured quality of water in the rivers or streams referred to, rather than being aspirational or a classification to work towards. It is the sixth column where any aspirational intention is stated – for example several items formerly listed with a water quality classification of “C” have, in their priority for improvement, “Third, upgrade to Class B where practicable”.”(emphasis added)

- 5.2.14. Turning to the existing applicable water classifications for the upper Maitai River, there are some clear inconsistencies and ambiguities in the excerpts provided in Figures 11 and 12 above. It arises principally because of the reference to “Class B” on page A28-15 (Figure 12). But the correct water classifications can be identified using the supporting documentation that informed the drafting of the NRMP. This is evidenced as follows.
- 5.2.15. Clearly, the dam, weir and backfeed discharge significantly predate the determination of water classifications. As a result of the classifications reflecting the actual quality of the water at the time of assessment, these components of the water scheme have had an effect on the water classifications identified.
- 5.2.16. As stated previously, the North Branch flow is essentially diverted to the weir on the South Branch, along with all of its physicochemical characteristics. With much of the South Branch water being taken the physical South Branch channel carries much of the North Branch flow.
- 5.2.17. It was previously established that the classifications reflect the actual quality of water and not a planning objective or aspirational level of quality. Also as previously stated the classification was originally determined through Cawthron Report 744. That report provided a map that identified the classifications at that time. A portion of the map is reproduced in Figure 13. (NB it is the block shading, not the line colours, that indicate water class.)
- 5.2.18. From this map it can be seen that the South Branch from the weir upstream and North Branch from approximately the head of the reservoir upstream were both Class A. From the weir and the reservoir downstream the river was class B.

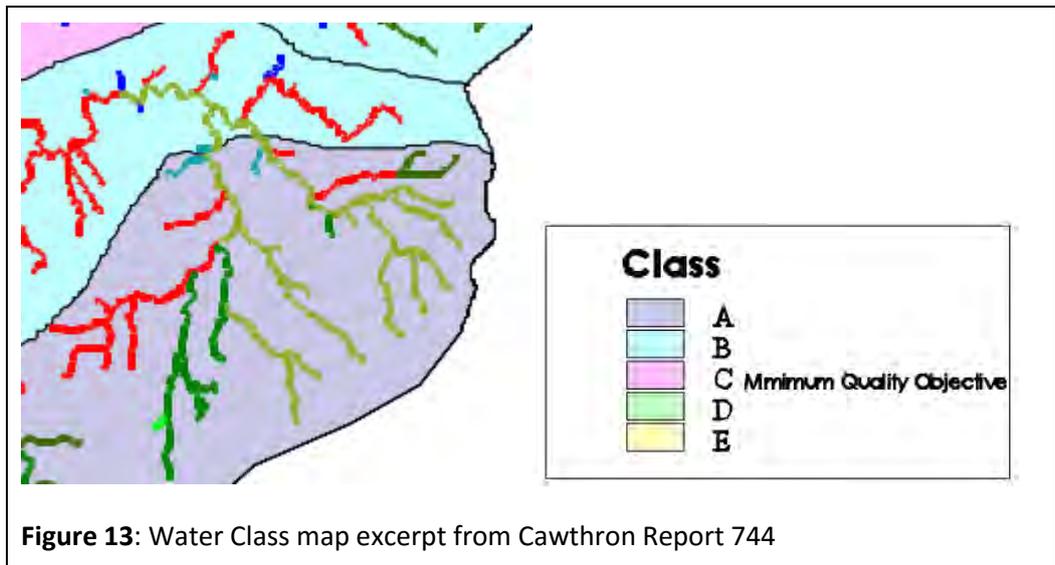


Figure 13: Water Class map excerpt from Cawthron Report 744

- 5.2.19. Water classifications were revised in the 2007 Cawthron Report (No. 1349), which also contained a map. An excerpt is shown in Figure 14 (NB the green on the excerpt of map shown corresponds with class A. There are no class B waterbodies shown on the plan.) Again the line between Class A and (in this case) Class C is shown in the location of the weir on the South Branch and the head of the reservoir on the North Branch.

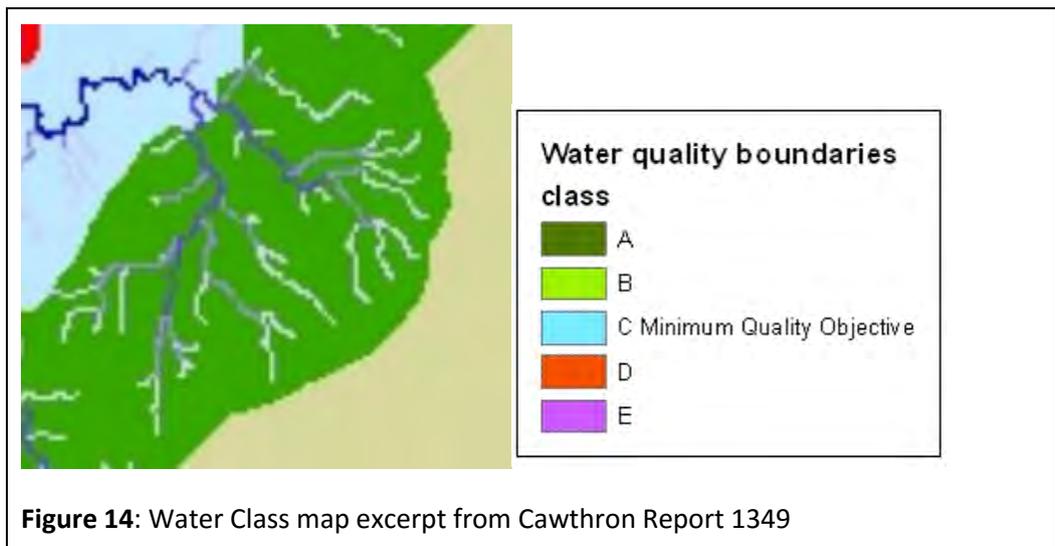


Figure 14: Water Class map excerpt from Cawthron Report 1349

- 5.2.20. Plan Change 24 resulted in the content reproduced in Figure 11 above being added to the NRMP, whereas the content in Figure 12 predated the plan change. The content added via Plan Change 24 states that the Maitai River from Jickells Bridge to the Conservation Zone Boundary has a Class C classification. The conservation zone boundary is aligned with the South Branch weir and the upper margins of the North Branch. Therefore all waters that are affected by the taking or discharge of water are Class C. This is entirely consistent with the approach taken in the map excerpts in Figures 13 and 14 above.

- 5.2.21. The reference to “Class B” in the pre-Plan Change 24 NRMP as shown in Figure 12 above is not clear, but may be intended to apply to the side creeks (Sharlands and Groom Creeks) that flow into the Maitai.
- 5.2.22. In summary, the water classifications that apply to the Maitai River are ambiguous due to inconsistencies in AP28.4, but it is concluded (and accepted by environmental policy and technical staff in NCC) that the upper reaches of the Maitai are Class C, except for the South Branch upwards from the weir and the North Branch upstream from the head of the reservoir, which are in an unmodified state and are Class A. The existing water classification boundaries are shown in Map 4 in the map bundle in **Attachment A**.
- 5.2.23. The meaning and effect of these classifications to freshwater management is set out in section 7.5 of this application.

Reasonable Mixing Zone

- 5.2.24. The Act and the NRMP both provide for the concept of a “mixing zone” and sets out what should be considered to be a reasonable mixing zone. The mixing zone is, relevantly, the distance downstream by which it can be reasonably expected that contaminants will have evenly mixed into a water flow and at which point conditions and performance criteria may thereafter apply.
- 5.2.25. Appendix AP28.7 NRMP states that the maximum size of the mixing zone in the case of discharges to the Maitai River shall be no greater than 100 metres plus the depth of water at the discharge point. With only a shallow local depth the mixing zone is effectively a maximum of 100 metres from the South Branch weir.
- 5.2.26. However, while the NRMP is clear about the applicable mixing zone (the NRMP anticipates that the discharge has mixed at Site A on N Map4), the historic water rights and the discharge permit 960396 which authorised the backfeed discharge explicitly identify the “Site B” (see Map 4 in Attachment A) as being the assessment and compliance site for the purposes of consent conditions. This was previously explained in Section 2 of this application.

Designation DN3

- 5.2.27. Designation DN3 is for water supply purposes and works. The delineation of the designation is shown on Map 2 of the map bundle in **Attachment A**. The following extracts from Appendix further describe the purpose of the designation and the nature of the works:

DN3.2 reason for designation

DN3.2.i The designation for Water supply purposes / Water supply purposes and works is to ensure that important water supply catchments are suitably protected by this designation and that the construction, operation, maintenance and upgrading of existing and future water supply installations is provided for.

DN3.3 nature of the works and restrictions

DN3.3.i Water Supply Purposes - Nelson City’s water supply is abstracted from the surface run off from these areas. No activities will be permitted that are not compatible with this purpose. The level of water treatment provided could eventually allow some flexibility but at present the only treatments provided is coarse screening (1.5mm mesh) followed by chlorination.

DN3.3.ii Water Supply Purposes and Works - this land is held for water supply related purposes. This includes the construction, operation, maintenance and upgrading of pump stations, treatment plants, dams, reservoirs, storage tanks, intakes, pipework, roads, tracks and other

similar or related structures or facilities necessary to abstract, treat, store, supply or convey water for the City Supply.

DN3.4 environmental Effects/Mitigation Measures

DN3.4.i The water supply catchments have high conservation values because of the long term protection provided by Nelson City Council and to maximise water quality.

DN3.4.ii Catchment Management Plans are being prepared to ensure this mutual benefit continues while still recognising that the main purpose of the land is for water supply. (NRMP, Volume 3, Appendix 24-p42, emphasis added)

- 5.2.28. As described in detail in Section 7.5 below, Appendix 28.2 (Flow Regime for specific rivers') of the NRMP specifically identifies the *Management Objectives* of the Maitai River (and Roding River) as being for a public water supply, enhancement (for ecological values) and for recreational use. The 'management objectives' (AP28.2) for these rivers, along with associated objectives, policies and rules, provide for this activity. The taking of water from these rivers for public water supply is enabled by FWr.12, with this activity being a *restricted discretionary activity* that must be processed without written approvals and without notification or service. The water takes must however comply with the flow regime (minimum flows) and allocation rules. Overall, this represents very strong direction as to the importance of this source of water to the community for its health and well-being.

5.3. Characteristics of the Receiving Environment

- 5.3.1. The Cawthron Report 2810 (**Attachment I**) describes the natural and physical characteristics of the Maitai River. This description provides important context to the description of the site and receiving environment, including its sensitivity.

Overview of the Maitai Catchment

Land use in the upper Maitai sub-catchment that comprises drainage to the Maitai Reservoir is dominated by native forest (95%), with small amounts on exotic forest cover localised around the Maitai Reservoir. The middle Maitai sub-catchment is dominated by exotic forest (54%) and native forest (39%), with a small area of pastoral / agricultural land use (4%). The lower Maitai sub-catchment (which includes the Brook) is dominated by native forest (60%), exotic forest (15%), urban / built up areas (14%), and pastoral / agricultural land use (8%). In all three sub-catchments there has been no substantial change in land use since 1996. (Cawthron Report 2810, p7)

Figure 2 displays the FENZ predictions of human pressure on river health in the Maitai catchment. In general, waterways situated in native forest are predicted to have the highest estimates of river health (0.6–1). River health is predicted to decrease with distance downstream as various anthropogenic pressures come into effect, driven mainly by the dominate sub-catchment land use. This is particularly evident in areas dominated by plantation forestry. Streams in the North Branch of the upper Maitai sub-catchment are predicted to be under greater pressure than those in the South Branch, which reflects the influence of the Maitai Reservoir on fish passage (Figure 2).

Pressure from surface water allocation in the Maitai catchment is considered negligible, with minimal abstraction (< 5 L/s) apart from the Nelson Municipal Supply scheme according to a GIS database that describes the extent of surface water allocation in New Zealand in 2011 (Clapcott 2011). (Cawthron Report 2810, p8)

Crowe et al. (2004) provided a comprehensive review on the influence of catchment pressures on the Maitai River including pre- and post-reservoir data. Since then a review undertaken by Allen et al. (2013) has found that nutrients from the backfeed discharge may contribute to cumulative impacts within the catchment (Figure 2, Table 1). However, they suggest that the impact of the

Maitai Reservoir on the mid and lower Maitai River was likely to be comparatively minor when considered in the context of the magnitude and extent of other pressures facing the catchment. These other pressures included plantation forestry in mid-reaches of the river and, in the lower reaches urbanisation (particularly stormwater runoff). (Cawthron Report 2810, p9)

Allen et al. (2013) highlighted three issues arising from the Maitai Reservoir that may affect the wider Maitai River catchment. These were:

- *concentrations of naturally occurring heavy metals (Mn, Fe, nickel and chromium) were higher in the upper Maitai River than in the mid-catchment, with a low to moderate risk that this issue may be exacerbated by the discharge of anoxic water from the Maitai Reservoir;*
- *the Maitai Reservoir spillway was the most significant fish passage obstacle within the Maitai River, restricting access for native fish (particularly longfin eel and kōaro) and trout to habitat in the Maitai Reservoir and North Branch; and*
- *water chemistry below the Maitai Reservoir's backfeed discharge was being altered, especially during periods when anoxic reservoir water is discharged. Subtle changes in water chemistry can alter algal communities, potentially providing favourable conditions for undesirable species (e.g. toxic cyanobacteria). (Cawthron Report 2810, p10)*

Reservoir water quality and water level fluctuations

- *Water levels in the Maitai Reservoir are operated over a reasonably narrow range by comparison to operations of most reservoirs (mean drawdown 1.4 m between 2004 and 2013), and are anticipated to maintain healthy ecological conditions in the lake-edge littoral community, which extends to the euphotic depth of around 6 m.*
- *Water quality in the Maitai Reservoir is characterised as a low-intermediate level of productivity (mesotrophic score of 2.0), and water clarity was moderate (Secchi of 4.0 m) by comparison to other small South Island lakes. The pH in the reservoir is slightly alkaline (pH 8), and likely influenced by limestone geology of several rock formations (principally Dun Mountain, Stephen's argillite) in its catchment. NRMP water quality standards for TN and clarity can at times be exceeded, mostly as a result of high humic organic materials derived from the beech forest catchment inflowing to the reservoir during floods.*
- *Based on monitoring data for 2013-2015, thermal stratification in the Maitai Reservoir over spring / summer contributes to deoxygenation in its hypolimnion, which was near-anoxic between 10 and 25 m depth. The progression of the thermocline and deoxygenation was highly consistent over two years for which continuous monitoring of reservoir DO and temperature data were available. This is consistent with patterns of low DO in bottom waters of deep lakes observed in other lakes in the region, however it does present ecological issues associated with the supply of backfeed water to the Maitai South Branch during stratified periods. Anoxic conditions in the reservoir breach the 90-110% DO NRMP standards for lakes and reservoirs. More importantly, these depleted DO conditions overlap all cool-water habitats that could provide thermal refugia for sensitive species in summer when surface waters (the only remaining oxic zone) exceed the NRMP 20 °C mean daily temperature standard.*
- *Highly reducing conditions in deep reservoir sediments result in solubilisation of trace metals into the bottom waters of the reservoir, principally dissolved Fe and Mn. These concentrations can occasionally exceed consent conditions for water discharged from the backfeed, as well as NRMP standards for contaminants, and result in the export of soluble metals into the Maitai South Branch downstream of the backfeed. It is more difficult to interpret the significance of high levels of dissolved Fe in the reservoir and backfeed waters because no ANZECC guidelines are cited, but based on North American criteria it suggests that concentrations exceed levels to protect sensitive aquatic life. However, it is expected that oxidation and precipitation of metals occurs rapidly in the river.*

- *Results from Maitai Reservoir monitoring and laboratory experiments indicate that only limited solubilisation of particulate bound P and N in reservoir sediments occurs under anoxic conditions. Redox conditions appear to favour sulphur and calcium reduction pathways over phosphate reduction. This means that internal loading of nutrients is not of great concern for water quality in the reservoir and backfeed water outflowing to the Maitai River.*
- *Phytoplankton and zooplankton communities present in the Maitai Reservoir are mostly characteristic of low productivity systems, dominated by small celled cyanobacteria, colonial greens and diatoms. The zooplankton community was comprised predominantly of the native daphnids *Daphnia carinata* and *Ceriodaphnia dubia*. These species would be effective phytoplankton grazers and could promote good water quality in the reservoir should phytoplankton increase in spring following the winter mixed period.*
- *Submerged macrophyte species were of low abundance and diversity in the reservoir, despite suitable substrata and a moderate reservoir water-level operating regime. Possibly a lack of localised colonist sources along with the reservoir's isolated access have meant that only limited macrophyte species have colonised the system. The absence of macrophytes does result in poorer quality habitats for aquatic biota, but would minimise its use by aquatic waterfowl that could contribute to faecal bacteria loads unfavourable to the human drinking water uses of the water.*
- *The macroinvertebrate community in the reservoir was of intermediate abundance and relatively low diversity by comparison to other South Island lakes, most likely related to the limited diversity of habitats and lack of submerged macrophytes. Unlike for rivers, no NRMP standards are cited for macroinvertebrates in lakes and reservoirs.*
- *Fish populations consisted of four species, numerically dominated by common bullies, followed by upland bullies and longfin eels. Kōaro were found in the river and juveniles may inhabit the reservoir, but were not detected during this survey, possibly due to the autumn timing. Brown trout are also known to be present in the reservoir but were not observed in the present survey principally due to survey methods used (fyke nets, gee-minnow traps).*
- *Near-anoxic conditions in the hypolimnion likely limited fish to the shallow portions of the Maitai Reservoir, and no fish were caught below 5 m depth during a survey in 2013. The heavily-skewed size class structure of longfin eels towards large (>600 mm) adult individuals indicates that limited or possibly no recruitment is occurring to the reservoir from downstream juvenile migrants.*
- *Upstream fish passage appears to be an issue for longfin eels and kōaro populations accessing the Maitai Reservoir and North Branch. Landlocked lake populations of this species can occur, but any kōaro in the North Branch would historically have been from a sea-run population. Kōaro can live quite long periods with individuals of 16+ years found in this region. Thus the finding of only few very large individual kōaro in the North Branch suggests uncertainty regarding whether migrants are regularly bypassing the dam face to access the upper catchment.*
- *No standards for fish communities have been cited in the NRMP, but relative to other lakes in the region the reservoir is considered to have a poor fish community health. The limited passage of diadromous species into the reservoir, and poor water quality conditions caused by low DO in cold-water refuge habitats are thought to be the two main contributors to this result. (Cawthron Report 2810, pg49-51)*

River water quality

- *Temperature:*

Monitoring data show that Maitai South Branch temperature consent conditions are complied with for the majority of the time, with only occasional exceedances.

River water temperature also tends to increase immediately downstream of the spillway discharge pool, and during summer can be in a range likely to induce thermal stress in some sensitive species.

River water temperature at times exceeds the NRMP daily mean standard of 20 °C, however, these breaches are not caused by the backfeed discharge. The spillway discharge has the potential to cause river water temperatures to exceed the 20 °C mean daily water temperature and 24 °C daily maximum NRMP standards, but it is not known whether this occurs. Neither of these temperature criteria were breached immediately downstream of the spillway during the summer of 2014/15, but spillway operation was infrequent.

The influence of the dam and its operation on water temperature is attenuated quite rapidly, and unlikely affect water temperature in the mid to lower river.

- *Dissolved Oxygen:*

The impact of the reservoir on DO levels in the Maitai River is minimal and confined to the river immediately downstream of the backfeed weir.

Dissolved oxygen levels at and below the backfeed discharge point have, to date, met consent requirements (i.e. exceeded a limit of 6 mg/L) on all sampling occasion, even during summer stratification in the Reservoir when water in the bottom of the dam is near or at 0 mg/L.

- *Iron and manganese*

Iron and Mn concentration below the backfeed discharges are generally at or below consented limits.

However, Mn concentrations have exceeded consented levels three (almost four) times during the term of the current consent. This may result in occasional breaches of the Mn standards under the NRMP of 1.2 g/m³.

Fe concentrations can exceed concentrations reported overseas for the protection of sensitive aquatic life, but no Fe criteria are cited by ANZECC for New Zealand freshwaters.

During summer, the anoxia in the bottom waters of the reservoir can elevate stored concentrations of Fe and Mn, which oxidise to form precipitates when this water is released into the South Branch.

- *Turbidity*

The impact of the reservoir on turbidity in the Maitai River is minor.

Turbidity at and below the backfeed discharge point have, to date, met consent requirements (i.e. a change of less than 10 NTU).

On a small number of occasions (fewer than 7 times) turbidity associated with the operation of the backfeed or spillway caused the river to exceed the NRMP standards of 1 NTU in the S. Branch and 2 NTU in the Maitai mainstem.

- *Nutrients*

Recommendation that nutrients be monitored (given recent concerns over proliferations of periphyton, and Phormidium).

Enriched DIN concentrations in the reservoir can at times cause exceedances of the NRMP DIN standard for the Maitai S. Branch of 80 mg/m³, however this is predicted to be relatively infrequent. (Cawthron Report 2810, p93-94)

Periphyton

In recent years, higher periphyton coverage and biomass has been noted downstream of the reservoir discharge than upstream during the summer months when river flows are low and stable. This indicates that the backfeed discharge may be encouraging algal growth downstream, since flow does not differ between the up and downstream sampling sites.

Coverage of periphyton at the biomonitoring site located 800 m downstream of the backfeed discharge indicate that standards identified in the NRMP are regularly exceeded during summer, most often for filamentous green algal cover exceeding 30%, and occasionally for medium brown mats exceeding 60% cover. No exceedances of these standards have occurred at the upstream control site suggesting the backfeed discharge to be the main cause of this greater coverage by nuisance periphyton.

The backfeed may be encouraging the growth of algae by increasing nutrients (principally DIN), altering the nitrogen to phosphate ratio, or introducing micronutrients (Fe and Mn) to the South Branch. Periphyton accrual rates in the river may be augmented through release of nutrients (micronutrients) from the bottom of the reservoir. (Cawthron Report 2810, p102)

Macroinvertebrates

Based on a range of commonly used macroinvertebrate community indices used for assessing river health, the presence of the current operation regime of the backfeed appears to be having a negative impact on stream biota downstream of the reservoir over time and spatially (Newton 2015).

Degradation in both MCI and QMCI metrics downstream of the backfeed between 2004 and 2015 indicate that the macroinvertebrate indices no longer meet NRMP minimum standards for Class C or Class B rivers. Consistent high invertebrate metric scores upstream of the backfeed suggest that the backfeed discharge has likely had a significant effect on the decline in benthic invertebrate community health downstream. These changes appear to continue further downstream and progressively worsen in the lower river with other tributary inputs.

Changes around the backfeed are most likely associated with changes in the periphyton communities, which in turn are influenced by nutrients present in the discharge of anoxic water from the bottom of the reservoir, especially during mid to late summer.

On the basis of the continued declining trend in macroinvertebrate community health downstream the backfeed and its breaching of Class B standards this effect is considered to be more than minor. (Cawthron Report 2810, pp 107-108)

Fish distributions, passage and fisheries

Fourteen species of native fish have been identified in the Maitai River as well as the introduced brown trout. Of these fish, eight have been recorded in the upper catchment around the Maitai Reservoir. With the exception of longfin eels, data are deficient to undertake a trend analysis on the native fish populations.

The Maitai Reservoir and South Branch weir are both partial barriers to fish passage, particularly for fish moving upstream.

The location of the Maitai Reservoir and South Branch weir in the upper catchment means they are likely an impediment only to relatively strong migrants, such as redfin bully, longfin eel and kōaro and trout.

Nelson City Council have recently undertaken remedial work to improve fish passage opportunities at both the Maitai Dam spillway and the South Branch weir (Hay et al. 2015).

Monitoring following the remedial work indicates that some elvers are successfully climbing these structures. However, the numbers climbing the Maitai Reservoir spillway are likely to still be relatively low (perhaps in the order of 480 elvers per summer), and both structures are likely to still present a passage barrier for non-climbing fish species.

Prior to the 1990s the mid-lower Maitai River is reported to have supported a popular and productive trout fishery. Currently the river is not a popular fishery. Electric fishing and drift dive surveys indicate a sustained decline in the trout population over the past two decades. At present it is unclear as to the reasons for the population decline.

The popular mixed-species whitebait fishery in the tidal reach of the Maitai River is likely to be predominantly based on juvenile inanga which are a lowland river species. Therefore, there is little potential for the reservoir (in the upper catchment) to influence this value. However, the NCC initiative to improve access for kōaro to habitat upstream of the reservoir may have a modest positive impact on the fishery.

Tuna (eels) are valued for biodiversity reasons as well the customary and recreational fisheries they provide. However, there is little available information on the use or productivity of the tuna fishery in the Maitai River. Based on electric fishing records at Site B juvenile eel numbers appear to be in decline since 2002. This decline occurs in parallel with a decline in trout numbers. At present it is unclear as to the reasons for the apparent decline in the juvenile eel population. (Cawthron Report 2810, p126)

5.3.2. The Cultural Impact Assessment provided within **Attachment O** also serves to identify the relationship iwi with the subject site and surrounding area. Part of this description is provided below as this context of important to this application:

4.1 Traditional Cultural Relationships

Te Tau Ihu iwi claim a long traditional relationship with the proposal site and surrounding area. Various iwi have held mana over both land and water resources and other taonga through generations of occupation and use. There are two naming traditions identified in the Statutory Acknowledgements in relation to the Mahitahi River, one describes “Mahitahi” as an old name for whitebait (inanga) which was once found in abundance in the river. While referring to this resource it also evokes working together in unison just as the whitebait appear to follow the same path. Another naming tradition is that “Mahitahi” also relates to tūpuna working as ‘one’ with the pakohe to produce tools. Mahitahi also means ‘hard’, or ‘excellent’ in Maori. The waters of the Mahitahi were considered to have spiritual and healing properties because of their connection to Maungatapu. The naming of water systems and land features is but one way that tangata whenua demonstrate the depth and closeness of this relationship. The waterways, and ranges and hills that surround them are named by the resident hapu in pepeha, waiata and whakatauki. For example, the following excerpt from the Statutory Association of Ngāti Kuia with the Mahitahi/Maitai River acknowledges this as follows;

*“Maungatapu te Maunga Mahitahi te Awa
Whakatu te Marae
Ngāti Kuia te Iwi”*

The Mahitahi River and surrounding wetlands and forest were rich with abundant wildlife that supported the traditional customary practices of the hapu. They were harvest sites for tuna, inanga, kokopu, korokoro (lamprey), paraki (smelt), koaro and a variety of waterfowl such as kereru, weka and Whio (Blue Ducks). Harakeke and other plants used for weaving, rongoa and timber for building were also sourced there. The Mahitahi historically provided Ngāti Kuia with easy passage from Nelson to their argillite quarry on Maungatapu as evidenced by the numerous ‘flaking’ sites recorded on the North Branch of the River. Some of these sites have been destroyed or modified by the creation of the dam reservoir¹⁰. This route also provided arā or overland trails to Marlborough and other parts of the region. The confluence or “the forks” of the former North Branch and the South Branch was an important resting place for parties coming up and down the river and trade occurred between those bearing mined pakohe and those bringing goods and materials from the coastal markets and villages such as Matangi Ahwio, at the outlet of the Mahitahi River in Whakatu (Raymond Smith, pers comm.). In

summary, traditionally, the Mahitahi River was essentially the lifeblood of Whakatu/Nelson for Te Tau Ihu iwi; a food basket, a focal point for customary harvest and practice, and a driver of trade, industry and settlement in the area. (p13)

- 5.3.3. Schedule 4(6)(d)(i) of the Resource Management Act 1991 specifically require that the '*sensitivity of the receiving environment*' be described for the purpose of assisting and informing the assessment of actual and potential effects from any discharge of a contaminant.
- 5.3.4. The analysis of sensitivity is complicated by the fact that this is a renewal application and the habitat has been modified for several decades. This has altered the sensitivity of the various environments from what would have naturally been the case.
- 5.3.5. Rivers and lakes, by their inherent nature have a level of sensitivity to contaminants and artificial alterations of their flow conditions and water chemistry. Much of the life (fish and invertebrates) within rivers and lakes has no ability to leave that environment.
- 5.3.6. Appendix 28 of the NRMP identifies the existing South Branch water quality class as being Class A above the weir and above the upper margins of the reservoir (the Conservation Zone boundary). Below the Conservation Zone boundary the water is Class C.
- 5.3.7. Below the weir the river has been subject to the backfeed discharge that, as a result of physicochemical characteristics has altered a range of physical characteristics and potentially affected the ecological values in the lower South Branch.
- 5.3.8. Section 2.4.4 of the Cawthron Report 2810 (**Attachment I**) provides a summary of the flow regime and habitat suitability assessment. Throughout Section 2.4 of the report it assesses the key sensitivity of aquatic life to flow quantity. The minimum flow is set to maintain the habitat of the 'critical value'. 70 to 90% of MALF is identified as being a minimum level of habitat retention. Torrentfish habitat is identified as being the most flow-demanding (and therefore the most sensitive). A minimum flow of 228-235 L/s is recommended on that basis to avoid the most sensitive flow regime of the river that could cause adverse effects on this sensitive species.
- 5.3.9. The Cawthron Report 2810 states that most fish species are sensitive to temperature extremes. Warm temperatures resulting from discharges can typically result in thermal stress.
- 5.3.10. Some fish species, such as trout, and invertebrates, such as mayflies, stone flies and most caddis flies, are also sensitive to low dissolved oxygen concentrations.
- 5.3.11. There are also a range of other determinands to which there are fish and macroinvertebrates that are sensitive.
- 5.3.12. An additional driver of river health is periphyton. Periphyton growth and rate of growth (accrual) is mainly dictated by light, temperature and nutrients, and the flow regime. But with sufficient light, nutrients nitrogen and phosphorus can be a major factor in controlling periphyton growth. The river ecosystem is sensitive to periphyton growth because excessive growth of medium and thick brown algae and green filamentous algae can smother the bed and reduce invertebrate numbers and diversity.

- 5.3.13. However, the Cawthron Report 2810 (**Attachment I**) and the Cawthron letter that provides assessment of the current and likely compliance with water classifications (**Attachment N**) have identified some adverse effects on the several measures of river health. As a result of the deterioration of these measures the existing sensitivity could be considered lower than would naturally be the case.
- 5.3.14. Nevertheless, the river is likely to be able to respond positively to improved water quality. The NPS-FM in particular directs regional councils (including through resource consent processes) to seek improvements in water quality where it is degraded.
- 5.3.15. However, an important point is made in the Cawthron Report 2810 is that below the South Branch weir there has been a community shift towards (lower diversity) lake-outlet communities.

6. Assessment of Actual and Potential Effects

6.1. Introduction

- 6.1.1. It is within this section that an assessment of the activity's effects on the environment is provided. The *activity* was described in section 2.3 above while the *environment*, including the *sensitivity* of the receiving environment, was described in section 5.
- 6.1.2. This assessment is supported by a number of technical reports that have been prepared by various persons with expertise in the relevant fields. These technical reports are summarised below with references also provided.
- 6.1.3. The scope of this assessment of effects has been determined by the relevant rules and assessment criteria of the NRMP, along with the requirements of Schedule 4, Section 104, 105 and 107 of the Resource Management Act.
- 6.1.4. The use of the words '*effect*' and '*environment*' have the same meaning as that defined in the Act. The definition of '*effect*' is provided here as the matter of probability is of particular relevance to the assessment of the discharge consent.

3 Meaning of effect

*In this Act, unless the context otherwise requires, the term **effect** includes—*

- (a) any positive or adverse effect; and*
- (b) any temporary or permanent effect; and*
- (c) any past, present, or future effect; and*
- (d) any cumulative effect which arises over time or in combination with other effects—
regardless of the scale, intensity, duration, or frequency of the effect, and also includes—*
- (e) any potential effect of high probability; and*
- (f) any potential effect of low probability which has a high potential impact.*

6.2. Effects on hydrology, flow and habitat

Influence of the Reservoir on the Hydrology of the Maitai River

- 6.2.1. The activities of damming, diverting and taking water have an impact on water flows in the Maitai River. These actual and potential effects on the Maitai River are well known in these circumstances as this application is for renewal of existing structures and water takes.
- 6.2.2. The Nelson Resource Management Plan identifies a water management regime that takes account of the water management objectives for each major river and so have a set of specific minimum flows, trigger flows and allocation limits. Allowable abstractions are balanced against the ecological bottom lines and other competing values. This framework is described in Section 5 of this application but summarised again here.
- 6.2.3. As set out in Appendix 28.2 of the NRMP, the Maitai River has a wide range of competing uses and values, including for domestic water supply for Nelson City. As a result, the following flow regime is imposed through FWr.12 and FWr.6.

Upper reaches (Forks) minimum flow:

From 1 November to 30 April (summer): 175 litres per second

From 1 May to 31 October (winter):

- i) when the South Branch instantaneous flow exceeds 140 litres per second, the minimum instantaneous flow at the Forks shall be 300 litres per second, and*
- ii) when the South Branch instantaneous flow is less than or equal to 140 litres per second, the minimum flow at the Forks shall be 225 litres per second. This minimum flow shall remain effective until the South Branch mean daily flow exceeds 140 litres per second and the water level in the Maitai reservoir exceeds the level shown in figure 1 of the resource consent (RM025151), and*
- iii) when the South Branch instantaneous flow is less than or equal to 130 litres per second, the minimum instantaneous flow at the forks shall be 190 litres per second.*

Minimum flow (lower reaches): 10% of mean annual low flow as measured at Riverside.

Trigger flow

There is no trigger flow for the Maitai.

Allocation limit: No additional water permits will be approved to take water from the Maitai River. (AP28.2, A28-p4)

- 6.2.4. As set out in Section 3.0 above, the Plan provides for significant volumes to be taken from the Maitai River as a *restricted discretionary activity* subject to meeting certain listed performance standards (FWr.12.3, A28-p50).
- 6.2.5. Provided in support of this application for resource consent is a comprehensive technical assessment of the current activities undertaken as part of the NCC community water supply scheme impact on the flows in the Maitai. Refer to Cawthron Report 2810 - section 2.3 (**Attachment I**).
- 6.2.6. The Cawthron Report 2810 provides the context for considering the effects of the water scheme on the hydrology of the Maitai River by identifying three time periods: pre-dam natural flow (prior to 1963); pre-dam with abstraction (1963-1987); and post dam with abstraction (since 1987).
- 6.2.7. Water abstraction for town supply in this location began in about 1963. Council also pumped from the Maitai at the Normanby Bridge as well before 1963. From around 1963, the abstraction was sourced from the South Branch of the Maitai River. With no storage available the take was purely abstractive and consequently had a substantial effect on stream flows and ecology. The Cawthron Report 2810 refers to summer median and low flows being reduced by 13% and 52%, respectively.
- 6.2.8. Following the construction of the dam and the backfeed discharge flow the depletion of the South Branch of the Maitai was reversed. Indeed the rates of return flow often exceed the South Branch flow above the South Branch weir. More details about this flow substitution can be found in Section 2.3.1 of the Cawthron Report 2810.
- 6.2.9. At the forks (the location immediately below the dam where historically the North Branch – now dammed – flowed forming a confluence with the South Branch) the Maitai dam has altered the natural flow of the river by capturing and storing North Branch flow.

6.2.10. Figure 20 of the Cawthron Report 2810 clearly summarises the river flow changes that have resulted from the construction of the dam and current management parameters. That figure is reproduced in **Figure 15**. The “status quo” is the actual existing flows, and the “naturalised” is the calculated flow that would have existed in the absence of the Maitai Dam.

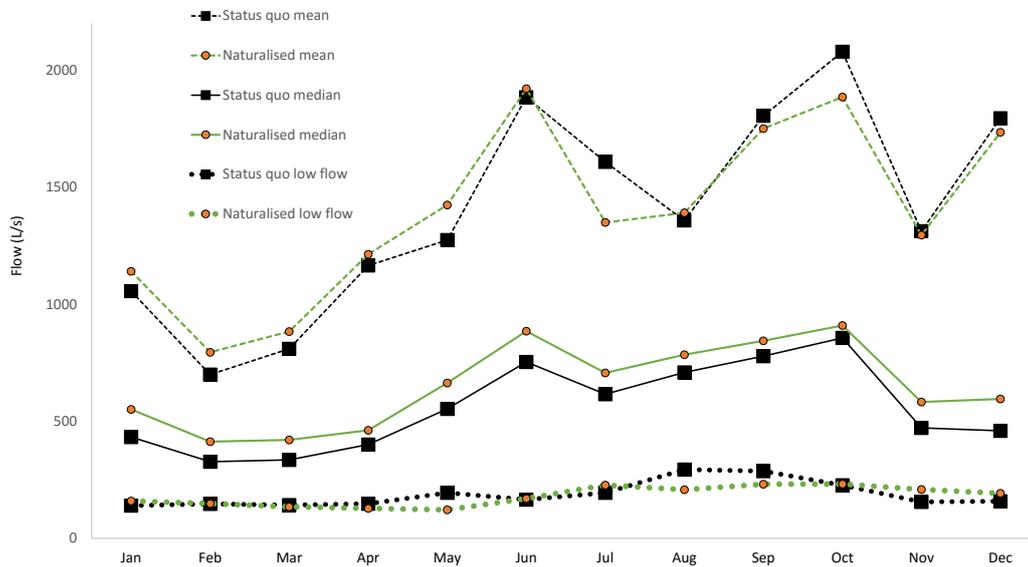


Figure 15: Monthly mean, median and low flows for Maitai at Forks, Status quo versus Naturalised (1990 to 2015).

6.2.11. The Cawthron Report 2810 produced a similar graph for the Avon Terrace site further downstream which showed similar trends but with less difference between the status quo and the naturalised flow.

6.2.12. To summarise these findings the Cawthron Report 2810 presents Table 13 which demonstrates the percentage change from the naturalised flow (that would otherwise have occurred) to the status quo. Table 13 is reproduced as **Figure 16**.

Month	Monthly low flow		Monthly median flow		Monthly mean flow	
	Maitai at Forks	Avon Terrace	Maitai at Forks	Avon Terrace	Maitai at Forks	Avon Terrace
Jan	88	78	79	86	93	93
Feb	99	84	79	86	88	90
Mar	105	82	80	86	92	89
Apr	116	90	87	90	96	101
May	160	84	83	96	89	102
Jun	98	105	85	115	98	116
Jul	86	96	87	98	119	106
Aug	142	97	90	100	98	102
Sep	124	109	92	98	103	99
Oct	98	108	94	95	110	101
Nov	74	75	81	87	101	98
Dec	82	78	77	86	103	105

XX	Less than 10% change in flow
XX	11-20% flow reduction
XX	21-30% flow reduction
XX	11-20% flow increase
XX	Greater than 20% flow increase

Figure 16: Mean monthly flow change for Maitai at Forks and Maitai at Avon Terrace as a result of Maitai Reservoir and water scheme.

- 6.2.13. The Cawthron Report 2810 provides the following summary to conclude its findings on the effects of the structures and activity of damming water in the reservoir:

“Updated flow statistics for the Maitai River at Maitai Forks show that the Maitai Reservoir has a moderate effect on low to median flows, with the median and 7-day mean annual low flow (7-day MALF) approximately 18% and 12% less than the naturalised flow regime. Mean flow is unaffected due to the influence of large floods, which are not captured by the dam. The relative change in median and 7-day MALF for the Maitai River at Avon Terrace shows a smaller reduction of approximately 8% and 10%, respectively, of naturalised flows.

Seasonal analyses of mean monthly median flow at Maitai Forks show a reduction of between 23% and 6% compared to the naturalised flow, with the largest reductions occurring during summer (23 to 21%). Mean monthly low flows for Maitai at Forks are moderately reduced during late autumn and summer months (November 26% to February 1%) but substantially increased during wetter months (May 60% increase, August 42% increase and September 24% increase).

Seasonal analyses of mean monthly median flow for Maitai at Avon Terrace show that the Maitai Reservoir has a small effect over the summer months (14% to 13% reduction from naturalised flows), and a moderate effect on mean monthly low flows at this time of year (25%-16% reduction). There is little effect at other times of the year at this site.”

- 6.2.14. The Cawthron Report 2810 also considers the effect of the proposed activities on flushing flows in the Maitai River. Flushing flows are important as they remove periphyton and rework channel sediment which can have the positive effect of removing fine sediment that has built up during low flow periods.
- 6.2.15. The authors conclude that the Maitai Reservoir is predicted to have a small impact on the frequency of flushing flows three or more times the median flow of the Maitai at Forks. The effect is in the order of one less event per year.

Flow Regime and Habitat Availability

- 6.2.16. Water levels in the Maitai Reservoir are operated over a reasonably narrow range by comparison to operations of most reservoirs (mean drawdown 1.4 m between 2004 and 2013), and are anticipated to maintain healthy ecological conditions in the lake-edge littoral community, which extends to the euphotic depth of around 6 metres.
- 6.2.17. Operation of water abstraction from the Maitai Reservoir and the South Branch weir are governed by minimum flow requirements stipulated by Consent No. RM025151/2. There is a summertime minimum flow at the Maitai Forks recorder site of 175 l/s (1 November to 30 April) and a graduated minimum flow for the winter of between 190-300 l/s, depending on the South Branch flow at the time. However, in practice abstraction is managed so that flow is usually above the minimum, as evidenced by the 7-day MALF at the Maitai Forks being greater than the minimum flow.
- 6.2.18. The Cawthron Report 2810 goes on to assess the effects that the flow regime has on habitat quality and quantity. This analysis is presented throughout Section 2.4.2 of the report. The key conclusion reached is that retaining torrentfish habitat is the most flow demanding. As a fast water specialist, torrentfish (*Cheimarrichthys fosteri*) is a candidate critical value species because its habitat is relatively sensitive to flow reductions¹, and torrentfish is listed as 'Declining' in the latest Department of Conservation threat classification listings (Goodman et al. 2014). They were traditionally caught by Māori and are still considered to be a taonga by some.
- 6.2.19. The existing summertime minimum flow at the Maitai Forks recorder site (175 l/s) is approximately 70% of the naturalised MALF at this site. For the majority of species modelled >70% of the habitat predicted at the MALF is retained at the minimum flow. However, for torrentfish and bluegill bully only 20% and 48%, respectively, of the habitat at the MALF is retained at the minimum flow.
- 6.2.20. However, it is also noted that the abstraction regime is managed by the applicant so that the flow in the Maitai River is usually above the minimum of 175 litres per second. In fact the existing 7-day MALF (220 litres per second at the Maitai Forks) is actually quite close to the minimum flows of 228 – 235 litres per second suggested by Cawthron as being appropriate for sustaining 70-80% of optimum habitat for torrentfish.
- 6.2.21. The Cawthron Report 2810 authors suggest that a minimum flow of 228-235 l/s would retain more than 70% of the torrentfish habitat available at the natural MALF, and provide greater than 80% habitat retention for all other native fish species and trout.
- 6.2.22. It is in direct response to this recommendation from Cawthron that the applicant proposes to maintain a minimum flow of in the range of 228-235 l/s at the forks, rather than the 175 litres/sec as currently consented, subject to maintaining the 60 year drought capacity in the reservoir.

¹ Torrentfish is the sole freshwater representative of its family found in New Zealand. It is aptly named because this species lives in swift, tumbling rapids and riffles in stony rivers and streams. Its flattened head and large pectoral fins help this fish to anchor on the riverbed in its fast-water habitat. As a fast water specialist, torrentfish is a candidate critical value species because its habitat is relatively sensitive to flow reductions, and torrentfish is listed as 'Declining' in the latest Department of Conservation threat classification listings.

Summary

- 6.2.23. At the beginning of this section the flow regime in Appendix AP28.2 of the NRMP was established. The current operation of the water scheme achieves the minimum flow requirements set out in that appendix. In fact most of the time the summer minimum flow of 175 litres per second is exceeded.
- 6.2.24. However, the Cawthron Report 2810 identifies adverse environmental effects that may result from this minimum flow regime. This applicant proposes to avoid these adverse effects by volunteering a minimum flow of approximately 230l/sec subject to maintaining the 60yr drought capacity in the reservoir. That will better protect fish habitat, particularly that of the sensitive torrentfish, although there would also be some impact on the aquatic habitat on the dam edge.

6.3. Effects on water quality

- 6.3.1. Dams, diversions, discharges and water takes have the potential to impact on water quality. As with the impact on river flows, the current effects on water quality in the Maitai River is well known due to the monitoring requirements of the current resource consents.
- 6.3.2. As set out in section 5.2 above, the '*Classification of water bodies*' is described in AP28.4 of the Plan. This Appendix identifies the Maitai River between Jickells Bridge and the Conservation Zone boundary (which corresponds with the South Branch weir and the top of the reservoir) as being Class C. The natural reaches within the Conservation Zone are Class A. The reservoir is also considered to be Class C. Class C represents '*Moderate*' water quality. In terms of '*Priority for improvement*', AP28.4 states that it is a "*Third*" priority and the objective is to "*Maintain*" and "*Upgrade to B where practicable*". Further, and as also discussed later, district-wide NRMP policies DO19.1.4 and DO19.1.6 seek improvements in water quality to at least Class B.
- 6.3.3. The South Branch has an '*A*' classification. The NRMP therefore expects that the South Branch will have '*Excellent*' water quality, with high conservation and ecological values. The classification of the North Branch is not specified, but the 2007 document identifying appropriate water classes in 2007 identified it as being Class A above the influence of the reservoir.
- 6.3.4. It is against the above water quality classifications, and associated objectives and policies, that resource consents applications such as this can be assessed. Upon doing so, the extent that a discharge, after reasonable mixing, maintains the relevant water quality is a significant consideration.
- 6.3.5. The Cawthron Report 2810 (Section 2.5) provided within **Attachment I** contains a comprehensive assessment of the current water quality effects of the existing system (both in terms of the structures, the water take and the discharges).

North Branch above reservoir

- 6.3.6. The water quality of the Maitai North Branch above the point where it is influenced by the reservoir is unaffected by the resource consent applications sought, and therefore generally beyond the scope of an assessment of effects. However, the North Branch above the reservoir is relevant insofar as it affects some water quality determinands in the reservoir.

- 6.3.7. The Cawthron Report 2810 references a range of water quality drivers from the North Branch. The predominantly beech forest vegetation type yields an inflow of high humic organic materials that results in reduction in clarity and some costly challenges in using the reservoir water directly for water supply purposes.
- 6.3.8. The North Branch also contains specific geological formations (principally Dun Mountain, Stephen's argillite) that influences the water chemistry of the North Branch. This is likely to result in the slightly alkaline (pH 8) reservoir, and the inflow of trace metals such as manganese (Mn), nickel (Ni), chromium (Cr), iron (Fe).

Maitai Dam Reservoir

- 6.3.9. A key characteristic of the Reservoir is that it thermally stratifies between October and April each year. Thermal stratification is a physical phenomenon whereby the surface waters that is exposed to significant solar radiation during the hotter summer months warms up while the deeper water remains at a relatively cooler constant temperature. As a result mixing between the upper and lower layers is reduced with the warmer water remaining at the surface and cooler denser water remaining deeper. This stratification effect remains in place with the surface waters getting increasingly warm. The Cawthron Report 2810 refers to up to 10 °C difference in water temperature between the epilimnion (above thermocline) and the hypolimnion (below thermocline). During (usually) April or May flood inflows and/or surface temperature cooling destabilise the thermal stratification and cause full reservoir mixing.
- 6.3.10. As a result of this thermal stratification, Cawthron identifies that the reservoir is susceptible to internal recycling of trace metals and dissolved nutrients (phosphorus and nitrogen) from reservoir sediments. The reservoir is described as a low productivity system.
- 6.3.11. Also as a result of the lack of mixing caused by the thermal stratification, the hypolimnion deoxygenates due to the biodegradation of organic matter in the lake.
- 6.3.12. The Cawthron Report 2810 explains that the interaction of a warm epilimnion and anoxic hypolimnion results in adverse effects for ecological values within the reservoir. Thermal stress for fish at the surface requires cooler water refugia. However, the deep water potential refuge is oxygen depleted and makes it difficult for fish to breath. The Cawthron Report 2810 goes on to provide commentary about the water quality effects in relation to the water quality standards in the NRMP.

The Nelson Resource Management Plan (NRMP) cites water temperature standards for Class C waterbodies ('moderate condition' applicable to the Reservoir) not to exceed daily mean temperatures of 22 °C or have maximum temperatures in excess of 27 °C (Appendix 3 and Appendix 4). Because lakes are relatively more stable in their thermal variation over daily cycles (save the top 1 m of the water column), the mean daily temperature standard is likely to be most appropriate to consider for the Maitai Reservoir. Mean daily temperatures in the Reservoir between 2-6 m depth can at times exceed the mean daily standard of 22 °C, particularly during the February/March late-summer period. Below 6 m water depth, temperatures remain cooler with mid and bottom-water temperatures in the range of 10–16 °C over most of the year. Therefore it is expected that a cool water refuge exists below these warm surface waters. However, as discussed in the next section, because deoxygenated water persists up to the depth of the thermocline in summer (to around 6 m), in February/March these cool-water refuge areas are likely to be compromised by having dissolved oxygen levels below what sensitive species can tolerate. Salmonids have a chronic stress below 80% saturation and acute stress occurs around 50% (Hay et al. 2007). DO saturation around these mid-water depths is likely to be close to this acute threshold. Therefore the interaction between thermal stratification and deoxygenation in

the reservoir mean that portions of the reservoir that are suitable to aquatic sensitive aquatic life from a dissolved oxygen perspective (i.e., > 80% DO saturation), are likely to be affected by water temperatures in excess of the temperatures in the NRMP standards cited for this waterbody.

*The NRMP cites that improvements in water quality over its existing water classification should be targeted where ever practicable; in this case standards cited for Class B waters being the aspirational target. The NRMP cites water temperature standards for Class B waterbodies ('very good condition') not to exceed daily mean temperatures of 20°C or have maximum temperatures in excess of 24°C. Over the mid-summer period, mean water temperature conditions cooler than 20°C occur below depths of 6 m, which as discussed previously are typically below depths at which DO ranges that are considered conducive to aquatic life (< 50% DO saturation). Therefore improvements in DO conditions in the reservoir would need to occur for these cooler habitats to be available to temperature sensitive species. (pp22-23, Cawthron Report 2810, **Attachment I**)*

6.3.13. And more specifically:

*The NRMP cites DO standards for lakes and reservoirs for both Class C (existing Reservoir Class) and Class B (aspirational target standard) waters to be in the range of 90-110% saturation. The ranges of DO observed in the Maitai Reservoir are consistently lower than these standards below 6 m of water depth over most of the thermally stratified period. Depletion of DO to below 90% saturation is not unusual for bottom waters of lakes and reservoirs in the Upper South Island and other regions (Verburg 2010). However, the severity of the DO declines in the Maitai Reservoir in mid and bottom-waters clearly demonstrate conditions persist for extended periods well below these standards. As discussed in the previous section, because deoxygenated conditions persists over the depths where cool water could provide refugia for temperature-sensitive species (e.g., most fish) during summer, these conditions are likely to degrade habitat values below those cited by the NRMP for this waterbody. (p26, Cawthron Report 2810, **Attachment I**)*

6.3.14. In relation to the nutrient status of the reservoir, the Cawthron Report 2810 identifies the recycling of the nutrients within the reservoir as being a result of the entrapment of runoff water containing nutrients that would otherwise be flushed out of the catchment. The entrapment in the reservoir allows the nutrients to be released slowly over time. In addition the anoxic characteristics of the hypolimnion results in a minor increase in the ongoing availability of nutrients.

6.3.15. Comparison with the NRMP water classifications are as follows:

The NRMP cites mean annual water nutrient standards applicable to C Class waters for TN and TP of 250 and 20 mg/m³, respectively. Limited data have been collected for the Maitai Reservoir to evaluate if the reservoir meets such standards, but based on the bi-monthly monitoring of surface waters over 2013–2014, both the TN and TP standards were met (mean of 8.33 mg TP/m³ and 174.5 mg TN/m³). These concentrations would also suggest that the Reservoir is close to meeting the aspirational Class B standards for TN and TP of 160 and 9 mg/m³, respectively, although the TN standard was slightly exceeded.

The NRMP cites a visual clarity minimum standard for Class C waters of 4 m Secchi depth. Clarity conditions in the Maitai Reservoir did breach these standards on occasion, largely related to elevated humic organic materials contained in inflows during high flow periods, but on an average basis reservoir clarity was close to this standard (2013–2014 mean Secchi of 4.0 m). The reservoir is unlikely to ever achieve the aspirational B Class standard of 5 m Secchi depth because humic organic materials derived from the beech forest catchment are likely to be the main driver of clarity in the reservoir, and this is mainly influenced by vegetation cover and hydrology of the upper North Branch catchment.

Both nutrients and clarity indicate that nutrient status of the reservoir is moderately higher than the oligotrophic (or better) standard cited for Class B reservoir waters. Both TN and Secchi are

affected to an extent by concentrations of dissolved humic material that contain organic nitrogen (increasing TN) and colouring the water thereby reducing Secchi depth. Therefore, although conditions in the reservoir at times (particularly following floods) breach the TN and clarity standards, this was likely partly mediated by beech catchment inputs to the reservoir. Overall the nutrient status and clarity of the reservoir are indicative of good water quality for its drinking water supply and ecosystem health values. (Cawthron Report 2810, p31)

6.3.16. Finally trace metals are considered in the Cawthron Report 2810. High dissolved iron and manganese concentrations in the bottom waters are evident, with the anoxic conditions in the bottom of the reservoir providing more favourable conditions for iron solubilisation. The report states that it is expected that the range of dissolved iron observed in the reservoir hypolimnion could have toxicity effects on aquatic life within the reservoir and downstream of the backfeed. The higher pH could potentially enhance these toxicity effects because toxicity of iron is mediated to an extent by pH².

6.3.17. Concentrations of manganese were similar as for iron but showed results that are lower than half of the ecosystem health benchmark. As a result it is concluded that toxicity to aquatic life as a result of manganese concentrations in the reservoir hypolimnion is expected to be unlikely.

6.3.18. In relation to the relevant water quality criteria in the NRMP the Cawthron Report 2810 states:

The NRMP cites water standards for toxicants for both Class C and B waters equivalent to the 95% level of protection for aquatic life. On this basis, concentrations of Mn observed in reservoir waters are unlikely to exceed these levels of 1.9 g/m³. ANZECC (2000) does not cite 95% levels of protection of aquatic life for Fe, and therefore interpreting reservoir concentrations of dissolved Fe relative to the NRMP water standards is not possible. However, based on preliminary examination of toxicity triggers for dissolved Fe from overseas literature (Phippen et al. 2008), it is possible that toxicity effects of dissolved Fe on sensitive species may occur in the reservoir bottom waters. It should be noted, however, that these periods of high Fe concentrations occur simultaneously with anoxia, and therefore chronic metal toxicity is likely to be of minor concern relative to the acutely toxic conditions associated with anoxia. The outflow of reservoir waters containing high concentrations of dissolved Fe to the Maitai South Branch (via the backflow) is likely to be of greater concern in a management context, and is addressed in subsequent sections on river water quality (see Section 2.5.4). (Cawthron Report 2810, p31)

6.3.19. Finally, the Cawthron Report 2810 investigates sediment-bound toxicants and considers concentrations in relation to the ANZECC (2000) guidelines and the NRMP water class criteria. The report identifies particularly high concentrations of chromium and nickel which are unlikely to ever meet ANZECC (2000) standards. The observation is made that the base concentrations are unrelated to the operation of the reservoir as they originate from the Dun Mountains' mineral rich areas, but that persistent anoxic conditions in the reservoir bottom waters could exacerbate the toxicity effects by enhancing the concentrations of dissolved metals which are far more toxic.

6.3.20. As previously stated, the Maitai water scheme does not by itself generate the source of the metals but provides the conditions in the reservoir where the metals can accumulate and where (through anoxic conditions) temporarily greater concentrations can remain in a soluble form than would otherwise be the case.

² Cawthron report, Attachment I, page 32

- 6.3.21. Both an effectively designed destratification system and a hypolimnetic aeration system would correct problems associated with toxicant formation and subsequent downstream effects associated with this water being discharged into the Matai River.
- 6.3.22. Through the course of Plan Change 24 for the NRMP the North Branch (including the reservoir) was allocated a water classification rating of “C”. There has been an ongoing deterioration of water quality and potential habitat in the reservoir resulting in a current C water classification. It is also apparent that the aquatic habitat has declined (Cawthron letter, **Attachment N**).
- 6.3.23. The letter from Cawthron (**Attachment N**) also provides a summary of the existing compliance with the Class C water classification determinands. The summer thermal stratification is resulting in an anoxic hypolimnion that is not meeting DO limits. Primarily as a result of this the water quality is reduced through concentrations of nutrients, dissolved trace metal toxicants and sediment-bound toxicants all failing to meet the desired class B standard.
- 6.3.24. Cawthron has explored the options for improving the water quality and habitat availability in the reservoir. Detail about these options was provided in the Cawthron Report 2810 (**Attachment I**) and the feasibility of the options was assessed in greater details in the Cawthron study provided in **Attachment K**. From the letter in **Attachment N** it is clear that there are a range of options which will have a low, moderate or high likelihood of achieving the various standards for Class B waterbodies in the Reservoir, Maitai South Branch and the main stem below the Forks. These options will continue to be investigated by the applicant.

Maitai South Branch

Temperature

- 6.3.25. The Cawthron Report 2810 contends that the composition and chemical features of river water strongly influence its suitability for aquatic life and use by humans. Subtle changes in water chemistry can alter the functioning of an ecosystem, for example, an increase in nutrients may increase periphyton accrual rates, which will affect invertebrate communities and subsequently the food base for fish.
- 6.3.26. As mentioned earlier in the report, water taken from the Maitai River for municipal supply is replaced with water from the reservoir via a backfeed located just below the intake structure. The replacement water for the Maitai River is often drawn from the reservoir hypolimnion (Inlet 3 or Inlet 4) so as to meet conditions that place limits on the temperature increase in the South Branch.
- 6.3.27. The Cawthron Report 2810 emphasises the critical role that temperature plays in sustaining river life. To mitigate local water temperature changes from discharge of water from the dam into the Maitai South Branch, via the backfeed, by the following water temperature consent conditions apply (Consent RM960396, Condition 8):
- a. *When the water temperature prevailing immediately above the intake is between 8 °C and 18 °C inclusive, the discharge shall not change the temperature of the river water by more than 3 °C.*
 - b. *When the water temperature prevailing immediately above the intake is greater than 18 °C, the discharge shall not reduce the temperature of the river water below 15 °C.*

- c. *When the water temperature prevailing immediately above the intake is less than 8 °C, the discharge shall not increase the temperature of the river water above 11 °C.*
 - d. *When Conditions (b) and (c) are in force, the discharge shall only be turned off at an even rate over a minimum period of two hours.*
 - e. *At no time shall the discharge increase the temperature of the river above 20 °C or reduce it below 6 °C.*
- 6.3.28. Compliance is assessed based on data in a 15-minute time-step for sites located in the South Branch upstream and approximately 100 metres downstream of the backfeed discharge point.
- 6.3.29. According to the Cawthron Report 2810 (Section 2.5.2) monitoring data show that the temperature consent conditions are complied with for the majority of the time. There are generally several breaches in most years, but these are mostly of quite short duration (<1 hour) and the frequency and duration of these breaches appears to have reduced over time. Of these breaches the vast majority involved excessive cooling.
- 6.3.30. The water quality standards that are relevant (Class C) state that human activities shall not increase the mean daily water temperature in the South Branch to above 22°C or the daily maximum above 27°C.
- 6.3.31. As a result of the applicant having access to water at different levels of the reservoir, and the deeper water being consistently cooler, the temperature of the backfeed can be managed so as to generally avoid increases in temperature that can cause significant environmental effects within the South Branch below the weir.
- 6.3.32. The Cawthron Report 2810 identifies that river water temperature tends to increase immediately downstream of the spillway discharge pool. The warming influence occurred irrespective of whether the spillway was operating, but was more pronounced when the spillway was operating.
- While the spillway discharge has the potential to cause river water temperatures to increase, this is never likely to exceed the NRMP 24°C mean daily water temperature nor the 27°C daily maximum criteria (due to human activities) cited for Class C waters. However on occasion water temperatures can exceed the NRMP Class B standard for maximum daily water temperature and 24°C when the spillway is operating over mid-summer (e.g., February 2016—Cawthron unpublished data). It is not known the frequency to which this occurs. On the basis of existing data, Class B temperature maxima were not breached downstream of the spillway during the summer of 2014–2015 (spillway not operating), but did over a short week-long period in February 2016. (Cawthron report 2810, p78)*
- 6.3.33. The Cawthron Report 2810 states that water temperatures did sometimes enter the stress range for sensitive aquatic organisms during the measurement period, at least in the lower reaches of the river (below the spillway). However, there is insufficient data to assess whether the operation of the dam has altered the frequency, duration, or magnitude of high water temperatures in the Maitai River.
- Dissolved Oxygen*
- 6.3.34. The Cawthron Report 2810 covers dissolved oxygen in Section 2.5.3. The importance of dissolved oxygen is described along with the description of a threshold level of 6mg/l (or 80%) saturation, below which levels are considered insufficient to support sensitive fish or macroinvertebrate communities.

- 6.3.35. The mainstem of the Maitai River is well oxygenated, with saturation levels commonly over 90–130%. However, water drawn from the base of the Maitai Reservoir and discharged into the Maitai South Branch via the backfeed can have very low DO levels during summer, and is likely to affect DO in river water over a short distance downstream. The Cawthron Report 2810 confirms, however, that the water appears to quickly re-oxygenate, with DO results meeting consent conditions for DO to remain above 6 mg/l after reasonable mixing (100 metres downstream).
- 6.3.36. Despite reoxygenating within a relatively short distance, the Cawthron Report 2810 indicates that low DO concentrations in the backfeed discharge drive other adverse aesthetic and water quality outcomes such as precipitation of trace metals, high nutrient concentrations and periphyton growth, and the possible release of odourous compounds. These are further addressed in the relevant sections below.
- 6.3.37. Notwithstanding the existing resource consent conditions, the Cawthron Report 2810 provides comment on the NRMP water standards that apply in the South Branch. The report comments that the specified limits are unrealistic and unachievable due to natural variations in DO that are beyond the specified envelope of 99-103%.
- 6.3.38. The applicant has committed to implementing the backfeed management options that are explained in Section 3.1 of the Cawthron Report 2810. Although this would still not necessarily result in compliance with either Class B dissolved oxygen concentrations, this is due to the concentration bands for those classes being unrealistic and unachievable at all times, even for natural river systems. For more information on this see the Cawthron Letter in **Attachment N**)

Trace metals

- 6.3.39. The chemistry and behaviour of iron (Fe) is described in Section 2.5.4 of the Cawthron Report 2810.
- 6.3.40. The report indicates that while dissolved iron concentrations in the bottom waters of the reservoir are relatively high, and that these high concentrations are discharged via the backfeed, they appear to quickly precipitate out as the water becomes oxygenated. Iron concentrations may be having an adverse effect on aquatic life within the mixing zone (0 to 100 metres) but appears unlikely to be causing adverse effects further downstream. The iron precipitate does, however, cause adverse aesthetic outcomes that are relevant under Section 107 of the Act.
- 6.3.41. However, manganese concentrations have exceeded consented levels on three occasions, by small margins, during the term of the current consent. These non-compliances are likely caused by the concentrations of manganese discharged in solution in the anoxic water discharged into the South Branch from the bottom of the Reservoir, used to meet the temperature conditions of the consent.

Water Clarity

- 6.3.42. The effect of the backfeed discharge on water clarity and turbidity is set out in Section 2.5.5 of the Cawthron Report 2810. The summary finding is that the impact of the reservoir on turbidity in the Maitai River is minor. Turbidity at and below the backfeed discharge point have, to date, met consent requirements which require a change of less than 10 NTU.

- 6.3.43. However, when the spillway is operating turbidity at the Forks can be much higher than it is upstream of the spillway discharge. The spillway operates generally in high rainfall events, which are characterised by high turbidity levels .
- 6.3.44. The Cawthron Report 2810 contains more information about how the discharges affect turbidity and clarity:

The NRMP cites a water standard for turbidity in the Maitai of 3 NTU for Class C waters (existing conditions) and 2 NTU for Class B waters, considered to be the aspirational target for the Maitai downstream of the Reservoir. There were no occasions over the last 15 years' monitoring where the Class C standard was breached due to the backfeed or spillway, and therefore it is presumed that this Class C standard is largely always met. Downstream of the forks, there were seven occasions over the past 15 years of monitoring where the reservoir spilling (combined with backfeed) increased turbidity to more than 2 NTU and caused a breach of the Class B standard, but on a mean or median basis (as stipulated in the NRMP) this Class B standard is achieved. Both could be viewed as infrequent and possibly related to localised flow conditions from the North Branch.

The NRMP also cites a standard for water clarity in Class C waters of 2.5 m (black disk) and a 4 m clarity for Class B waters. Because consent conditions are specified in terms of turbidity (a measure of suspensoids in the water), monitoring has been focused around this parameter and has not included black disk monitoring. Hence interpreting the influence of the reservoir in terms of meeting the NRMP clarity targets downstream of the backfeed weir and spillway is more difficult. As discussed in regards to reservoir Secchi disk monitoring, the occurrence of coloured humic materials derived from beech forest catchment drainage reduces water transparency in the reservoir to around 4 m Secchi depth. On this basis we might expect that the NRMP Class C standard of 2.5 m is likely to be met downstream of the dam. However, the Class B clarity standard of 4 m may not be met below the backfeed, as considerable water in the South Branch (up to 80%) can be derived from the backfeed during low flows. Precipitation of soluble metals under oxic conditions in the river increases turbidity and light scattering, and inputs of dissolved humic organic material from the reservoir reduce water transparency. It is anticipated the main influence on clarity downstream of the reservoir are effects related to storage of coloured waters that are imported into the reservoir during high flows and then slowly released over normal flow periods. This ultimately acts to change the clarity in the river over much longer periods than would normally have occurred without the presence of the dam.

Nutrients

- 6.3.45. Nutrients (nitrogen and phosphorus) are key ingredients for the growth of river algae. Instream nutrient concentrations are commonly compared with guideline concentrations of dissolved inorganic nitrogen (DIN) and dissolved reactive phosphorus (DRP) in order to assess whether concentrations are likely to prevent development of 'nuisance' biomasses of periphyton. The NRMP also cites standards for DIN and DRP for Class A rivers (South Branch) of 80 and 5 mg/m³, respectively, and for class-B (Maitai mainstem and reservoir) rivers of 120 and 9 mg/m³, respectively.
- 6.3.46. Monitoring of nutrients in the Maitai River downstream of the reservoir backfeed is not required under current consent conditions and as a result long term data and trends are not available. The Cawthron Report 2810 (Section 2.5.6 of **Attachment I**) presents data and interpretation in relation to nutrients below the South Branch weir. Nutrient levels are not consistently high but appear likely to be elevated at times, and in parallel to the observed abundance of *Phormidium* in the River. This suggests that nutrient concentrations may be contributing to the periphyton trends observed.

- 6.3.47. The Cawthron Report 2810 states that proliferations of periphyton in recent years and increasing incidences of the potentially toxic cyanobacteria *Phormidium* in the lower river have highlighted a need to understand how the Maitai Reservoir backfeed discharge affects nutrient concentrations in the Maitai South Branch.
- 6.3.48. A study reported on in the Cawthron Report 2810, however, found nutrient levels at the key locations of downstream of the backfeed, downstream of the spillway, and several other sites down the catchment to comply with the relevant guideline levels and the NRMP water classification standards.
- 6.3.49. Nevertheless, the report concludes that enriched DIN concentrations in the reservoir can at times cause exceedances of the NRMP DIN standard for the Maitai South Branch of 80 mg/m³. However the report predicts this to be relatively infrequent, but states that DIN in the South Branch could still contribute to the greater coverage by periphyton noted in the report.

6.4. Periphyton communities

Periphyton Growth

- 6.4.1. Section 2.6 of the Cawthron Report 2810 provides a comprehensive description of the characteristics of periphyton growth and the impacts that it can have on in-stream ecosystems and aesthetic values. The report describes the differing characteristics of algae as shown in Figure 17, reproduced from the Cawthron Report 2810.

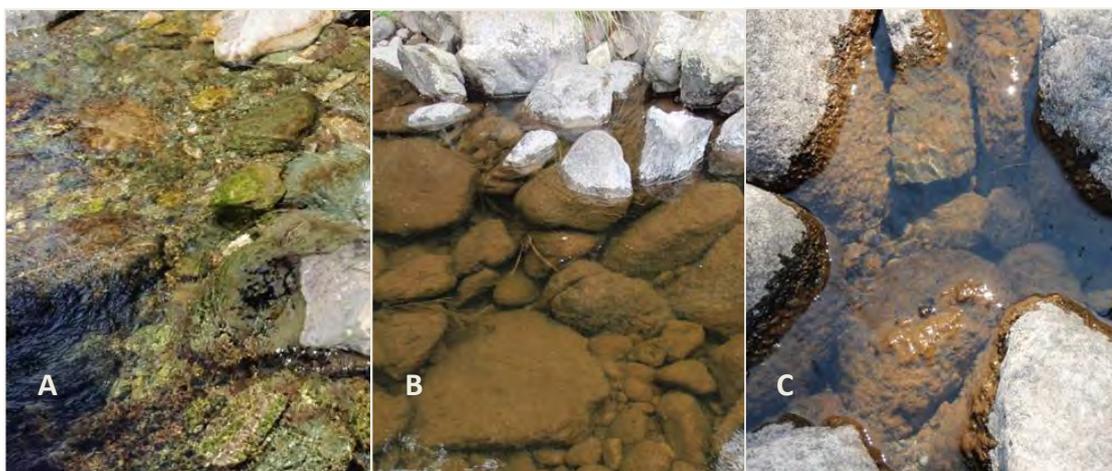


Figure 17. Example of periphyton communities present in the Maitai River South Branch showing: A) thin brown algae at the Maitai North Branch site; B) medium brown algae at the downstream of the Spillway site; C) thick brown algae at the Lower Site located 2.5 km downstream of the backfeed.

- 6.4.2. The Cawthron Report 2810 then provides the following summary in relation to periphyton growth. In recent years, higher periphyton coverage and biomass has been noted downstream of the reservoir (backfeed) discharge than upstream during the summer months when river flows are low and stable. This indicates that the backfeed discharge may be encouraging algal growth downstream, since flow does not differ between the up and downstream sampling sites.

- 6.4.3. Coverage of periphyton at the biomonitoring site located 800 m downstream of the backfeed discharge (Site B on Map 4 of the map bundle) indicate that standards identified in the NRMP are regularly exceeded during summer, most often for filamentous green algal cover exceeding 30%, and occasionally for medium brown mats exceeding 60% cover. No exceedances of these standards have occurred at the upstream control site suggesting the backfeed discharge to be the main cause of this greater coverage by nuisance periphyton.
- 6.4.4. The backfeed may be encouraging the growth of algae by increasing nutrients (principally DIN), altering the nitrogen to phosphate ratio, or introducing micronutrients (Fe and Mn) to the South Branch. Periphyton accrual rates in the river may be augmented though release of nutrients (micronutrients) from the bottom of the reservoir.
- 6.4.5. As stated previously, flushing flows have not reduced as a result of the structures and operation of the water scheme and therefore it appears more likely that the causation of nuisance periphyton is more related to water quality factors.

Phormidium (cyanobacteria)

- 6.4.6. The Cawthron Report 2810 makes mention of the emerging issue of *Phormidium* proliferations in the lower Maitai River. NCC now monitors cyanobacteria coverage at three sites in the ‘middle’ Maitai River catchment. The report does not make any direct linkage between the operation of the Maitai Water Scheme and the proliferations, but states that periphyton (including *Phormidium*) growth is related to nitrification of water, and for this reason recommends the implementation of routine monitoring of nutrients at the monitoring sites. This monitoring requirement is accepted by the applicant.

6.5. Effects on aquatic ecosystems

- 6.5.1. A number of the relevant planning documents identify that activities such as dams, diversions, takes and discharges have the potential to affect aquatic ecosystems and habitat. The NRMP is no exception with this being one of the relevant assessment criteria for the consideration of instream dams and point source discharges.
- 6.5.2. Cawthron has assessed the actual current effects that the activities are having on the aquatic habitat of the Maitai (Sections 2.6 [periphyton] 2.7 [invertebrates] and 2.8 [fish populations] of the Cawthron Report 2810). These include:
 - (a) Promotion of algal (periphyton) growth, including greater coverage of filamentous green algae and medium brown algal mats;
 - (b) Having a negative effect on stream biota;
 - (c) Promoting a low productivity “lake outlet” invertebrate community assemblage;
 - (d) Partial blockages of fish passage; and
 - (e) Sustained declines in trout and native fish populations (unclear if directly linked to water scheme).
- 6.5.3. The water quality standards set out in the NRMP also include standards that directly or indirectly relate to the quality of aquatic ecosystems, for example, periphyton, macro invertebrates and aquatic habitat. These water quality standards, and

associated objectives and policies provide the relevant standards for assessing the effects of this application.

- 6.5.4. In relation to discharges the effects on water quality standards are relevant *after reasonable mixing*. Reasonable mixing, as a concept and in practice was addressed in Section 5 above.

Maitai Dam Reservoir

- 6.5.5. The reservoir is described in the Cawthron Report 2810 as a low productivity system, with biota in the reservoir such as phytoplankton, zooplankton, macrophytes and macroinvertebrates being characteristic of that low productivity.
- 6.5.6. Cyanobacteria is present in the lake and this is manifest in some of the toxic blooms that are experienced in the lower Maitai catchment. Eutrophication appears to be a major driver of increasing dominance of cyanobacteria in lakes. The Cawthron Report 2810 provides a comprehensive discussion of the relevant bacterial taxa in Section 2.2.5. The NRMP does not cite any standards associated with toxic cyanobacteria or other phytoplankton or zooplankton species.
- 6.5.7. Turning to reservoir macrophytes, the Cawthron Report 2810 provides (in Section 2.2.6) a description and analysis of macrophyte communities. The observation is made that the reservoir has unexpectedly low abundances, and very low diversity of macrophytes. Given the length of time that the reservoir has been in existence, a greater level of colonisation would have been expected. The lack of macrophytes causes adverse effects on ecological functioning, lower uptake of soluble nutrients and less habitat for fish. It is stated that the reason for the lack of macrophytes is unknown as it is unlikely that the magnitude and frequency of water level fluctuations is a major factor as it has been observed that this fluctuation is low compared to other reservoirs.
- 6.5.8. Macroinvertebrate communities are then discussed in Section 2.2.7. The report concludes that macroinvertebrates in the Reservoir include a moderately diverse range of taxa, and intermediate scores for invertebrate metrics which quantify the richness, diversity, and evenness of the invertebrate community.
- 6.5.9. Although standards for macroinvertebrate community metrics have been cited in the NRMP for rivers and streams, there are no equivalent macroinvertebrate metrics for lakes and reservoirs. Hence, macroinvertebrate communities are only interpreted relative to other lakes in the region to provide insight as to the relative health of the community. On this basis the reservoir is considered to have an intermediate macroinvertebrate community relative to these other lakes.
- 6.5.10. Finally, Section 2.2.8 of the Cawthron Report 2810 assesses fish populations within the reservoir. The report states that fish are essential components of lakes and reservoirs, affecting the foodweb structure, and water quality. The fish community richness and overall catch abundances were intermediate to low in comparison to other South Island lakes. The report states that a possible reason for the lack of fish at deeper depths is the anoxic conditions below the thermocline.
- 6.5.11. The reservoir does not suffer from the presence of exotic pest fish such as European perch and goldfish.
- 6.5.12. The Cawthron Report 2810 states that the size structure of the eel population in the reservoir is skewed towards the larger eels with very limited recruitment by juvenile

upstream migrates. No longfin eels of less than 600 mm fork length were observed. It is likely that this lack of recruitment is due to the poor fish passage prospects for juveniles to access the reservoir.

- 6.5.13. In the case of kōaro, no adults were detected in the Maitai Reservoir, possibly indicating that the species has also not been able to obtain access to the reservoir, and only low densities of large adult fish were observed in the North Branch tributary. Again, while accessing the dam up the spill way is not reported to be impossible, until recent improvements were implemented it would be challenging and with only a few fish likely to achieve access.
- 6.5.14. No standards for fish communities have been cited in the NRMP for any waterbodies. As such, the Cawthron Report 2810 interpreted fish community abundance and composition relative to other lakes in the region to provide insight as to the relative health of the fish community. On this basis the reservoir was considered to have a poor fish community health relative to other lakes. The limited passage of diadromous species (fish with portions of their life cycles in fresh and salt water) into the reservoir, and poor water quality conditions caused by low DO in cold-water refugia habitats are thought to be the two main contributors to this result.
- 6.5.15. From this discussion it is concluded that the presence of the reservoir is likely to be having a more than minor adverse effect on ecological communities within the reservoir. This is most likely due to the thermal stratification causing thermal stress in the surface (well oxygenated) layer and anoxia in the cooler deeper waters. The lack of oxygen obviates the potential for the hypolimnion to act as a cold water refuge during warm settled summer months. High concentrations of toxicants may also contribute to the lack of a cold water refuge.
- 6.5.16. The letter from Cawthron (**Attachment N**) provides a comparison against the Class C water classification standards. The final row in Table 1 in the letter identifies an assessment of the overall quality of the aquatic habitat. It is restated in note 15 of this letter that:
- “In the Maitai Reservoir, the combination of high water temperatures in surface layers and anoxic conditions at depth render the Reservoir poorly suited to sensitive aquatic life such as fish and potentially other aquatic invertebrate species.”*
- 6.5.17. As a result the reservoir is considered to currently meet the Class C standard for aquatic habitat.
- 6.5.18. If aeration or destratification is provided then this will eliminate anoxic conditions. Hypolimnetic aeration will retain the cold water hypolimnion (as the layers are not mixed) but introduce oxygen to the deep layers so that it can act as a cold water refuge. It is expected that this will result in improved outcomes for aquatic habitat. The letter from Cawthron (**Attachment N**) identifies a “high probability” of the Class B standard being met indicating an increase in the quality and quantity of the aquatic habitat.
- 6.5.19. A trap and transfer programme is currently a condition of the existing resource consent RM025151/1. This condition requires an annual transfer of “up to 200” eels of differing sizes into the reservoir. It is understood that this condition has been

implemented on a sporadic basis, although the condition is poorly worded and technically does not require any eels to be relocated.

- 6.5.20. It is recommended by Cawthron that greater quantities of fish should be transferred into the reservoir. While fish passage has also been improved, the dam spillway remains a formidable obstacle and, it appears, will always form a challenge to migrating fish. Therefore the applicant volunteers to adopt the recommendations for a trap and transfer programme as set out in Section 3.5 of the Cawthron Report 2810.

Maitai South Branch

Macroinvertebrates

- 6.5.21. Aquatic macroinvertebrates describes large (> 0.5 mm in length) invertebrates such as insects, snails and worms that live in the riverbed. Macroinvertebrates play an important role in maintaining periphyton communities (through grazing), and as a food source for fish and some birds species. Macroinvertebrates are commonly used in assessments of the environmental change in the river as they are easy to sample and identify.
- 6.5.22. The Cawthron Report 2810 contains an assessment of the macroinvertebrate community indices to provide information on the likely effects of the proposed activities on these essential components of the ecosystem. The results of the various indices (explained in Section 2.7.4 and Appendix 1 of the Cawthron Report 2810) are best shown in the Figure 18 which has been reproduced from Figure 33 of the Cawthron Report 2810.

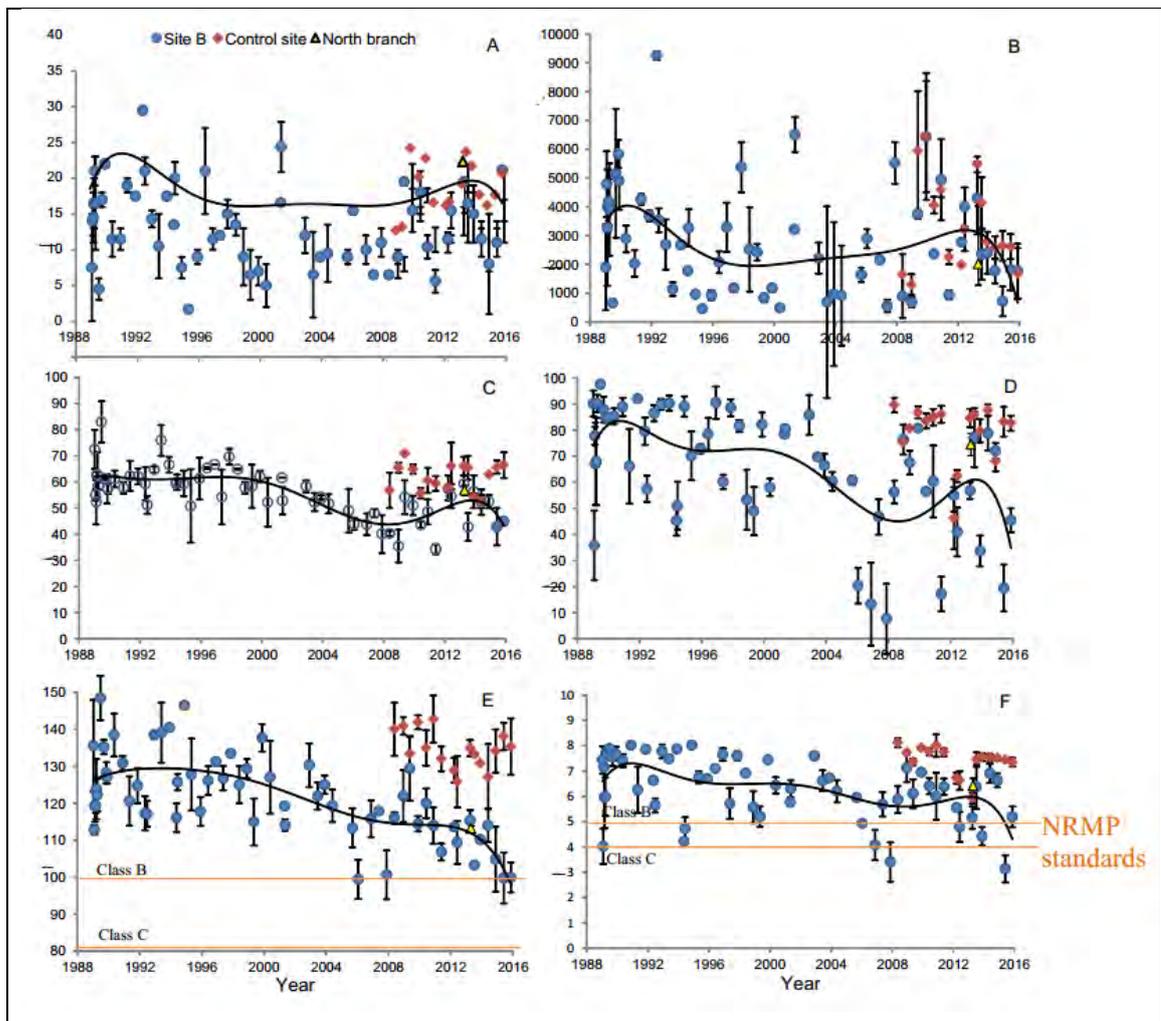


Figure 18: (A) Taxa richness, (B) mean macroinvertebrate densities, (C) %EPT taxa, (D) %EPT abundance (E) Macroinvertebrate Community Index (MCI) scores and (F) Quantitative MCI (QMCI) scores for: Site B in the Maitai River (blue circles) for 60 occasions between 1989 and 2015; the Control Site (upstream of intake = red diamonds) on 16 occasions between 2008 and 2015 and for the North Branch upstream of the Maitai Reservoir on one occasion in 2013 (yellow triangle). Fitted lines (black) are polynomial curves (order 6) fitted to Site B data only. Error bars represent standard errors of the mean. Also shown with an orange line are the NRMP standards for the MCI and QMCI indices. (Reproduced from Figure 33 of the Cawthron Report 2810)

6.5.23. Based on a range of commonly used macroinvertebrate community indices used for assessing river health the presence of the current operation regime of the backfeed appears to be having a negative impact on stream biota downstream of the reservoir backfeed over time and spatially.

6.5.24. Degradation in both MCI and QMCI metrics downstream of the backfeed between 2004 and 2015 indicate that the macroinvertebrate indices no longer meet NRMP minimum standards of 120 MCI and 6 QMCI cited for Class-A rivers. Consistent high invertebrate metric scores upstream of the backfeed suggest that the backfeed discharge has likely had a significant effect on the decline in benthic invertebrate community health downstream. These changes appear to continue further downstream and progressively worsen in the lower river with other tributary inputs.

- 6.5.25. Adverse effects on macroinvertebrates downstream of the backfeed are most likely caused by changes in the periphyton communities and thicker more extensive growth. Changes in periphyton communities and abundance appears to be influenced by nutrients present in the discharge of anoxic water from the bottom of the reservoir, especially during mid to late summer. As previously indicated these discharges of deep reservoir water is driven by a requirement to meet existing resource consent conditions that limit temperature changes.
- 6.5.26. Based on the Cawthron letter (**Attachment N**), the macroinvertebrates standard under the NRMP water classifications currently meets Class C. Although it is noted that under the status quo macroinvertebrate metrics could trend lower in the future.
- 6.5.27. There is a medium likelihood of strategic management of the backfeed achieving the Class B macroinvertebrate standard, and a high likelihood of reservoir oxygenation or destratification achieving the Class B macroinvertebrate standard (**Attachment N**).

Fish Populations

- 6.5.28. Fisheries are an important value of the Maitai River. The classification of the upper Maitai River (both South Branch and North Branch) in Appendix AP28.4 of the NRMP identifies “native fisheries”, “trout and eel fishery” and “trout spawning” as being values associated with the river reaches.
- 6.5.29. Table 19 of the Cawthron Report 2810 provides a list of the fish species found in the Maitai River catchment. A simplified list of these species that have been found within the upper catchment is:
- Longfin eel (at risk – declining)
 - Shortfin eel
 - Kōaro
 - Brown trout
 - Upland bully
 - Redfin bully (at risk – declining)
 - Common bully
 - Bluegill bully (at risk – declining)
 - Īnanga (at risk – declining)
- 6.5.30. In addition to the above list, torrentfish (at risk – declining) are recorded as not being detected in the upper catchment despite potentially suitable habitat being available.
- 6.5.31. Section 2.8.4 of the Cawthron Report 2810 examines the effects on fisheries, and provides the following summary:

“Prior to the 1990s the mid-lower Maitai River is reported to have supported a popular and productive fishery. Currently the river is not a popular fishery. Electric fishing and drift dive surveys indicate a sustained decline in the trout population over the past two decades. At present it is unclear as to the reasons for the population decline.

The popular mixed-species whitebait fishery in the tidal reach of the Maitai River is likely to be predominantly based on juvenile Īnanga which are a low-land river species. Therefore, there is little potential for the reservoir (in the upper catchment) to influence this value. However, the NCC

initiative to improve access for kōaro to habitat upstream of the reservoir may have a modest positive impact on the fishery.

Tuna (eels) are valued for biodiversity reasons as well the customary and recreational fisheries they provide. However, there is little available information on the use or productivity of the tuna fishery in the Maitai River. Based on electric fishing records at Site B juvenile eel numbers appear to be in decline since 2002. This decline occurs in parallel with a decline in trout numbers. At present it is unclear as to the reasons for the apparent decline in the juvenile eel population.”

- 6.5.32. From the above conclusions, and with reference to Section 2.8.3 of the Cawthron Report 2810, it appears clear that valuable native fish species and trout have declined to low numbers in the river. However, the cause of this decline is unclear but reference is made in the Cawthron Report 2810 to the adverse effect that periphyton growth can have on macroinvertebrate levels, and therefore to the food sources for fish.

6.6. Effects on fish passage

Introduction

- 6.6.1. Doehring and Hay (2014a) provide a useful summary of the passage requirements of New Zealand fish species. They state that a large proportion of New Zealand’s native fish species require access to and from the sea to complete their life cycles. The requirement to migrate results in relatively small juveniles migrating upstream seeking suitable habitat to grow to adulthood. Trout and salmon, on the other hand, migrate upstream as adults seeking spawning habitat. They also point out that river resident fishes (both native and introduced) often move between parts of a catchment during their life.
- 6.6.2. This means that any kind of barrier (whether physical [*i.e.* dams, weirs] or chemical [*i.e.* poor water quality]) to their up and /or downstream migration may disrupt their life cycle. Some of New Zealand’s native fish species have adapted their swimming ability and developed climbing skills to overcome barriers. Juvenile eels (elvers), kōaro and some bully species are particularly adept at migrating or ‘climbing’ large physical barriers. The upstream migration usually occurs at night during the summer months.
- 6.6.3. Nevertheless, Doehring and Hay (2014a) point out that ‘climbers’ still require some assistance over passage barriers. They identify four different swimming ability categories:
1. Anguilliform (worming their way through interstitial spaces);
 2. Climbers (climb the wetted margins of waterfalls, rapids and spillways);
 3. Jumpers (leap using the waves to jump over obstacles); and
 4. Swimmers (swim around obstacles relying on areas of low velocity to rest).
- 6.6.4. Clearly, effective fish passage provision needs to provide for these different strategies. Non-climbing species will obviously struggle to overcome impediments that can be negotiated by climbing species that utilise the above strategies.
- 6.6.5. Doehring and Hay (2014a) state:
- “Other than the Reservoir, Fish & Game (NZ) are currently of the opinion that fish passage is not a major issue in the Maitai River (pers.comm. Neil Deans, Fish & Game NZ). However two potential barriers to fish passage were noted, including the ford at Almond Tree Flat, which crosses the mainstem approximately 1 km downstream from the confluence with Sharland Creek; and a culvert on Packers Creek ...”*

- 6.6.6. Turning to the structures for which consent is sought in this application. There are two structures in the Maitai River which potentially act as partial or complete barriers to fish migration up or down the rivers. These are the Maitai Dam and the South Branch weir.
- 6.6.7. Schedule AP28.4 of the NRMP identifies the Maitai River from the confluence (the forks just below the dam) to the headwaters as having significance for native fisheries, trout and eel fishery and trout spawning.
- 6.6.8. The Cawthron Report 2810 confirms that the Maitai Dam is a partial barrier to fish passage. A large proportion of New Zealand's native fish species require access to and from the sea to complete their life cycles and some introduced sport fish (*e.g.* trout and salmon), commonly migrate upstream as adults, seeking spawning habitat or cooler water temperatures during summer.
- 6.6.9. The influence of fish passage barriers depends on their location within a catchment. Those closer to the sea are likely to impact a broader range of species, while those in upper catchments will influence only those species that would normally penetrate further inland.
- 6.6.10. Nelson City Council is working toward addressing recognised fish passage barriers in the mid to lower Maitai catchment, and have addressed barrier issues at the fords at Almond Tree Flat. This will leave the Maitai Dam and the South Branch weir as the only remaining major fish passage barriers in the mainstem of the Maitai River. However, the location of these structures in the upper catchment means they are likely an impediment only to relatively strong migrants, such as redfin bully, longfin eel and kōaro and trout, or to non-migratory fish resident in the vicinity, such as upland bully.

Maitai Dam

- 6.6.11. Section 4.1.1 of Doehring and Hay (2014a) concludes that the Maitai Dam is a significant barrier to fish species, including strong climbing species. They identify the following issues:
 - 1. Size, shape and slope of the spillway and apron
 - 2. Lack of wetted margins and rest areas for migrating fish during high flow
 - 3. lack of flow (no flow) on the spillway during elver and whitebait migration season; and
 - 4. High water temperatures in the Maitai Dam reservoir and spillway
- 6.6.12. With the exception of redfin bully, all strong migrant species have been recorded upstream of the Maitai Dam, although the population densities above the dam are reduced to some extent relative to what may have existed naturally. The eel population in the Maitai Reservoir appears to have skewed size distribution suggestive of poor recruitment.
- 6.6.13. The Maitai Reservoir spillway presents a more significant obstacle to fish passage than the South Branch weir, largely due to its height. The spillway is approximately 30 metres high and 151 metres long.
- 6.6.14. Fish passage remediation work undertaken at the Maitai Dam spillway during autumn 2015 included:

- Installation of a pump to deliver water from the reservoir to the spillway crest to ensure continuous flow down the spillway during summer migration periods.
- Plugging the drainage outlets in the flip bucket with bungs to maintain the pool that usually forms in this bucket when spilling occurs.
- Installation of mussel spat ropes down the length of the spillway and downstream of the flip-bucket, adjacent to the true right spillway wall, to provide additional cover, as well as resting and climbing opportunities for migratory fish.
- Installation of a short ramp from the lip of the flip-bucket to the spillway apron below to allow climbing fish to avoid the steep transition into the flip-bucket.

6.6.15. The Cawthron Report 2810 provides comment on the success of these measures. It states that the modifications carried out during autumn 2015 have undoubtedly improved the situation for elvers attempting to climb the spillway. But it is also clear that climbing the spillway remains a considerable challenge for the migrant fish. The number of elvers successfully climbing the reservoir spillway is likely to be relatively low. Furthermore, many are predated by birds and eels when they reach the top of the spillway due to the predictability of their climbing location.

6.6.16. Current NCC consent conditions for the dam (condition RM025151/1) identifies certain requirements that amount to a 'trap and transfer' programme to relocate elvers to the reservoir. Doehring and Hay (2014a) state that the habitat in the North Branch upstream of the reservoir is suitable for eels and kōaro and consequently recommend that trap and transfer options for both species should be considered as part of the 2017 re-consenting process.

6.6.17. Given the challenges of achieving unassisted fish passage into the reservoir it is recommended that the existing trap and transfer programme be continued and enhanced so that both elvers and koaro are transferred in greater numbers, and more regularly from the Maitai River into the reservoir. Conditions to this effect are accepted by the applicant. Such a programme also appears to be supported by local Iwi who have an interest in the ongoing health of the fisheries (**Attachment O**).

South Branch Weir

6.6.18. Doehring and Hay (2014a) assessed the South Branch weir and concluded that the structure is a partial (but not complete) barrier for resident South Branch fish species. Low populations of longfin eel above the weir, despite favourable habitat existing, is of concern and improvements to native fish passage over the weir would be beneficial.

6.6.19. As described in the section 2.8.2 of the Cawthron Report 2810, a suite of fish passage remediation works were undertaken on 2 December 2014. Following the remedial works elvers have been observed successfully passing the weir, predominantly via the smooth wetted edge adjacent to the true left of the intake screen. However, the weir may still impede passage for some weaker climbing species, *e.g.* redfin bully, which has been found immediately downstream of the South Branch weir, but has not been recorded upstream of the weir, since its construction.

- 6.6.20. There also remains an issue with relatively large numbers of elvers being attracted to the attractant flow from the backfeed discharge (Hay *et al.* 2015). These elvers climb the wet rocks in the splash zone of the backfeed, but appear unable to find a way upstream over the dry area on top of the weir.
- 6.6.21. This will be resolved by the addition of effective fish passage and a wetted surface on the true right side immediately beside the backflow discharge point.

6.7. Effects on Aesthetic Values

- 6.7.1. As previously discussed, the NRMP identifies the Maitai River below the South Branch weir as being Class C. Class C represents 'Moderate' existing water quality.
- 6.7.2. The water quality standards are dominated by water quality criteria and these have been discussed above. However, aesthetic values are a criterion and must therefore be considered. The water quality criteria seeks that:

"aesthetic values are not reduced by dissolved, suspended, floating, or submerged matter not attributed to natural causes, so as to affect water use or taint the flesh of edible species".

- 6.7.3. The factors that could most readily affect aesthetic values would be:
- Flow volumes;
 - Water colour and clarity;
 - Odour; and
 - Periphyton growth.

Flow Volumes

- 6.7.4. Flow volumes are maintained through the release of backfeed water to achieve naturalised flow volumes. The backfeed fully supplements the South Branch flow that is abstracted, and for much of the time the overall flow is actually increased by the operation of the backfeed.
- 6.7.5. As described in Section 6.2 above and in Section 2.3 of the Cawthron Report 2810, the overall flow in the Maitai River below the forks monitoring site is largely maintained from the naturalised (without dam) flow characteristics.
- 6.7.6. As a result it is considered that the adverse effects on aesthetic and amenity values resulting from alteration in flow volumes are less than minor.

Turbidity, clarity and colour

- 6.7.7. The Cawthron Report 2810 concludes that the backfeed discharge has only a minor effect on the clarity of the Maitai River. Turbidity at and below the backfeed discharge point generally meets consent requirements.
- 6.7.8. However, it is clear from a visit to the South Branch weir that there is a noticeable change in colour from the upstream to the downstream. This colour is evidently the result of the precipitation of metals (most notably iron) upon the emergence of the backfeed water into the South Branch. As a result of its rapid aeration metals precipitate out of solution and the rocks in the vicinity of the discharge point have become coated in the precipitate. The change of colour can be seen in Figure 19.



Figure 19: Aerial photograph of South Branch Weir. Backfeed discharge can be seen on left side of pool immediately downstream of weir.

- 6.7.9. As stated, this change in colour – not from the clarity of the water but from the colour of the rocks that make up the bed – is noticeable, and causes a significant reduction in visual and aesthetic values. It is clear to observers that, from appearance of the South Branch immediately above the weir to the appearance of the darkly stained bed below the weir, a noticeable and marked change has occurred in the management of the river.

Odour

- 6.7.10. There have been several anecdotal experiences of odours being emitted from the South Branch downstream of the backfeed (pers. comm A. Millar). In one case odour was reported from the river over 100 metres from the backfeed discharge (pers. comm David Kelly, Cawthron). More recently one author of this application undertaking a site visit with representatives of Ngati Kuia and the NCC experienced a strong sulphurous odour from the backfeed discharge (23 March 2016, mid-morning).
- 6.7.11. While no person present was qualified to objectively quantify the intensity of the odour, all present agreed that the odour was relatively strong and objectionable.

- 6.7.12. Given that the site visit was undertaken on 23 March 2016 the thermal stratification of the reservoir is likely to be strong and, in order to achieve temperature change conditions, water was being discharged from the deeper waters within the reservoir which would have had low dissolved oxygen. As a result of this anoxic water release sulphurous compounds would have been released.
- 6.7.13. It has also been noted that sulphurous odours are emitted when the thermal stratification breaks down and the reservoir “turns over” (pers. comm. A. Millar).

Periphyton

- 6.7.14. The Cawthron Report 2810 concludes that the backfeed discharge into the South Branch has had a causative effect on increasing levels of nuisance periphyton growth downstream of the weir. This conclusion is based on the lack of nuisance growth upstream at the control site.
- 6.7.15. The transition from thin brown algae to medium brown algae downstream of the spillway to thick brown algae at the lower site 2.5 km downstream of the backfeed is evident. The images in Figure 30 of the Cawthron Report 2810 (reproduced in Figure 17 above) demonstrate the lower aesthetic values that result from increasing dominance of periphyton growth.

Summary and Mitigation

- 6.7.16. The discharge of the backfeed into the South Branch has a set of particular characteristics that are likely to result from the anoxic state of the water. These characteristics can indirectly adversely affect some aesthetic values of the South Branch, and main stem of the Maitai River. The same characteristics are not necessarily observed as a result of the spillway discharge as that flow is sourced from the well-oxygenated waters at the surface of the reservoir.
- 6.7.17. The resulting effects from the backfeed include a noticeable change in colour as a result of staining of the rocky substrate, an intermittent unpleasant sulphurous odour, and a promotion of medium brown algae, thick brown algae and filamentous green algae on the bed downstream of the discharge.
- 6.7.18. The promotion of medium and thick brown periphyton mats and filamentous green algae appears to be the most persistent visual and aesthetic impact that continues downstream. It is likely that the causative factors driving the transition to greater nuisance algae with distance downstream are broader and may include other nutrient inputs. However, in the upper areas from the backfeed downstream and immediately downstream of the forks it is likely that the effects are driven by the activities sought by this application.
- 6.7.19. Because the production of odourous compounds occurs as a result of anoxic conditions, aerating the backfeed water by way of destratification aeration of the entire reservoir, or aeration of the hypolimnion should eliminate the issue of smell. The backfeed management strategy may reduce the effects but may not be able to fully eliminate them.
- 6.7.20. Aeration of the reservoir should eliminate the deposition of iron staining, while backfeed management may reduce the effect.

6.8. Effects on Maori cultural values

- 6.8.1. The Cultural Impact Assessment (CIA) provided within **Attachment O** of this application serves to identify and assess the actual and potential effects of the activities on cultural values. This assessment is provided in section 5.2 of the CIA, inserted below, however it is acknowledged that the environmental effects also overlap with the cultural effects:

5.2 Cultural Effects

As mentioned previously, the Mahitahi River is a tupuna awa for Te Tau Ihu iwi. Safeguarding the mauri of the river is a primary focus. Tangata whenua such as Ngāti Kuia look to cultural health indicators to interpret the status of mauri. These may include factors such as the presence of healthy kai and other indigenous flora and fauna, the presence of resources fit for cultural use, and the aesthetic qualities of resources such as the visibility of important landmarks. The cultural integrity of the river as an important landmark or component of the cultural landscape has been compromised by the weir and other related structures. Fortunately, the passage between Nelson and Maungatapu has not been affected and iwi are able to continue their annual hikoi to Maungatapu for the collection of Pakohe for traditional stone working.

The environmental effects outlined in section 5.2 can have flow on cultural effects such as the reduction in ability to practice kaitiakitanga, loss of matauranga, loss of harvest opportunities and so forth.

The mitigation options proposed by Cawthron are supported as they are expected to improve water quality, the distribution and abundance of fish such as tuna (eel) and koaro and enhance cultural values such as mauri overall. Consideration of opportunities for iwi to practice kaitiakitanga in the context of this consent, i.e; through provision of monitoring reports, reports on trap and transfer operations and exploring possibilities to support cultural health monitoring would also provide a level of mitigation in relation to this consent. (pp16-17, emphasis added)

- 6.8.2. The CIA report then contains the following recommendations:

Recommended measures to avoid, remedy or mitigate potential adverse effects for consideration by NCC should this consent be granted include:

- *That the content and recommendations contained in this report be received and considered by NCC.*

- 6.8.3. The CIA was received and fully considered in advance of this application being finalised and formally lodged.

- *That the full consent application; including AEE and any volunteered consent conditions is provided to Te Tau Ihu iwi as soon as it becomes available for their review and input.*

- 6.8.4. This resource consent application was provided to iwi as soon as it was finalised.

- *That the applicant select the 'in dam' oxygenation pump method to remedy the adverse effects of the current anaerobic state of the lower level water strata, improve the dam habitat and mitigate the adverse effects the dam has had on the mauri of both branches of the River and that this method should be implemented as soon as practicable following the grant of consent.*

- 6.8.5. The applicant has committed to further investigation of options to oxygenate the hypolimnion of the reservoir to improve the water quality and habitat availability.

- *That the applicant provide for fish passage in line with current best practice (including maintaining wet passage areas for climbing species and potentially retreats for steep long distance climbs such as the dam spillway) for all in stream structures as soon as practicable and in consultation with iwi and Cawthron.*

6.8.6. Fish passage improvements have been volunteered with many already implemented.

- *That the applicant undertake intermittent fish trap and transfer operations in line with the recommendations of the Cawthron report and make provision for the involvement of iwi (if they desire) to promote kaitiakitanga and build capacity and capability. Reports of these operations are to be provided to iwi and any such operation shall ensure that no exotic species are transferred.*

6.8.7. Trap and transfer has again been volunteered.

- *That the applicant invite Te Tau Ihu iwi to discuss opportunities to support cultural health monitoring programme/s in the Mahitahi River.*

6.8.8. The applicant is in the process of arranging this discussion with iwi. It is expected that there will be significant overlaps with other existing work streams, which as the implementation of the NPSFM.

- *That the consent's current requirements for annual aquatic ecological monitoring reports are continued at least 1 x per year; and that these reports include three locations being, upstream of the south Mahitahi weir, within the natural flows of the North Branch upstream of the dam lake, and immediately downstream of the confluence (the forks). The report must include fish species; invertebrates; algae and cyanobacteria and; instream vascular flora. If the reports show depleted native flora and fauna health and abundance that can be attributed to the Mahitahi water takes, the applicant must investigate a remedy as soon as practicable and in conjunction with Te Tau Ihu iwi.*

6.8.9. Annual reporting is volunteered. Remedying changes in the aquatic habitat are very complex with, in some cases, a high degree of uncertainty given the range of factors.

- *That a comprehensive list of proposed physical and chemical monitoring regimes be made available to iwi for review and comment.*

6.8.10. The applicant volunteers to provide this information to iwi. Cawthron would be involved in establishing these regimes.

- *That the applicant remove any debris from the subject structures from the bed or banks of the rivers as soon as practicable following any flooding event or at any other time when debris becomes detached from the consented structures.*

6.8.11. This is volunteered.

6.8.12. In summary, there is a very high level of agreement between the applicant and the recommendations contained in the CIA report. As a result, it is considered the applicant has appropriately identified and provided for the actual and potential effects on cultural values.

6.9. Historic heritage

6.9.1. As set out in Section 6.8 above, there are existing archaeological values present in the area of the Maitai Dam. The actual and potential adverse effects on those values occurred at the time that the existing infrastructure was constructed. With no further physical disturbance works proposed as a part of this application, no additional or new adverse effects can arise.

6.10. Recreational values

- 6.10.1. The Maitai River is a significant and highly valued recreational resource that is enjoyed by residents and visitors on a daily basis. The NRMP formally identifies these recreational values in Appendix 6 and Appendix 28.4 (refer to Section 7.5 above). Access is a priority riparian value.
- 6.10.2. Within listed assessment criteria (Fwr.6, Fwr.12, Fwr.20) the Plan directs that, as a part of assessing resource consent applications, consideration be given to the effects on these values listed in Appendix 6 and A28.4.
- 6.10.3. In May 2015 the applicant commissioned Rob Greenaway & Associates Limited to establish baseline recreational values for the Maitai (and Roding) River to enable it to assess the actual and potential effects of the Maitai River water abstraction (and discharge). This assessed is set out in Section 2 'Introduction' of the RG&A report contained within **Attachment P**:

The Nelson City Council provided the following scope for the project:

The primary driver for this assessment is the water abstraction resource consent which is due to expire in early 2017. As part of the application process for the new resource consent, it is essential we understand all impacts the water abstraction activity has on the river. The application will not be seeking any increase in abstraction rates.

The recreational assessment is to establish a baseline of recreational values which covers all aspects of the river, and a range of NCC activities which may impact upon recreational users enjoyment of the river, not just those associated with the water abstraction activity.

The key objectives were to review the recreational values of the Roding and Maitai Rivers with the following considerations:

- What are the recreational uses of the river, and what do recreational users value about the river and its environs? Users to include: in-river activities, river environment activities, properties immediately fronting the river, any businesses dependent on the river activities.
 - Determine how river characteristics such as flow rates, water quality, water temperature and ecological quality ('natural-ness') affect the recreational uses and user enjoyment associated with the river. This is to cover the impact of both low flows and high flows within the river.
 - How do river users rate the impact of current Council activities on their enjoyment of the river? Current Council activities include: water abstraction, structures within the river (e.g. fords and bridges), structures alongside the river (e.g. walkway and signage), flood protection work, gravel extraction, landscaping and mowing, riparian planting, forestry, Waahi Taakaro golf course, Maitai Campground, and stormwater discharges.
 - What future changes to river characteristics (including flow rates, water quality, water temperature and ecological quality) would impact (positively or negatively) on types of recreational use, or the enjoyment of users?
 - Discuss any predicted change in recreational experiences and activities over time, based on currently available information.
 - Identify recommendations for practical options for enhancement of recreational use and enjoyment.
- 6.10.4. Answers to the above questions were gathered through two surveys, an intercept survey and a resident's survey. The data gathered is reported in separate sections of the RG&A report, with a summary also provided in Section 1 of the report. Note: the resident's survey was designed to be slightly shorter to ensure a good response rate.

The following table has been prepared to provide to two sets of results alongside each other.

	Intercept Survey	Residents Survey
Main Activity	Walk (42%), Swimming (28%) Dog Walking (10%), Mountain biking (6%), Picnicking (5%), Relaxing (3%)	Walk (54%), Dog Walking (20%), Looking at the water (12%), Swimming (5%), Cycling (5%), Picnicking (5%),
Change over time	35% better, 33% no change, 26% worse	14% better, 19% no change, 68% worse
Best aspects	Calm atmosphere / peaceful, close to town, walking, cycling / running, scenic, trees, swimming	Accessibility, walking / cycling, running, scenic qualities, wildlife, calm atmosphere, trees, setting natural environment
Worse aspects	Algae, toxic algae, mosquitoes / sandflies / wasps etc, litter / rubbish, cyclists, dogs / dog poo.	Slime, algae, lower water / flow, wildlife decreased, water quality deteriorated, dirtier, pollution / rubbish
Naturalness / modified	Partially –moderately modified	(Not surveyed)
Flows	61% never affected water based activities, 24% rarely, 9% occasionally, 6% frequently – with 89% not checking flow before visiting	(Not surveyed)
Improvements	Toxic algae, water quality, planting, fish friendly	Water quality and toxic algae

6.10.5. The RG&A report lists the following key points:

Key points from the results:

- *Flow levels in the rivers were of less interest to respondents than algae and water quality.*
- *Algae and toxic algae were key concerns, although there appears to be some confusion about what algae is.*
- *Water quality was also a strong area of interest, but what constitutes poor water quality was poorly described, with it including water clarity, algae and ‘pollution’.*
- *Residents were more likely to consider the rivers to have changed for the worse in comparison with other river users, but river users were more likely to consider the rivers to be better or the same as when they first visited, rather than worse.*

- *Flood protection was a lower priority on the Maitai River than most other management issues.*
- *The rivers were highly valued for recreation and natural and scenic values, and respondents were able to name many more positive aspects than negative ones. (p5, Attachment P)*

6.10.6. The discussion in section 1.1 of the report also provides some assistance:

The Maitai River has a more mixed activity profile, but swimming remains an important use above Nile Street. Water quality and algae issues were identified by all user groups, suggesting that both issues affect contact recreation as well as general concerns about maintaining natural in-river values. However, there appeared to be a high level of satisfaction with the developments for recreation which have occurred around the Maitai River to date. Interestingly, during the survey design and implementation process there were many comments heard about historic gravel extraction from swimming holes on the Maitai River and their consequent suitability for jumping and swimming, but only limited comment about this opportunity appeared in the survey results.

Importantly, it must be remembered that all respondents were more able to name good things about the rivers than bad things. While there is clearly concern over the issues discussed, the rivers are highly valued for many reasons in their current conditions, and are greatly enjoyed for recreation.

In sum, respondents appear to be most interested in managing the rivers to reduce nuisance and toxic periphyton growths and to improve water quality. Flow levels, in themselves, appear to be less of an issue for recreation. There are education opportunities about what periphyton is and how it may naturally occur (several respondents noted that if the rivers are behaving 'naturally', then whatever happens is acceptable), and what is toxic algae and didymo. There is also a range of preferences for recreation facility development (including maintaining low levels of development in some areas) which can inform planning processes. Preferred priorities for works are clearly to improve in-river and natural values. (Attachment P, p8-9, emphasis added)

6.10.7. The applicant's commitment to improve the current water quality effects from the backfeed discharge, while also committing to leave a higher minimum flow (outside of 1 in 60 year droughts), are entirely consistent with the overall expectations of recreation water users. Fishery enhancement is also a possibility however this would need to be discussed and agreed between all stakeholders before this measure is undertaken.

6.10.8. In summary, this application for resource consent is considered to have addressed the actual and potential adverse effects on the Maitai water scheme on recreational values. The adverse effects are considered to be less than minor, with changes to minimum flows being a likely positive outcome.

6.11. Network utilities

6.11.1. The effect of the activity on any network utility is an assessment criteria in FWr.4 and FWr.6 of the Plan. Ironically, this application relates to the operation of DN3 being a network utility for public water supply purposes. No other network utilities are considered to be potentially affected by these activities.

6.12. Public safety considerations

6.12.1. New resource consents have been sought for the Maitai Dam and the weir on the South Branch pursuant to Rule FWr.6.3 of the NRMP. As set out in Section 3.0 above, this application is to be considered as a discretionary activity.

- 6.12.2. The explanation to FWr.6 explains why “safety considerations” are a relevant assessment criteria listed in FWr.6.4:

While dams and reservoirs have the potential to improve the efficient use of water (through water harvesting), as physical structures they also have the potential to: affect fish passage, disturb water quality (during construction), affect water chemistry (such as oxygen levels), trap sediment and starve the downstream reaches of sediment, and cause a safety hazard if not engineered to specific standards. (FWr.6.5, A28, p41, NRMP, emphasis added)

- 6.12.3. The existing dam and weir were constructed in accordance with sound engineering practices. For the weir, being a very small structure compared to the 39m high Maitai dam, and only damming a nominal volume of water, the safety risks are considered to be de minimus. The focus of this part of the AEE is therefore on the Maitai Dam. However provided within **Attachment H** is a Life Expectancy and Durability Assessment (December 2014) undertaken of the South Branch Weir / Intake. The Executive Summary reported that:

*This assessment found that the Maitai Dam Intake Structure – South Branch is generally in sound aged condition with some aesthetic defects. Overall, the residual design life of the key structural components is estimated to be in the order of 30 years. It is likely this could be extended with regular maintenance. The service life of some ancillary components could be less than 30 years, for example deep pitting was observed on the steel sluice valve and this should be subject to a more detailed condition assessment. (p3, **Attachment H**)*

- 6.12.4. And in terms of recommendations:

It is recommended that a regular inspection and maintenance program is implemented to ensure deterioration in observed conditions can be identified and repaired as required. In particular, depth of concrete spalling should be monitored and a protective coating should be applied if the rate of spalling rapidly increases.

Further inspection of steel sluice valve should be completed to determine the extent of corrosion on the sluice gate and guide channels. This may involve inspection from the waterway. (p9)

- 6.12.5. The Dam Intake Structure on the South Branch has therefore been assessed and is in good condition. The applicant volunteers to implement the recommendations set out in this report.
- 6.12.6. A full set of as-building engineering drawings for the Maitai dam are provided within **Attachment C1** to this application. With the renewal Water Right 82-0490 in July 2002, the new consent RM025151/1 imposed the following relevant conditions:

Maintenance of structures

3. *The consent holder shall ensure that the structural integrity and safety of the dam and associated ancillary structures (including spillways, pipelines, inlet and outlet structures) is monitored and maintained in strict accordance with the original design and maintenance specifications.*

Safety inspections and Independent Safety Reviews

4. *The consent holder shall engage the dam designers to undertake an annual inspection, and an independent engineer or firm of engineers to undertake a five yearly review, of the safety of the dam and ancillary structures. Copies of the inspection and review reports are to be forwarded to the consent authority.*

- 6.12.7. RM025151/1 is provided within **Attachment R**.
- 6.12.8. A copy of the latest *Comprehensive Safety Review* (June 2014) is provided within **Attachment Q1** of this application for resource consent. This assessment from

DamWatch satisfies the required 5 yearly review, and followed the report DamWatch prepared in 2013.

6.12.9. Copies of the Tonkin and Taylor Ltd latest annual Dam Safety Review (May 2015) and the Intermediate safety Inspection (October 2014) are also attached to this application for resource consent (**Attachments Q2 and Q3**).

6.12.10. In combination, these specialised engineering reports helpfully set out the overlapping requirement of the relevant legislation (i.e. Building Act 2004). Importantly, the DamWatch report concludes that:

The dam is in good condition and is performing well. There are no indications of any of its failure modes developing. ... (pii, Attachment Q1)

6.12.11. The applicant continues to monitor and maintain the Maitai Dam in accordance with the recommendations of its engineering consultants, best practice, and also meet its statutory obligations.

6.12.12. In summary, the existing Maitai Dam South Branch Intake Structure / Weir do not pose a significant risk to public safety as they have been constructed, are monitored and maintained in accordance with best practice.

6.13. Positive effects

6.13.1. The provision by Council of a safe and reliable water supply is essential to community and environmental health and wellbeing. Not only is water critical to human health, but also to economic, social and cultural well-being. Water is essential to all life and this is why it is a core business activity undertaken by the Council.

6.13.2. The importance and value of the Council's water supply scheme is acknowledged in all relevant local planning documents (see section 7.4 and 7.5 below), and in various other documents such as the Long Term Plan 2015-2025 (see Section 9.2) and Water Asset Management Plan (Section 9.3). The identified management objective of public water supply, along with the activity status and flow regimes, which secure this water for this purpose is a reflection of this importance.

6.13.3. The Cultural Impact Assessment also acknowledges the value of this water scheme:

... Understandably, the water take is currently seen as essential to the City, however the renewing of these consents provide opportunities for improved management with better outcomes for iwi. (p4, CIA, Attachment O, emphasis added)

And:

5.3 Social and Economic Effects

Security of domestic water supply for Nelson/Whakatu is important for the wellbeing of the entire community, including iwi. Balancing against that is the fact that the social and economic wellbeing of mana whenua/ tangata whenua is also inextricably linked to ecological and cultural health. (p17, CIA, Attachment L, emphasis added)

6.13.4. In many ways, the positive effects associated from the Maitai water supply scheme are best described within the definition of "sustainable management" in section 5 of the Resource Management Act 1991:

In this Act, sustainable management means managing the use, development, and protection of natural and physical resources in a way, or at a rate, which enables people and communities to provide for their social, economic, and cultural well-being and for their health and safety while—

- (a) *sustaining the potential of natural and physical resources (excluding minerals) to meet the reasonably foreseeable needs of future generations; and*
- (b) *safeguarding the life-supporting capacity of air, water, soil, and ecosystems; and*
- (c) *avoiding, remedying, or mitigating any adverse effects of activities on the environment.*

6.13.5. The activities that make up the Maitai Water Supply Scheme enable these positive community outcomes. The activities are therefore fundamental to the well-being, health and safety of the community. These actual positive effects are considered to be significant.

7. Relevant Planning Documents

7.1. Introduction

7.1.1. It is within this section that the proposed activities are assessed against the relevant provisions of the relevant planning documents referred to in section 104(1)(b). This assessment is required by Clause 2(2) of Schedule 4.

7.1.2. The relevant planning documents include:

- National Policy Statement for Freshwater Management 2014 (4 July 2014)
- National Environmental Standard for Sources of Drinking Water (June 2008)
- Nelson Regional Policy Statement (10 March 1997)
- Nelson Resource Management Plan (2004)

7.1.3. The relevant provisions of these documents are addressed under separate subheadings below.

7.2. National Policy Statement for Freshwater Management 2014

7.2.1. The National Policy Statement for Freshwater Management 2014 (NPSFM) was gazetted on 4 July 2014. The following extract from the Preamble explains why the NPSFM was developed and its primary function:

“Given the vital importance of freshwater resources to New Zealand and New Zealanders, and in order to achieve the purpose of the Resource Management Act 1991 (the Act), the Crown recognises there is a particular need for clear central government policy to set a national direction, though the management of the resource needs to reflect the catchment-level variation between freshwater bodies and different demands on the resource across regions. This includes managing land use and development activities that affect fresh water so that growth is achieved with a lower environmental footprint.

This national policy statement sets out objectives and policies that direct local government to manage water in an integrated and sustainable way, while providing for economic growth within set water quality and quantity limits. This national policy statement is a first step to improve freshwater management at a national level.” (p3)

7.2.2. The preamble also explains that the NPSFM sets national bottom lines for ecosystem health and human health for recreation. However it explains that these standards do not need to be achieved immediately, but will need to be improved over time. It explains that it is up to communities and iwi to determine the pathway and timeframes for ensuring freshwater management units meet these bottom lines.

7.2.3. The Nelson City Council publicly notified its Implementation Programme before the end of 2015 and this is now set out on the Council’s website (<http://nelson.govt.nz/environment/water-3/freshwater-2/freshwater-management/freshwater-implementation-programme/>) and on the following page. This Programme has involved the establishment of Freshwater Management Unit Advisory Groups and an Iwi Working Group. These groups “meet regularly to:

- *confirm the values and objectives for each FMU;*
- *define freshwater attributes;*
- *input to the limit setting process for each of the attributes; and*
- *provide feedback on draft objectives, policies and methods”.*

- 7.2.4. The “*Progressive Implementation Programme*” identifies that a draft regional policy statement and provisions for inclusion in the Nelson Plan are to be released in mid-2016, seek feedback on drafted freshwater provisions for inclusion into the Nelson Plan in mid-2016, develop new plan provisions for the freshwater chapter in 2016/2017, notify the new Nelson Plan in 2017 and hear submissions and make decision in 2018.



Resource Management Act 1991
National Policy Statement for Freshwater Management (NPS-FM)
Progressive Implementation Programme

The freshwater Progressive Implementation Programme defines phases for implementation of the NPS-FM, and includes a summary of actions and deadlines.

Phase	Summary of Actions	Due Date
Collaborative policy development	The freshwater management unit advisory groups and the Iwi Working Group continue to meet regularly to: <ul style="list-style-type: none"> confirm the values and objectives for each FMU determine freshwater attributes. input to the limit setting process for each of the attributes. provide feedback on draft objectives, policies and methods The Whakamahere Whakatū Nelson Plan freshwater policy provisions are developed with the involvement of Council, iwi, FMU advisory groups and independent experts and scientists.	2016/17
Regional Policy Statement provisions	A draft of the regional policy statement provisions for inclusion in the Whakamahere Whakatū Nelson Plan is publicly released for comment	Mid 2016
Public consultation	Council seeks feedback from the public on the draft Whakamahere Whakatū Nelson Plan freshwater provisions as part of draft Nelson Plan consultation.	2016
Whakamahere Whakatū Nelson Plan	Development of plan provisions for the freshwater chapter. The plan will include: freshwater values, attributes, limits and targets; adopt an integrated approach and recognise cumulative effects; manage takes and discharges; manage allocation and avoid over-allocation; manage land use and co-ordinate growth and infrastructure. Public notification of Whakamahere Whakatū Nelson Plan including freshwater chapter.	2016/2017 2017
Decisions on Plan review	Council hears and considers submissions and makes decisions as part of the Nelson Plan.	2018



- 7.2.5. The Nelson City Council has however already undertaken a Plan Change to ensure the Freshwater Plan includes the interim provisions. This Plan Change was notified in 2015 and this involved changes to Freshwater Rule 12 (take use divert), Freshwater Rule 20 (point source discharges) and District Wide Objective DO19.1.5 and DO19.1.12. These provisions are addressed in detail in section 7.5 of this

assessment of the relevant planning documents, under the heading ‘Nelson Resource Management Plan’.

- 7.2.6. In essence, the NPSFM will be implemented through the work currently being undertaken by the Nelson City Council in preparing the *Whakamahere Whakatū Nelson Plan*. This new Plan will replace and combine the current Nelson Regional Policy Statement (NRPS) and Nelson Resource Management Plan (NRMP).
- 7.2.7. In the meantime, Section 104 of the Resource Management Act 1991 requires that applicants assess, and decision makers have regard to, the relevant provisions of the NPSFM when preparing and making decisions on resource consent applications.
- 7.2.8. The relevant provisions of the NPSFM are addressed under the associated subheadings / sections of the NPSFM below.

Section	Topic
A	Water quality
B	Water quantity
C	Integrated management
CA	National Objectives Framework
CB	Monitoring plans
CC	Accounting for freshwater takes and contaminants
D	Tangata whenua roles and interests
E	Progressive implementation programme

Water quality

- 7.2.9. There are two water quality objectives in the NPSFM:

Objective A1

To safeguard:

- a) *the life-supporting capacity, ecosystem processes and indigenous species including their associated ecosystems, of fresh water; and*
- b) *the health of people and communities, at least as affected by secondary contact with freshwater;*

in sustainably managing the use and development of land, and of discharges of contaminants.

Objective A2

The overall quality of freshwater within a region is maintained or improved while:

- a) *protecting the significant values of outstanding freshwater bodies;*
- b) *protecting the significant values of wetlands; and*
- c) *improving the quality of fresh water in water bodies that have been degraded by human activities to the point of being over-allocated.*

- 7.2.10. Objective A1 essentially requires that the life-supporting capacity of freshwater and the health of people and communities be safeguarded. Objective A2 requires that water quality be maintained or improved, while certain listed degraded waterbodies be protected or improved.

- 7.2.11. Policies A1, A2, A3 and A4 set out how these objectives are to be achieved. Policy A1 requires every regional council to change its regional plans to the extent needed.

Policy A2 enables Council's to specify targets and implement methods for improving water quality in circumstances where FMU's do not meet the objectives. Policy A3 seeks to enable Council's to impose conditions on discharge permits to ensure the limits and targets specified pursuant to Policy A1 and Policy A2 can be met. Policy A3 also seeks to enable Councils to *make rules* requiring the adoption of the best practicable option to prevent or minimise any actual or potential effect on the environment of any discharge of a contaminant into fresh water. Hence, Policies A1-A3 all involve implementation within regional plans. While Policy A2 is applied at the time of condition setting, this too relies on the targets, methods and timeframes established within the regional plans.

- 7.2.12. Finally, Policy A4 required that each Council amend its regional plans to include new interim policies which would apply in advance of the new freshwater quality limits and targets becoming operative. Policy DO19.1.12 of the NRMP applies Policy A4 of the NPSFM. This new policy was inserted into the NRMP, pursuant to Section 55 of RMA, in August 2015.
- 7.2.13. **Assessment:** The actual and potential effects of the subject activities on water quality were assessed in Section 6.3 of this AEE.

Water quantity

- 7.2.14. There are four water quantity objectives in the NPSFM:

Objective B1

To safeguard the life-supporting capacity, ecosystem processes and indigenous species including their associated ecosystems of fresh water, in sustainably managing the taking, using, damming, or diverting fresh water.

Objective B2

To avoid any further over-allocation of fresh water and phase out existing over-allocation.

Objective B3

To improve and maximise the efficient allocation and efficient use of water.

Objective B4

To protect significant values of wetlands and of outstanding freshwater bodies.

- 7.2.15. Of the 7 associated policies in B1-B7, policies B1 to B4 each involve implementation via direct changes to regional plans. However Policies B5 and B6 also relate to the decision making to avoid over allocation, with timeframes and methods to avoid allocation to be phased out within the timeframes set within regional plans.
- 7.2.16. Policy B7, just like just A4, required the Council to amend its regional plan as an interim step prior to the above described changes becoming operative. In August 2015 the Nelson City Council implemented Policy B7 pursuant to Section 55 of the Act, with this policy now being DO18.1.4 of the NRMP.
- 7.2.17. **Assessment:** The actual and potential effects of the subject activities on water quantity (flows) were assessed in Section 6.2 of this AEE

Integrated management

- 7.2.18. Section C of the NPSFM relates to ‘*Integrated Management*’ of freshwater and land use and development. Section C and objective C1 seeks to improve integrated management using the ‘whole catchment’ approach.

Objective C1

To improve integrated management of fresh water and the use and development of land in whole catchments, including the interactions between fresh water, land, associated ecosystems and the coastal environment.

- 7.2.19. Policy C1 requires this integrated management approach generally while Policy C2 provides that regional policy statements (as opposed to regional plans) are changed to the extent needed to provide for integrated management.
- 7.2.20. Integrated management is already a key part of the NRPS and NRMP.

National Objectives Framework

- 7.2.21. Section CA sets up a framework whereby freshwater values are consistently identified and managed within regional plans, while recognising regional and local circumstances. Objective CA1 seeks:

Objective CA1

To provide an approach to establish freshwater objectives for national values, and any other values, that:

- a) is nationally consistent; and*
- b) recognises regional and local circumstances*

- 7.2.22. The Nelson City Council is currently giving effect to policies CA1-CA4 as a part of the establishment of the Freshwater Management Units and the work being undertaken with the Freshwater Advisory Group and Iwi Advisory Group. This work will lead onto the preparation of the Nelson Plan.

Monitoring plans

- 7.2.23. Section CB follows on from CA in that it requires regional councils to develop a monitoring plan as a part of achieving the freshwater objectives.

Objective CB1

To provide for an approach to the monitoring of progress towards, and the achievement of, freshwater objectives.

- 7.2.24. A monitoring plan will therefore need to form a part of the Nelson Plan. Monitoring will continue to be undertaken as a condition of any resource consent granted for the activities proposed. Any new conditions granted could be developed to align with the NPSFM where it is reasonably practical to anticipate the new provisions.

Accounting for freshwater takes and contaminants

- 7.2.25. Objective CC requires that every regional council set up and maintain a freshwater accounting system that is to be available to the public. This level of improved information is intended to again help the achievement of freshwater objectives and policies. Objective CC is as follows:

Objective CC

To improve information on freshwater takes and sources of freshwater contaminants, in order to:

- a) Ensure the necessary information is available for freshwater objectives and limit setting and freshwater management under this national policy statement; and*
- b) Ensure information on resource availability is available for current and potential resource users.*

Tangata Whenua roles and interests

7.2.26. Objective D1 and Policy D1 are as follows:

Objective D1

To provide for the involvement of iwi and hapu, and to ensure that tangata whenua values and interests are identified and reflected in the management of freshwater including associated ecosystems, and decision making regarding freshwater planning, including on how all other objectives of this national policy statement are given effect to.

Policy D1

Local authorities shall take reasonable steps to:

- a) involve iwi and hapu in the management of freshwater and freshwater ecosystems in the region.*
- b) work with iwi and hapu to identify tangata whenua values and interests in fresh water and freshwater ecosystems in the region; and*
- c) reflect tangata whenua values and interests in the management of, and decision-making regarding, fresh water and freshwater ecosystems in the region.*

7.2.27. The establishment of an Iwi Working Group as a part of giving effect to the NPSFM has enabled iwi to become closely involved in the development of the new Plan. Likewise, the steps taken by the applicant to involve iwi in the preparation of a Cultural Impact Assessment was outlined in Section 2.4 of this application and is described in detail in 6.8. Collectively, these initiatives are considered to achieve the above objective and policy.

Progressive implementation programme

7.2.28. The steps being taken to progressively implement the NPSFM were outlined earlier in this section.

7.3. National Environmental Standard for Sources of Drinking Water

7.3.1. The National Environmental Standard for Sources of Human Drinking Water (NES) is a regulation made under the Resource Management Act (1991) that sets requirements for protecting sources of human drinking water from becoming contaminated. This NES came into effect on 20 June 2008.

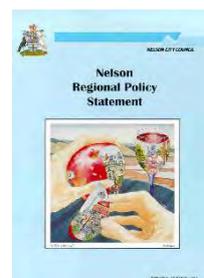
7.3.2. For the purpose of this NES, a human drinking water source is a natural water body such as a lake, river or groundwater that is used to supply a community with drinking water. The standard applies to source water before it is treated and only sources used to supply human drinking water i.e. not stock or other animals.

7.3.3. The NES requires regional councils to ensure that effects of activities on drinking water sources are considered in decisions on resource consents and regional plans. Hence, this NES is not of direct relevance to this application for resource consent. It does however highlight the importance of community drinking water sources.

7.4. Nelson Regional Policy Statement

7.4.1. The Nelson Regional Policy Statement (hereafter referred to as 'NRPS') became operative on 10 March 1997 and has not been changed in any way since then. The purpose of this document is:

"to achieve the purpose of the Act by providing an overview of the resource management issues of the region and policies and methods to achieve integrated management of the natural and physical resources of the whole region". (s59 of the RM Act 1991)



- 7.4.2. The NRPS is the highest level resource management document that guides the development of other plans, such as regional and district plans (Refer to AB3.4, p6, NRPS).
- 7.4.3. The content of Regional Policy Statement's prepared under the RM Act 1991 is determined by Section 62 'Contents of Regional Policy Statements'.
- 7.4.4. In achieving 'integrated management' of the region's natural and physical resources, and for the purpose of meeting the statutory obligation contained within Section 62(1)(h) above, the NRPS refers to 'cross-boundary issues'. These 'issues' cross territorial or geographical boundaries and therefore have a wider community of interest (Refer to AB1 (p5), AB5 (p7), LB1.1 (p21), UP1 (p29) and DH1.1 (pp43-44) of the NRPS).
- 7.4.5. The NRPS identifies the cross-boundary issues with other local authorities in section UP1 'Issues affecting other authorities' (pp29-30). Of the 16 issues listed in UP1 the following 2 are considered relevant to this assessment:
- consistent water management for urban supply (Nelson City / Tasman District);
 - consistent management of the Roding River (Nelson City / Tasman District);
- 7.4.6. Richmond (Tasman District) is acknowledged in the NRPS as forming a part of the wider economic and social community with Nelson to the point where many services and facilities are shared (Refer to DH1.1, p43, NRPS). The overlaps between the Nelson and Richmond sewage treatment facilities, shared water supply, land, air and maritime transport networks, not to mention the regional economies, are representative of this relationship.
- 7.4.7. *"Establishing a clear separation of resource management functions where Council is the resource user as well as the consent authority"* is the issue identified in UP3 (p33). For resource consent applications such as this, it is appropriate to maintain separation between regulatory and service delivery functions to avoid potential conflicts. This would be achieved through the use of independent commissioners to hear and determine this application.
- 7.4.8. Of most direct relevance to this application for resource consent is Chapter 9 Water. Chapter 9 is addressed in detail below, with appropriate consideration also given the other relevant provisions contained within Chapter 5 (Treaty of Waitangi) and Chapter 7 (Natural and Amenity Values)

Chapter 9 Water

7.4.9. Chapter 9 is the most relevant to this assessment as it contains the overarching provisions on the topics of water quality (WA1) and water allocation (WA2).



7.4.10. WA1 of the NRPS contains a detailed description of the issue of *water quality*, including the influences on water quality and the influence water quality has on other values (such as recreational, cultural and fisheries values).

7.4.11. WA1 then has two objectives and 7 associated policies. Only the first objective is relevant as the second relates to coastal water quality, while only three of the policies relate to freshwater.

WA1.2 objectives

WA1.2.1 *The maintenance and enhancement of the quality of inland water to protect the life supporting capacity of aquatic ecosystems and in specific areas, for urban water supply. (p97, emphasis added)*

WA1.3 policies

WA1.3.1 *Following consultation with appropriate agencies including tangata whenua and the wider community, to classify all inland and coastal waters within the Nelson City area, based on one or more of the following:*

- i) *protection of urban water supplies to a drinking water standard;*
- ii) *protection of instream fisheries and wildlife values;*
- iii) *protection of areas of cultural value;*
- iv) *protection of recreation values for contact recreation purposes; and/or*
- iv) *protection of coastal waters to preserve aquatic ecosystems, fisheries, fish spawning, gathering of shellfish and other food, and to safeguard the potential development of aquaculture. (p97, emphasis added)*

WA1.3.3 *To control point discharges through the use of resource consents and appropriate conditions in order to ensure that water quality classifications are met and sustained. (p97)*

WA1.3.7 *To recognise and provide for the cultural and spiritual values of water to tangata whenua. (p98)*

7.4.12. It is evident from the methods (WA1.4, pp98-100) that the objective is to be achieved principally through the classification of water bodies in the regional plans (WA1.4.1), and then with the assessment of applications for resource consent against the maintenance of that classifications (WA1.4.4, p98). A range of other non-regulatory methods are also listed.

7.4.13. **Assessment:** These directions are implemented through DO19 of the NRMP (see section 7.5 below).

Water Allocation

7.4.14. The water allocation provisions are contained within WA2. The 'issue' is of particular relevance to this application as the value of the Maitai River (and Roding) is addressed at length:

WA2.1 issue

The availability of water of an appropriate quality to meet the following needs:

- *maintenance of the life supporting capacity of aquatic ecosystems;*
- *maintenance of urban water supply (including needs of industry); and*

- maintenance and enhancement of recreational opportunities.

Water is a limited resource in Nelson City. Climatic conditions dictate the quantity of water in rivers and the demand for some abstractive uses. Low flows can result in unacceptable stress in fish, aquatic communities, plants and animals.

The Maitai and Wakapuaka Rivers are recognised as important trout fisheries. Part of the popularity of the Maitai is its close proximity to the Nelson urban area, good access, good fishable area and suitability for a wide range of other recreational activities especially picnicking, swimming and enjoying the scenery.

A survey of recreation activities undertaken in 1993 showed walking, swimming and picnicking as being among the most popular recreation activities in Nelson. Approximately a quarter of the respondents who listed swimming as a preferred activity swim in rivers. Both the Roding and the Maitai Rivers attract comparatively high recreational usage, particularly during summer. A number of reserves and swimming holes popular for informal recreation, picnicking and swimming, exist along both rivers.

The region's water resources are extensively used for abstractive purposes (taking water from the river). The Maitai and Roding Rivers are used for public water supply, with a limited supply from the Brook, while many of the smaller streams are used for irrigation and private water supplies. Most rivers are also used directly or indirectly for stock drinking water.

By far the greatest abstractive demand placed on the rivers of Nelson is that of urban water supply and this demand is predicted to grow along with Nelson's population. Currently a storage reservoir exists on the North Branch of the Maitai River and is operated for both urban water supply and for river base flow enhancement purposes. During low flows water is released from the North Branch reservoir to ensure that specified flows in the river are maintained.

All water in the North Branch passes through the reservoir. It is currently full 70% of the time, and flows not required for urban water supply are spilled. Net flows in the South Branch are unaffected by abstraction and join spill or base flow supplementation water from the North Branch immediately below the reservoir.

During low flow periods, total urban demand from the Maitai River may exceed the total North Branch flows. Storage is drawn down in order to maintain both river flow below the confluence of the branches and to provide urban water supply.

Little storage exists on the Roding River and during low flow periods virtually all of the river's flow above the intake weir is abstracted for urban water supply. This leaves little base flow in the river immediately below the weir except that contributed by leakage around the weir and from side streams joining the river immediately downstream of the weir. There is little potential to take further water from the Roding during low flows without the creation of a storage reservoir.

The present authorisation under which Council abstracts water from the river is due to expire in the year 2001 and Council is required to apply for a resource consent under the Resource Management Act if it wishes to continue to abstract any water from this source.

The potential also exists to reduce the impact of Nelson City's water requirements through the use of water conservation and/or supplementation measures. These measures could include:

- metering and charging for water used so as to encourage more efficient use;
- promoting water conservation through advertising and education;
- encouraging the use of dual flush toilets, low flow shower heads and other water conservation appliances, and discouraging the use of other less efficient appliances;
- recycling/reusing waste water, particularly process water from industrial/commercial operations, but also in domestic situations (such as washing the car on the lawn);
- imposing restrictions on water use during low flow periods, particularly on the watering of lawns and gardens;
- undertaking leak detection investigations of pipe networks;

- *encouraging home owners to plant gardens in drought resistant species which do not require watering;*
- *increasing the total volume of the water resource available through diverting water from other catchments;*
- *investigating and developing ground water resources for low quality water uses;*
- *encouraging on site water storage including both reticulated water and rainwater storage tanks to provide supplementary water during low flow periods; and/or managing existing water supply catchments to optimise water yields (vegetation type can affect the rate and volume of run-off). (pp101-103, emphasis added)*

7.4.15. The water allocation objectives and policies are provided in full below:

WA2.2 objectives

WA2.2.1 *Maintenance and enhancement of the ability of rivers, the coast and other waterbodies to support aquatic life.*

WA2.2.2 *Maintenance of other instream values, including recreation.*

WA2.2.3 *Water that is allocated for abstractive uses being fairly distributed and used in an efficient and beneficial manner.*

WA2.2.4 *To ensure there is enough supply of sufficient quality for abstractive uses, including urban water supply, commensurate with achievement of Objectives 1 and 2. (p103, emphasis added)*

WA2.3 policies

WA2.3.1 *To establish minimum flow regimes for the Maitai, Roding, Wakapuaka and Whangamoa Rivers, and any other river or stream under stress from water abstraction. Minimum flows will be based on the following criteria:*

- i) *the existing and potential productivity, diversity, importance, intrinsic values, habitat characteristics, water quality and variability of aquatic ecosystems;*
- ii) *the significance of the native flora and fauna;*
- iii) *the value of iwi or hapu for spiritual and cultural purposes and customary uses;*
- iv) *natural character, scenic, amenity, intrinsic and recreational values including fishery values and the habitat of trout;*
- iv) *the significance of flows to the maintenance and enhancement of downstream habitats and water quality;*
- v) *the degree of existing protection; and*
- vi) *the impact on sediment transport and the stability of the river bed. (p103, emphasis added)*

WA2.3.2 *For rivers specified in Policy 1 above, to establish 'Conservation Flows' which protect the security of supply, and 'Minimum Flow regimes' which protect the natural character, functioning and integrity of the plant and animal communities, and recreation associated with those rivers. (p103)*

WA2.3.3 *To allocate water for abstractive uses which provide for the social, economic and cultural well-being of the people of Nelson City where adverse effects (including impacts on the needs of instream values necessary for the integrity of aquatic ecosystems) can be avoided, remedied or mitigated. (p103, emphasis added)*

WA2.3.4 *To continue to encourage urban water supply conservation. (p103)*

- 7.4.16. The value of the Maitai (and Roding) as a part of the urban water supply therefore features prominently in WA2 of the NRPS. The clear intention is to maintain the freshwater values in these rivers, with the establishment and protection of minimum flow regimes as the primary tool/method of achieving the stated objectives.
- 7.4.17. **Assessment:** Objective 2.2.4 and policy 2.3.1 and 2.3.3 are significant in this regard. As will be explained with reference to the NRMP, water has been allocated to public water supply to provide for a reliable supply and to meet the social, economic and cultural wellbeing of Nelson City. Refer to DO18 of the NRMP (section 7.5 below).

Chapter 5 Treaty of Waitangi

- 7.4.18. The NRPS provides full recognition to the relationship of Maori to the natural and physical resources of this region, as acknowledged and required by Part 2 of the Act.
- 7.4.19. Taking water resource for public water supply and the effects this use has on cultural values and sites of significance is therefore an issue of relevance under Chapter 5.
- 7.4.20. The NRPS then sets out the following objectives:



TW1.4 objectives

- TW1.4.1 Resource use which provides for the relationship of the Maori and their culture with their ancestral lands, water and sites, waahi tapu, urupa, and other taonga.*
- TW1.4.2 A mutually satisfactory relationship between Council and tangata whenua regarding resource management.*
- TW1.4.3 Increased opportunities for tangata whenua to exercise kaitiakitanga in the region.*
- TW1.4.4 Increased opportunities for the cultural aspirations and tikanga of the tangata whenua with regard to natural and physical resources to be met. (p39)*

- 7.4.21. The relevant policies (listed below) set out how the objectives are to be achieved:

TW1.5 policies

- TW1.5.1 To ensure that all persons exercising functions and powers under the Act take into account the Principles of the Treaty of Waitangi. (p39)*
- TW1.5.2 In consultation with tangata whenua, to seek to identify and protect specific matters or sites of cultural significance to the tangata whenua. (p39)*
- TW1.5.5 To ensure that tangata whenua views are sought and considered prior to Council consideration of any resource consent application which relates to matters which the tangata whenua themselves have indicated are of significance to them. (p39)*
- TW1.5.6 In exercising functions and powers related to Crown land (including foreshore and seabed which is not in private ownership) to recognise and facilitate the special relationship between the Crown and tangata whenua. (p39)*
- TW1.5.11 To have regard to environmental plans prepared by iwi authorities. (p40)*

- 7.4.22. In section 2.4 of this application, the engagement of Chetham Consulting to undertake meaningful dialogue with iwi was summarised, with the Cultural Impact Assessment (CIA) in **Attachment O** reporting on the relevant issues and feedback in full.
- 7.4.23. As set out in Section 6.8, the applicant has given appropriate consideration to the identified values and the relationship iwi have with the Mahitahi water resource. Likewise, improvements are proposed to the operation of the Scheme, most of

which are in full accordance with the recommendations in the CIA. This application is therefore considered to have achieved those outcomes sought in Chapter 5.

Chapter 7 Natural and Amenity Values

7.4.24. Chapter 7 of the NRPS addresses the wide ranging topic of natural and amenity values. There are six topics covered by this Chapter:



- NA1: amenity and conservation values
- NA2: landscape values and natural features
- NA3: significant indigenous vegetation and habitats of indigenous fauna
- NA4: management of pests
- NA5: riparian and coastal margins
- NA6: beds of rivers and lakes

7.4.25. NA6 is considered to have the most direct relevance to this application for resource consent. However, aside from acknowledging the dams on the Maitai (and Roding) and the abstractions from these rivers for water supply supposes (NA6.1, p81), the NRPS does not provide any direct guidance. Objective NA6.2.1 and Policy NA6.3.1 do however provide some general assistance:

NA6.2 objective

NA6.2.1 Minimal adverse effects from structures on river and lake beds. (p81)

NA6.3 policies

NA6.3.1 To manage river and lake beds in a manner which gives priority to the natural functioning of the river or lake beds where the adverse effects of such structures or works can be avoided, remedied or mitigated. (p81)

7.4.26. The primary means of achieving these outcomes are listed in the methods in NA6.4 (p82), such as the provision of rules in the regional plan and the assessment of resource consent applications.

7.4.27. NA3 also has relevance to the assessment of this application as it is here that the NRPS seeks:

NA3.2 objectives

NA3.2.1 Protection of areas of significant indigenous flora and significant habitats of indigenous fauna. (p67)

NA3.2.2 Restoration and rehabilitation of areas of significant indigenous vegetation and significant habitats of indigenous fauna, undertaken as appropriate. (p68)

7.4.28. Identifying priority areas for protection in regional plans is one of the primary methods to achieve these objectives. As set out in Section 7.5 below, freshwater values are identified in Appendix 28 of the NRMP, with the water quality classifications (AP28.4) and Management Objectives (AP28.2) also informing the consideration and determination of resource consent applications.

Summary

7.4.29. At a regional level, the NRPS acknowledges and provides specifically for the substantial water takes for public water supply purposes. The stated 'allocation' of

water from the Maitai (and Roding) is in recognition of the importance and values of this water for the people of Nelson City. The NRPS however also establishes that the other important values will be provided for through the use of flow regime for specific rivers. As set out in Section 7.5 below, the NRMP fully implements these directions.

7.5. Nelson Resource Management Plan

- 7.5.1. The Nelson Resource Management Plan (NRMP) was publicly notified in 1996 with the district and regional plan components becoming operative in 2004. The Regional Coastal Plan became operative in 2006. Then Freshwater Plan was notified on 9 October 2004 and this became operative in July 2007. There have been a number of other changes and variations made to the NRMP since 2004.
- 7.5.2. The NRMP is a combined regional and district plan. It therefore also contains sections on the coastal marine area, soil erosion and sedimentation and freshwater environments.
- 7.5.3. The NRMP is in 4 volumes. Volume 1 contains the administrative chapters, including the 'Meaning of Words' (Chapter 2), 'Administration' (Chapter 3), 'Resource Management Issues' (Chapter 4), 'District Wide Objectives and policies' (Chapter 5) and 'Financial Contributions' (Chapter 6).
- 7.5.4. Volume 2 contains the *Zone Rules*, Volume 3 contains the *Appendices*, and Volume 4 contains the *Planning Maps*.
- 7.5.5. There are provisions throughout the NRMP that are relevant to this assessment, however the relevant provisions are contained in:
 - Chapter 4 resource management issues (Volume 1)
 - Chapter 5 district wide objectives and policies (Volume 1)
 - DO1 Tangata whenua
 - DO2 Natural hazards
 - DO4 Heritage
 - DO5 Natural values
 - DO6 Riparian and coastal margins
 - DO16 Zones
 - DO17 Activities in the beds of rivers and lakes, and in wetlands
 - DO19 Discharges to freshwater and freshwater quality
 - DO20 Freshwater management
 - Chapter 12 rural (Volume 2)
 - Appendix 6 riparian and coastal margin overlay (Volume 3)
 - Appendix 24 designations (Volume 3)
 - Appendix 28 freshwater (Volume 3)
- 7.5.6. The Rural zoning of the site and the fact that the land use is provided for within Designation DN3 was addressed in Section 5.2 of this application. Likewise, it was within Section 5.2 of this application that the identification of the Maitai as being the subject of the Riparian Overlay and as a significant public water supply resource. The relevant water quality classifications and values were also described in Section 5.2. It is within this section that these planning tools/methods will be linked with the

broader planning framework, including the objectives and policies of the NRPS and NRMP.

7.5.7. Chapter 4 of the NRMP sets the scene by identifying the “*significant resource management issues affecting Nelson City*” (RI1, p2-4). It also identifies the nature and cause of these issues. Chapter 4 is addressed here as this provides helpful background to the more specific provisions and directions contained in subsequent chapters.

7.5.8. Chapter 4 identifies 17 significant issues, with those of relevance to this assessment including:

- RI2 *Issues that cross territorial boundaries*
- RI4 *Tangata whenua*
- RI6 *Natural features*
- RI9 *Risk from natural hazards*
- RI11 *Efficient use of natural and physical resources*
- RI12 *Public access to margins of lakes, rivers, and the coast*
- RI13 *Heritage and cultural values*
- RI14 *Amenity values*
- RI15 *Adverse environmental effects of activities*
- RI16 *Competing demands or values attributed to resources*
- RI17 *Hazardous substances, contaminant discharges, and waste management*
- RI18 *Freshwater environments*

7.5.9. The following discussion explains that some of these resource management issues are only broadly relevant while others are of direct relevance to this explanation and assessment. Once the above issues have been introduced this assessment cascades down to the more specific District Wide objectives and policies contained in Chapter 5 of Volume 1.

Issues that cross territorial boundaries (RI2)

7.5.10. The NRMP acknowledges the geographic connection between Nelson, Tasman and Marlborough and upon doing so states:

RI2.ii The Council recognises that although divided by local authority boundaries, the Nelson province is a socially and economically integrated unit. It functions as one effective community and it is geographically isolated from other communities. (Chapter 4, p2)

7.5.11. The listed cross boundary issues with Marlborough relate to roading and coastal management such as coastal space. For Tasman, there are 10 cross boundary issues listed as:

- a) *Urban space requirements, including residential, industrial and commercial expansion.*
- b) *Integrated management of the effects of the use, development, or protection of natural and physical resources*
- c) *Integrated management of the effects arising from, and effects on, urban services such as Bell’s Island Oxidation Ponds and the Roding river urban water supply*
- d) *Management of coastal water quality and coastal space*
- e) *Protection of natural values and features in the Waimea Estuary*
- f) *Solid waste and hazardous waste management*
- g) *Recognition of iwi issues*

- h) *Management of the effects arising from the use of the road network and management of the effects of transportation of hazardous substances*
- i) *The protection of marine areas*
- j) *Management of the Roding River, which transects both the Nelson and Tasman districts.*
(Chapter 4, p2)

7.5.12. The Roding River is mentioned twice in this list, however the Maitai River is not. This is due to the Maitai being entirely within the Nelson City boundaries and catchment, while the Roding River passes through both Nelson and Tasman.

Tangata Whenua (RI4)

7.5.13. The NRMP states that this issue is discussed fully in the NRPS. Herein lies the overlap between the NRPS and the NRMP. These issues are also closely related to the competing demands (RI16) and heritage and cultural values (RI13) discussed below.

Natural values (RI6)

7.5.14. This issue acknowledges the contribution that natural features (such as rivers) make to Nelson's bio-diversity, landscape setting, amenity values and heritage. The degradation of the natural character of rivers is a listed issue.

Risk from natural hazards (RI9)

7.5.15. Of the range of potential natural hazards addressed in RI9, the Maitai River catchment is noted in the context of the city's location within the flood plain. This issue is noted here in the context of dam safety being a relevant consideration, in combination with Nelson being traversed by several active faults.

Efficient use of natural and physical resources (RI11)

7.5.16. The introduction to this issue states:

RI11.i Efficiency in resource use is about minimising 'waste', and often arises in relation to changes to or intensification of resource use. It requires that regard be given to the finite characteristics and sustainable use of resources to meet not only immediate but long-term individual and community needs. One of these resources is freshwater, which needs to be efficiently allocated to avoid wastage of the resource and degradation of freshwater environments as a result of over-abstraction. To do so, resources must be seen for not only their economic but also their ecological and environmental worth. (Chapter 4, p7)

7.5.17. While efficient water allocation is not then listed as one of the two 'issues', this is an issue that is addressed in the District Wide provisions and in the relevant rules of the Plan.

Heritage and cultural values (RI13)

7.5.18. The listed heritage and cultural values are as follows:

RI13.1.i Loss of important heritage features and sites for present and future generations due to their demolition, desecration, or modification for activities unsympathetic or incompatible with the inherent value of these resources.

RI13.1.ii Recognition of the cultural affiliations of tangata whenua with their ancestral lands, waters, sites, waahi tapu, and other taonga.

RI13.1.iii Recognition of the status of the protection of historic heritage from inappropriate subdivision, use and development as a matter of national importance in the Resource Management Act 1991. (Chapter 4, p8)

7.5.19. These matters are addressed in more detail in the District Wide provisions.

Amenity values (RI14)

7.5.20. The Plan states:

RI14.i Amenity values are those inherent qualities or characteristics which contribute to people's appreciation or enjoyment of the local environment and therefore the community's overall perception of well being. (Chapter 4, p8)

7.5.21. Some of the identified components of amenity values include public health and safety, recreational values and aesthetic values. Hence, there are a number of actual and potential effects on amenity values from the activities proposed by this application.

Adverse environmental effects of activities (RI15)

7.5.22. The introduction to RI15 states:

RI15.i Adverse effects of activities become a resource management issue where they cross property or site boundaries to the detriment of activities, resources, or values on adjacent sites, or where they have impacts in time (ie limit subsequent uses of the site or resource). The significance of effects such as noise, traffic, glare, odour and contamination will vary according to the setting and adjacent uses or values. For example, a lower environmental standard may be more acceptable within industrial areas than within or adjacent to residential areas. (Chapter 4, p10)

7.5.23. While the matter of 'adverse effects of activities' is relevant to resource management generally, the listed 'issues' are of particular relevance to the activities that form a part of this application:

RI15.1.i Degradation of the life supporting capabilities of natural resources (land, water, air and ecosystems) through the environmental outcomes of resource over-use, contamination, compromise in the integrity of ecological processes, soil compaction or erosion, or habitat destruction.

RI15.1.ii Reduced water quality which may limit downstream uses of the resource. RI15.1.iii Loss of opportunities to use or enjoy resources and values as a result of adjacent land use or activities.

RI15.1.iv Risk to public health, safety, and amenity values associated with traffic, aircraft and vessel movement, noise, and other contaminant discharges.

RI15.1.v How to manage adverse effects of important regional resources. (Chapter 4, p10-11)

Competing demands or values attributed to resources (RI16)

7.5.24. The NRMP states:

RI16.i The District is comprised of natural and physical resources of often conflicting value to different sectors of the resident and visitor communities, for example as a living environment or recreational resource, or having inherent economic, spiritual, cultural or heritage value. (Chapter 4, p11)

7.5.25. Competition for flat land, coastal space and water suitable for urban supply are then specifically identified. In terms of water:

RI16.iv Projected levels of growth for the district indicate that in future there will be significant competition for water suitable for urban supply with other uses and values. In particular, the greater importance now placed on ecological and conservation values is likely to mean that there will be greater conflict in the management of scarce water resources, where present allocation is at the expense of those values. (Chapter 4, p11)

7.5.26. Of the seven issues listed, only one relates broadly to water resources:

RI16.1.i Reconciliation of demands on conflicts in resource use and protection created by the need for present and future generations to provide for their health and safety and their social, economic and cultural well being. (Chapter 4, p11)

Hazardous substances, contaminant discharges, and waste management (RI17)

7.5.27. Issue RI17 is also broad in nature however does address the matter of contamination of water:

RI17.i Environment contamination is the process of physical, chemical, or biological change in the condition of land, water, and air as a result of discharges. This may compromise the life supporting capacities of these resources, and accordingly the health of ecosystems and communities. In extreme cases, contaminated sites may be declared unsafe for human use or occupation. (Chapter 4, p12)

7.5.28. The issue is then identified as:

RI17.1.i. Contamination of land, air and water and the associated impacts on cultural values and the health and safety of ecosystems and communities resulting from the generation, use, storage, transportation and disposal of hazardous substances and contaminant wastes. (Chapter 4, p12)

Freshwater environments (RI18)

7.5.29. In this section the significant freshwater issues are identified. The following contextual information is provided:

RI18.iv The flow levels of the Maitai and Roding Rivers are affected by substantial water takes to provide the urban water supply. The water demand projections for the Nelson City urban area are 35,997 cubic metres per day in 2005, rising to 50,299 cubic metres per day in 2045.

RI18.v The effects of water takes on flow levels of rural freshwater (both in rivers and in groundwater) are not likely to be having a significant impact at this stage in most situations, but there are some small rivers such as the Lud and at Cable Bay which are under pressure from abstractions. There is also potential for other rivers to be affected by water takes if subdivisions continue to occur, increasing the demand for water for domestic uses. (Chapter 4, p12)

...

RI18.viii Freshwater is essential for survival, and rivers are valued by many people for aesthetic, recreational, spiritual and cultural reasons. Rivers, lakes and wetlands also have intrinsic natural values which are reduced when their health is degraded through physical modification, contamination, and low flows.

RI18.ix Safeguarding the life-supporting capacity of water and ecosystems is central to the purpose of the Resource Management Act. The preservation of the natural character of wetlands, lakes and rivers, and their margins is listed as a matter of national importance.

RI18.x Freshwater and rivers are a 'public good' owned by everyone and managed by the Council on behalf of the public. Public resources such as water and air are managed differently from privately owned resources such as land. Land use activities are generally allowed unless a rule requires otherwise. In contrast, activities involving water or water bodies can only occur if they are expressly allowed by the Act, a rule in a regional plan, or by a resource consent. (Chapter 4, p13)

7.5.30. While there is reference to the Maitai water take above, the significant freshwater issues are more generic.

RI18.1.i The potential for activities and structures in the beds of lakes and rivers and their margins to adversely affect water resources and aquatic ecosystems, natural sediment transport, and river stability, and the potential for activities to adversely affect network utilities or public structures.

RI18.1.ii The potential for activities to adversely affect natural character and amenity values of rivers, lakes and wetlands, and their margins. Protection of the natural character of these areas from inappropriate subdivision, use and development is a matter of national importance, while particular regard should be given to the maintenance and enhancement of amenity values.

...

RI18.1.vi The potential for modified flows and levels of surface water to adversely affect instream and out of stream values.

RI18.1.vii The adverse effects of activities on groundwater levels and flows.

RI18.1.viii The potential for using and taking water to adversely affect stream values, and how to achieve equitable and efficient allocation of water.

RI18.1.ix The potential for activities and discharges to adversely affect water quality and natural character. How to maintain or enhance water quality to a level appropriate to maintain the recognised uses and values. (Chapter 4, p13)

- 7.5.31. District Wide Objectives DO18-20 and the supporting and Policies of the NRMP, addressed below, address each of the above issues and how the sustainable management of water resources is to be achieved.

Chapter 5 district wide objectives and policies

- 7.5.32. Of the twenty (20) sections in Chapter 5, the following are considered to have some relevance to the assessment of this application. Some are however more relevant or pertinent to this application than others.

- DO1 Tangata whenua
- DO2 Natural hazards
- DO4 Heritage
- DO5 Natural values
- DO6 Riparian and coastal margins
- DO16 Zones
- DO17 Activities in the beds of rivers and lakes, and in wetlands
- DO18 Freshwater abstraction and instream flows
- DO19 Discharges to freshwater quality
- DO20 Freshwater management

Tangata Whenua (DO1)

- 7.5.33. In section 2.4 of this application the consultation process undertaken with iwi was described. This process, undertaken by a specialist in iwi related matters (Chetham Consulting Limited) was designed to enable meaningful dialogue about the Mahitahi River and its value to iwi, while also identify actual and potential effects of this proposal on those cultural values. The Cultural Impact Assessment (CIA) prepared by Chetham Consulting reports on these values in detail.
- 7.5.34. At a broader level, iwi are involved with Council in the preparation of the *Whakamahere Whakatu Nelson Plan*, with the Iwi Advisory Group being involved in the implementation of the NPS for Freshwater Management (see section 7.2). Likewise, *Project Mahitahi* has involved iwi representatives (see section 9.4).
- 7.5.35. Given the above, it is considered that the applicant has recognised the needs and interests of Maori in the preparation of this application for resource consent. The applicant has incorporated changes to the proposal in direct response to these

needs and interests, such as the trap and transfer programme. These changes were set out in Section 2.5 and 6.8 of this application.

- 7.5.36. The relevant objective and policies of DO1 are provided below. This application is considered to be consistent with these provisions.

DO1.1 Maori and resources

Management of natural and physical resources that recognises the needs of Maori communities and enables them to provide for their social, economic, and cultural well being and their health and safety. (Chapter 5, p2)

policy DO1.1.1 relationship with ancestral resources

Natural and physical resources should be managed in a way that recognises and provides for the relationship of Maori and their culture and traditions with their ancestral lands, water, sites, waahi tapu, and other taonga. (Chapter 5, p2)

policy DO1.1.2 treaty principles and kaitiakitanga

Management of natural and physical resources that takes into account the principles of the Treaty of Waitangi and has particular regard to kaitiakitanga. (Chapter 5, p2)

policy DO1.1.3 management by tangata whenua

Tangata whenua should have opportunities to manage their ancestral land and resources in a sustainable manner. (Chapter 5, p3)

policy DO1.1.4 traditional resources

Access should be provided to traditional resources within public reserves, water bodies, and coastal water, consistent with preserving natural values. (Chapter 5, p3)

policy DO1.1.5 cultural activities

Opportunities should be given to maintain Maori cultural values within the District by enabling the Maori community to establish (in appropriate zones) a range of housing types, and educational, health, and community activities. (Chapter 5, p4)

policy DO1.1.6 water management

Make policy decisions on water management having regard to the provisions of resource management plans such as eel management and iwi environmental management plans that promote the sustainable use of water and associated resources. (Chapter 5, p4)

- 7.5.37. The consultation process undertaken by Chetham Consulting has provided the opportunity for the iwi values and interests to be identified and fully considered as a part of the preparation of this application. Where practicable, the applicant has incorporated changes to the activities in direct response to the issues raised in the CIA and the advice from Cawthron. This application is therefore considered to achieve those outcomes sought by DO1 of the NRMP. It should however be noted that the involvement and input from iwi in giving effect to the NPSFM and in preparation of the *Whakamahere Whakatu Nelson Plan* will also significantly achieve these outcomes.

Natural hazards (DO2)

- 7.5.38. The relevant 'Natural hazard' objective and policies are as follows:

Objective DO2.1 natural hazards

An environment within which adverse effects of natural hazards on people, property, and the environment are avoided or mitigated. (Chapter 5, p5)

policy DO2.1.1 health and safety

Development, redevelopment, or intensification of activities should not occur in natural hazard prone areas where the hazard is likely to endanger human health and safety. (Chapter 5, p5)

policy DO2.1.2 property and environment

Development, redevelopment, or intensification of activities should not occur in natural hazard prone areas where the hazard is likely to endanger property or the environment, unless the hazard can be adequately mitigated. (Chapter 5, p5)

policy DO2.1.3 aggravation of hazard

No activity should aggravate any known or potential natural hazard on its own site or any other site. (Chapter 5, p6)

policy DO2.1.4 flood mitigation

Access to riparian areas should be provided, maintained, or acquired where it is necessary for maintenance and flood mitigation works. (Chapter 5, p6)

- 7.5.39. In section 5.2 of this application the position of the Maitai Dam away from any hazard overlays was identified. The Maitai Dam has not been constructed over a fault hazard. Likewise, in accordance with good practice and as a part of complying with the current consent conditions, the dam is frequently inspected as a part of ensuring its stability and safety. Refer to Section 2.1 above. As such there are not considered to be any inconsistencies or conflicts with the above listed provisions in DO2 of the NRMP.

Heritage (DO4)

- 7.5.40. This area is formally identified on the planning maps as containing heritage sites in close proximity to the site, with additional cultural heritage sites identified by Ngati Kuia (see the Cultural Impact Assessment, **Attachment O**).
- 7.5.41. The following objective and policy seeks to retain heritage items, while using the Archaeological Overlay as a means of protecting significant cultural values.

objective DO4.1 heritage values

Retention and enhancement of heritage items that contribute to the character, heritage values, or visual amenity of Nelson, in a setting that enhances such items. (Chapter 5, p13)

policy DO4.1.5 archaeological sites and overlay

Archaeological sites, and places of special significance to tangata whenua, as identified as an individual site and/or falling within the Archaeological Overlay, as well as the cultural and spiritual values associated with those places, should be protected from activities which would have adverse effects on those sites, places and values. (Chapter 5, p15)

- 7.5.42. This application for resource consent, while seeking a new / replacement consent for the *existing* dam and ancillary structures, does not propose any physical works that could affect heritage or cultural values. The fact that the structures exist is therefore of particular relevance to this assessment. As a result, this application is considered to be consistent with these provisions in DO4 of the Plan.

Natural values (DO5)

- 7.5.43. The introduction to DO5 provides helpful context to the objectives and policies in this part of the Plan:

DO5.i Nelson contains a wide range of significant natural features vital to the character and diversity of the District. As well as regionally significant features such as remnant areas of indigenous forest and wetland, there are features of national and international significance including the Nelson mineral belt, Nelson Boulder Bank, and extensive coastal inlets and

estuaries. (See Issues in Chapter 4, particularly RI5 - landscape, seascape and open space values and RI6 – natural features.) (Chapter 5, p19)

7.5.44. These significant locations and values are formally identified in the Plan, none of which relate directly to the subject site. The land to the east, above the dam, is however located in the Conservation Zone.

7.5.45. Objective DO5.1 is as follows:

objective DO5.1 natural values

An environment within which natural values are preserved and enhanced and comprise an integral part of the natural setting. (Chapter 5, p19)

7.5.46. With the stated reasons for this objective (DO5.1.ii), further clarification is provided as to the priority natural values in the Nelson City area:

In the Nelson City area, indigenous communities with priority for protection are:

Alluvial forest

Coastal sand dune, spit and boulder communities

Coastal forest and shrub land

Estuarine communities

Ultramafic communities

Freshwater wetlands and riparian forest (Chapter 5, p19)

7.5.47. None of these areas are of particular relevance to this application for resource consent. Likewise, the physical structures already exist and so no new or additional actual and potential effects on natural values are proposed. The effects of the subject activities on freshwater values are however addressed under more specific and directly relevant district wide provisions (see below).

7.5.48. Despite DO5 not being of direct relevance to the activities sought, the wider work being undertaken by Nelson City Council (in partnership with other stakeholders) to enhance the natural values of the Maitai contribute towards the achievement of the outcomes in DO5. Fencing, revegetation, regeneration, pest control, education etc are all methods listed in DO5 that have been employed in Project Maitahi.

Riparian and coastal margins (DO6)

7.5.49. Riparian margins are identified in DO6 as being of considerable significance for a wide range of reasons. This is encapsulated in Objective DO6.1:

objective DO6.1 riparian and coastal margins

Riparian and coastal margins where natural character, public access, natural functions, landscapes, heritage values, water quality and ecological values are protected and enhanced. (Chapter 5, p24)

7.5.50. As set out in Section 5.2, the Maitai River has been identified in Appendix 6 of the Plan as having Priority 1 conservation values (aquatic habitat and water quality), along with value for public access along the river, and recreation.

7.5.51. The relevant policies then seek:

policy DO6.1.1 priority margins

Priority riparian and coastal margins should be identified, and acquired at the time of subdivision, development, or through negotiation. (Chapter 5, p24)

policy DO6.1.2 activities in margins

The values associated with riparian and coastal margins should be protected from the adverse effects of activities in order to prevent degradation or loss of esplanade values while recognising that some activities require to be located in or adjacent to water bodies. (Chapter 5, p26)

policy DO6.1.4 management of margins

The long term natural functioning of riparian and coastal margins should not be adversely affected by activities. In particular, natural values of margins including water quality, the habitats of plants and animals, landscape, and amenity values, including potential enhancement opportunities should be recognised and protected. (Chapter 5, p27)

- 7.5.52. The primary method to achieve the above outcomes is through acquiring esplanade reserves and strips, being 20m in the Rural Zone (Table 6.2). Education and management of activities within margins, through the resource consent process, are also methods identified to achieve these outcomes.
- 7.5.53. The actual and potential adverse effects on the Maitai River margin, over and above the presence of existing water supply infrastructure, is considered to relate more directly to the water takes and discharges from the North and South branches. These effects on the aquatic habitat and water quality are addressed more directly in the specific freshwater provisions that follow. No changes to the current opportunity for public access and recreation are proposed. As with the discussion on natural values, there are other Council projects such as Project Mahitahi that are also contributing towards the enhancement of riparian values.

Subdivision and development (DO14)

- 7.5.54. A majority of this topic addresses the city, its layout and design. Issues such as residential intensity, provision of services at the time of subdivision and development, and subdivision patterns are addressed here. Objective 14.4 (p73) is however headed ‘*Network Utilities*’ which is of particular relevance to this application which fundamentally involves the operation of a network utility, the water supply infrastructure (covered by Designation DN3).
- 7.5.55. The relevant objective and policies are provided below:

Objective DO14.4 network utilities

Efficient use of network utilities infrastructure while avoiding, remedying, or mitigating the adverse effects of utilities on their surrounding environments.

Reasons DO14.4.i The growth of the Nelson community has resulted in the development of a significant network utility infrastructure to support the community. It is important that efficient use is made of this infrastructure of network utilities as they are often significant community assets. While network utilities are in many cases essential to the community, it must be recognised that they can generate adverse effects on the environments surrounding them. It is appropriate that the adverse effects of network utilities be minimised. (Chapter 5, p73, emphasis added)

policy DO14.4.1 efficient use of network utilities

Management of network utilities that promotes their efficient use. (Chapter 5, p73)

Explanation and Reasons

DO14.4.1.i In most cases existing network utilities represent a considerable investment and are substantial community assets. It is appropriate that these assets be used and developed in an efficient manner. This is in line with the intentions of Section 7 of the Resource Management Act 1991 in relation to physical resources.

Methods

DO14.4.1.ii Rules in each zone enabling the efficient management of network utilities.

DO14.4.1.iii Assessment criteria on applications. (Chapter 5, p74, emphasis added)

Policy DO14.4.3 effects of network utilities

Ensure that the adverse effects of network utilities on the surrounding environment are minimised.

Explanation and Reasons

DO14.4.3.i Network utilities have the potential to cause adverse effects on the environment surrounding them. Many network utilities involve the use of visually obtrusive structures or the generation of electromagnetic radiation or fields. Any development of new or existing network utilities should minimise the potential adverse environmental effects of the utilities on the surrounding environment.

Methods

DO14.4.3.ii Rules in each zone requiring the minimisation of the environmental effects of network utilities.

DO14.4.3.iii Assessment criteria on applications. (Chapter 5, p74)

- 7.5.56. It is within these provisions that the Plan acknowledges the significance of network utility infrastructure. This significance is not only due to the essential support these provide to the community but also due to the considerable investment they represent and hence being ‘substantial community assets’. These provisions seek to ensure these assets can be efficiently managed and used while *minimising* adverse effects. Some adverse effects are therefore contemplated, for example the obtrusive nature of some network utility structures.
- 7.5.57. There are effectively two methods listed to achieve these outcomes. The first is the use of rules in each zone and the second is the assessment of resource consent applications. DN3 and also the relevant freshwater rules are where these policies are implemented. In terms of the water takes, the NRMP has a water regime that anticipates and protects the substantial water take as a source of public water supply. The restricted discretionary activity classification in FWr.12.3 is fundamental in this regard. This planning framework, which uses minimum flows to ensure the instream values are protected, enables the Council to efficiently manage and operate this system. Combined with the imposition of resource consent conditions, the actual and potential effects of the activities are expected to be minimised as far as practicable.
- 7.5.58. In summary, DO14.4 is considered to provide specific guidance as to the assessment of this application, including the interpretation of the wider planning framework.

Zones (DO16)

- 7.5.59. DO16 effectively introduces the zoning as a means of managing natural and physical resources ‘by location’. The objective and relevant part of the policy is provided below. The reference to water works catchment in the context of the rural zone is noted here given the nature of this application. There are no particular directions in DO16 that serve to provide particular guidance to the assessment and determination of this application. Of course Designation DN3 has a fundamental role in determining the use and character of this portion of the Rural Zone.

objective DO16.1 management of resources by location

Management of the natural and physical resources of Nelson in a way that responds to the varying resource management issues and the varying actual and potential effects of use,

subdivision, development, and protection arising in different parts of the District. (Chapter 5, p79)

policy DO16.1.1 zones (and areas)

The District should be divided into zones (and areas), for the purposes of resource management, as follows: (Chapter 5, p80)

...

5. Rural Zone

An environment within which soil, water and land resources are managed sustainably, and the rural character of the District, including water works catchments, and the surroundings of urban Nelson, is maintained or enhanced. (Chapter 5, p81)

Activities in the beds of rivers and lakes, and in wetlands (DO17)

7.5.60. DO17 relates to the land use activities in the beds of rivers etc. The provisions are directed toward activities that relate to Section 13 of the Act, such as structures and works.

7.5.61. As explained in section 2.5, this application for resource consent involves existing structures and does not involve, beyond fish passage improvements, physical works or further disturbance. These physical effects have already been realised and to a certain degree now form a part of the current environment. This is due to the fact that legally established structures (excluding dams) may be maintained or replaced without resource consent. Note: this also supports DO14 above. Hence it is considered that it is the Maitai dam and South Branch weir that should be the focus of this assessment against DO17.

7.5.62. The relevant objective and policies are as follows:

objective DO17.1 Effects of activities and structures in the beds and margins of rivers and lakes on the natural environment

Activities, works or structures within the beds of lakes and rivers and their margins, and in wetlands, are undertaken or constructed in a way which avoids, remedies or mitigates adverse effects on freshwater bodies and their associated uses and values. (Chapter 5, p84)

policy DO17.1.3 flood damage

Structures in river beds and their margins should be constructed to allow for flood flows from significant storm events without causing or exacerbating flood damage to natural and physical resources. (Chapter 5, p86)

policy DO17.1.7 dams and reservoirs

The diversion and damming of surface water within the beds of rivers should not result in significant adverse effects. (Chapter 5, p89)

7.5.63. Starting first with the matter of flood flows, the Maitai Dam was constructed with spillways that specifically provide for flood flows.

7.5.64. The actual and potential adverse effects of the dam and the diversion on freshwater values have been comprehensively assessed by Cawthron. These effects are summarised in section 6.0 of this application. The applicant has volunteered to change some of the current operating parameters to both enhance existing values while also mitigate some of the specific effects on water quality and flows. These changes will ensure the applicant is doing what it can to minimise the adverse effects of operating this network utility.

- 7.5.65. DO17.2 relates to the protection of network utilities from other activities. These provisions are not of particular relevance here however they do again highlight the importance and value of this infrastructure to the community.

objective DO17.2 Effects of activities and structures in the beds of rivers and lakes on infrastructure

Activities, works or structures within the beds of lakes and rivers and their margins undertaken or constructed in a way which avoids, remedies or mitigates adverse effects on lawfully established network utility operations. (Chapter 5, p94)

policy DO17.2.1 Activities and structures in the beds of rivers and lakes which affect network utility operations

Activities or structures in the beds of rivers and lakes should not result in significant adverse effects on network utility operations. (Chapter 5, p94)

Freshwater abstraction and instream flows (DO18)

- 7.5.66. The use of the Maitai and Roding as a public water supply are acknowledged in the opening paragraphs to DO18 (p96). As will become further evident in the assessment of the relevant provisions in DO18, these water takes are central to the wider planning framework around freshwater management for these rivers.

- 7.5.67. There are four objectives in DO18 (and numerous supporting policies). The objectives are:

- DO18.1 maintaining and enhancing flows and levels
- DO18.2 underground flows and levels
- DO18.3 providing for water abstraction
- DO18.4 diversion of water

- 7.5.68. These provisions and their supporting policies and methods of implementation (rules etc) make up an important part of the planning framework against which this application for water takes is to be assessed.

- 7.5.69. Objective 18.1 and policy 18.1.1 are considered to be of particular relevance to the assessment of this application, and for water takes in particular:

objective DO18.1 maintaining and enhancing flows and levels

Flow regimes and water levels within the region's water bodies maintained, and enhanced where necessary, to ensure a water level which:

- a) *provides for natural, intrinsic, cultural, and spiritual values, including aquatic ecosystems, natural character, native fishery habitats, existing trout and salmon habitats, and recreational values, and*
- b) *provides for a range of uses, in particular reasonable domestic and stock water use and fire fighting, and*
- c) *provides for the adequate dilution of contaminants arising from natural sources while preserving the life-supporting capacity (the mauri) of the water. (Chapter 5, p96)*

policy DO18.1.1 flow regimes: specific rivers

Manage flows and levels for specific rivers in accordance with the minimum flows and trigger flows set out in Appendix 28.2. (Chapter 5, p96)

Explanation and Reasons

DO18.1.1.i The values and priorities listed in objective DO18.1 were taken into account during the process of setting minimum flows. Water is taken out of all the rivers listed in

Appendix 28.2 for out-of-stream uses. In order to leave enough water in the rivers and streams to protect instream values it is necessary to set a minimum flow below which no further water should be taken.

DO18.1.1.ii A minimum flow does not mean that flows will not sometimes naturally fall below this level. The minimum flow reflects the probability of a flow reaching that level, whether that is on average once a year (mean annual low flow) or once over a five year period. The aim is to avoid taking water out of these waterways during these very low flows to avoid causing extra stress for instream life. Minimum flow levels vary depending upon the management objectives established for each water body. These objectives are listed in the table in Appendix 28.2.

DO18.1.1.iii Trigger flows have also been set. When flow levels drop to this level, all non-essential abstraction from that river are suspended, except where an approved 'Water Conservation Plan' exists.

DO18.1.1.iv Wai (water) will be the starting point for the development of Iwi environmental indicators, using the Maitahi (Maitai) River as a case study. The literature review recently carried out as part of the Council initiated study of the Maitai will provide a resource for the Iwi indicators project. (Chapter 5, p96-97)

- 7.5.70. Of particular importance to both the above objectives and policies is that the NRMP uses 'flow regimes' as the primary means of maintaining and enhancing flows for a wide range of reasons / values, and to achieve specific management objectives. Policy DO18.1.1 is applied through Appendix AP28.2 of the Plan 'Flow regime for specific rivers'. Specific minimum flows and in some cases trigger flows are identified in AP28.2 for the purpose of achieving the 'Management objectives' listed in that same section.
- 7.5.71. As noted in section 5.2 of this application, the Maitai River (and Roding River) are the only specific rivers identified as having "*public water supply*" as a management objective. Both also have enhancement for ecological values and recreational use as management objectives. Other specific rivers have different management objectives, such as the upper Hillwood for '*irrigation for horticulture*'.
- 7.5.72. Public water supply is one of the priorities for the Maitai River, with the minimum flows being set in order to protect the instream values. The applicant proposes to increase the minimum flows (over and above that set out in AP28.2 and above the current consent conditions) as a part of the maintenance and enhancement of aquatic values, being in direct response to the recommendations of Cawthron. This is considered to achieve the 'ecological' management objective.
- 7.5.73. While the applicant has volunteered to maintain higher minimum flows where practicable, policy DO18.1.3 signals the relevance of population growth and this may impact on water demand and flows. This links directly to WA2.1 of the NRPS. Promotion of efficient use of water, rainwater storage and water reuse are some of the listed methods to address this issue. Leaving more water in the Maitai (and Roding) are signalled as not likely given these increased urban water demands, and no doubt in recognition of the essential nature of this service in terms of community health and well-being.

policy DO18.1.3 increased demands for water

Address increased demand for water created by population growth. (Chapter 5, p97)

Explanation and Reasons

DO18.1.3.i This policy recognises that the population for the Nelson City Council area is expected to increase by 24% from 2001 to 2021. This has significant implications regarding increasing demand for out-of-stream uses of water.

DO18.1.3.ii Increased demand for water in both the urban and rural zones means that a number of measures will be necessary to avoid the cumulative effects of that population growth on water resources.

DO18.1.3.iii The Council recognises that as the city grows there will be an increased demand for water from the Maitai and Roding rivers. While the Council will be able to continue to meet the minimum flows established in the urban supply resource consent, the opportunities to leave more water in the Maitai and Roding rivers will reduce as urban water supply demands increase. For this reason, and in recognition that water is a precious resource, the Council will promote efficient use of water, rainwater storage, and water reuse. (Chapter 5, p97)

Methods

DO18.1.3.iv Actively monitor water permits and instream flows, to ensure that:

- a) consent conditions are adhered to, and
- b) sufficient residual flows remain to provide for in-stream values, and
- c) water is returned to the source where it is no longer needed for abstraction, and
- d) accurate information is held on what water permits are held but not used, particularly for over-allocated rivers.

DO18.1.3.v Meter all consented water takes.

DO18. 1.3.vi Continue to monitor river flows and set up new monitoring sites, where necessary, to improve data flow.

DO18. 1.3.vii Set up a website to advise users of flow levels.

DO18. 1.3.viii Limit most water permits to 10 years to allow for regular review of allocations.

DO18.1.3.ix Change the conditions on existing water permits which do not meet allocation limits specified in Appendix 28.2 (refer to Policy DO18.3.1(b)).

DO18.1.3.x Require rainwater storage for new residential units in rural areas.

DO18.1.3.xi Promote efficient use of water, rainwater storage, and water reuse in the urban area.

DO18.1.3.xii State of the environment monitoring and reporting. (Chapter 5, p98)

7.5.74. The last policy in DO18.1 was inserted into the Plan under s55 of the Act as directed by the NPSFM. This policy (DO18.1.4 - below) relates to new discharges or more than minor adverse changes compared to the existing operation of the Scheme. Given the established nature of the subject discharges, and the beneficial / positive nature of the changes proposed, this policy is not considered to be relevant to the assessment.

policy DO18.1.4 water quantity (NPS – Freshwater Management 2014)

1. When considering an application for a discharge, the consent authority must have regard to the following matters:

- (a) The extent to which the change would adversely affect safeguarding the life-supporting capacity of freshwater and of any associated ecosystem and

(b) *The extent to which it is feasible and dependable that any adverse effect on the life supporting capacity of freshwater and of any associated ecosystem resulting from the change would be avoided.*

2. *This policy applies to:*

(a) *Any new activity and*

(b) *Any change in the character, intensity of scale of any established activity – that involves any taking, using, damming or diverting of fresh water or draining of any wetland which is likely to result in any more than minor adverse change in the natural variability of flows or level of any fresh water, compared to that which immediately preceded the commencement of the new activity of the change in the established activity (or in the case of a change in an intermittent or seasonal activity, compared to that on the last occasion on which the activity was carried out).*

3. *This policy does not apply to any application for consent first lodged before the National Policy Statement for Freshwater Management 2011 took effect on 1 July 2011.*

Explanation and Reasons

DO18.1.4.i This policy has been included (under section 55 RMA) as directed by the National Policy Statement for Freshwater Management 2014. (Chapter 5, p98)

7.5.75. DO18.2 is heading ‘underground flows and levels’ and relates to groundwater abstractions and flows.

objective DO18.2 underground flows and levels

Water levels and flows within the region’s groundwater sufficient to maintain a range of uses and sustain underground aquatic life, and groundwater levels and flows are enhanced where uses and values have been degraded as a result of modified levels or flows. (Chapter 5, p98)

policy DO18.2.1 managing underground abstractions

The effects of underground abstractions on aquifer levels and on surface flows and levels will be considered on a case-by-case basis, having regard to the precautionary principle. (Chapter 5, p99)

7.5.76. The methods to achieve these outcomes are listed as ‘rules’ controlling quantity of water taken and rules controlling installation and decommissioning of bores. The latter of these is not relevant to this assessment. In terms of the former, the flow regimes are the primary methods of implementation.

7.5.77. The third objective in DO18 is headed ‘providing for water abstraction’. There are also 13 policies supporting this objective. The relevant provisions are provided and discussed below.

objective DO18.3 providing for water abstraction

Provided that objectives DO18.1 and DO18.2 can be met, allocate water for abstraction in a way which:

- *provides a reliable supply under normal flow conditions, and*
- *is equitably distributed between all water users while taking into account the priority uses of fire fighting, reasonable domestic use (including reticulated urban domestic use), and reasonable stock water use, and*
- *provides for and promotes efficiency in water use. (Chapter 5, p99)*

7.5.78. Objective DO18.3 seeks to ensure water allocation provides reliability of supply, equity in distribution and is efficiency in use. In terms of equity, the objectives clarifies that priority uses must be taken into account, such as reticulated urban domestic use. This is of particular relevance to the Maitai (and Roding) given the Management Objectives.

7.5.79. Policy DO18.3.1 sets out the criteria for considering (all) water permit applications:

policy DO18.3.1 water permits

Implement a water permit system for any water take based on the following criteria:

- a) *Single-class permit system for all rivers and streams.*
- b) *All existing water permits which do not meet any new flows, levels, or allocation limits specified in the Plan will be required to meet 80% of the new flows, levels, or allocation limits within 2 years of the freshwater plan change becoming operative, and fully comply within 5 years of the freshwater plan change becoming operative.*
- c) *All applications for water permits, including renewals of existing permits, will be treated as new applications and assessed on a case by case basis. Physical resources relating to a previous water permit are an assessment matter which can be considered as part of the application process. The RMA Amendment Act 2005 requires the efficiency of the applicant's use of the resource to be considered when determining applications from existing water permit holders.*
- d) *Consider declining an application to take water where taking from an alternative water source on the applicant's property or through an alternative available supply is likely to have less adverse effect on the water resource, or result in more equitable water allocation.*
- e) *review water permits and allocation limits where:*
 - i) *the water is surplus to the actual annual water requirements of the existing activity (at a 1 in 5 year low flow), or*
 - ii) *the activity has changed such that the full allocation is no longer required, or*
 - iii) *flow records show the water resource available for allocation is less than originally thought. (Chapter 5, p99)*

7.5.80. Clause b) to this policy is not relevant as the applicant will comply, and in fact exceed the standards in, the flow regime.

7.5.81. Clause c) is relevant however the activity status ultimately determines the assessment procedure. FWr.12.3 makes specific provision for this "priority use". Hence the extent to which this application is considered on a case-by-case basis needs to be tempered by the specific plan provisions. The matter of efficient use also needs to be considered against the direction provided in policy DO18.3.1 and 18.1.1.

7.5.82. Clause d) relates to the consideration of alternative sources. This question of alternatives has been addressed in 2.1 of this application.

7.5.83. Clause e) involves consideration of formal reviews and allocation limits. This is a relevant consideration which, due to the assessment of Cawthron, has resulted in the applicant not seeking to utilise the full volume of allocated water above the current minimum flow (175 l/s).

7.5.84. Each of the above matters have been addressed in this application for resource consent.

7.5.85. Policy DO18.3.2 (Chapter 5, p100) relates to monitoring to improve knowledge. On-going monitoring over a long period of time has provided the applicant with a high level of knowledge and this level of monitoring is again volunteered, with adjustments where appropriate to align with the requirements of the NPSFM.

7.5.86. Policy DO18.3.3 (Chapter 5, p101) seeks to generally align the expiry of water permits to improve management and certainty to consent holders. This is not so much of an

issue for the Roding River as the water is effectively set aside for public water supply (and aquatic values) and the taking of water downstream (within NCC) is a prohibited activity (FWr.12.3). As such the applicant has sought an expiry period of 35 years.

7.5.87. Policy DO18.3.4 (Chapter 5, p101) is not relevant as this relates to the transfer of water permits.

7.5.88. Policy DO18.3.5 (Chapter 5, p101) simply seeks to manage the total abstraction from specified rivers, such as the Maitai, to those within AP28.2. Policy DO18.3.6 (Chapter 5, p102) is closely related as this seeks to avoid new allocations after 9 October 2004. The Prohibited Activity status achieves this. Refer to Section 3.

policy DO18.3.5 allocation limits for specified rivers

Manage the abstraction of water from any river or stream specified in Appendix 28.2 so that the total abstraction does not exceed the allocation limits listed in that Appendix. (Chapter 5, p101)

policy DO18.3.6 Allocation limits for the Maitai and Roding rivers

Avoid any water takes or uses from the Maitai and Roding Rivers which are additional to existing allocations at 9 October 2004.

Explanation and Reasons

DO18.3.6.i Continued and reliable urban water supply allocation is Nelson City Council's priority out-of-stream use for both the Maitai and Roding rivers. The urban water supply resource consents for both the Maitai and Roding Rivers are intended to retain sufficient minimum flows in the rivers for in-stream uses. Any water taken downstream of the Maitai and Roding dams may adversely affect the ability of the reticulated water supply to provide water to urban areas, and may require water stored for town supply to be released in order to maintain minimum flows. For these reasons, and in order to conserve stored water for future use, new water takes should not be permitted. (Chapter 5, p102)

7.5.89. Policy DO18.3.8 relates to over allocated rivers.

policy DO18.3.8 over-allocated rivers

Where a river is considered to be over-allocated no further water permits will be issued except that where existing water permits are relinquished the Council may consider either leaving the water as part of the instream resource or re-allocating any available water. (Chapter 5, p102)

7.5.90. The explanation to this policy identifies the Lud, Maitai and Todds Valley Stream as examples of over-allocated rivers. The appropriate time to review allocation limits is when existing water permits are due to expire.

7.5.91. The remaining policies in DO18.3 relate to the operation of water permits, such as the implementation of water restrictions at the time of reaching trigger flows or minimum flows, rates of take, monitoring fees and also the use of water user management groups. DO18.3.10 also clarifies what it provides for in terms of permitted abstractions.

policy DO18.3.9 water restrictions

Restrict water abstraction during periods of low flow using the following criteria: a) Require all water takes to cease where any trigger flows in Appendix 28.2 are reached and where: i) the take is not for domestic, stock water, or fire fighting purposes, and ii) a water conservation plan has not been approved by the Council. b) Require all water takes to cease when the minimum flow is reached, except for fire fighting purposes. c) Water shortage directions to safeguard instream flows will be issued as a last resort. (Chapter 5, p103)

policy DO18.3.10 Permitted abstractions

Abstractions from surface water and groundwater will be permitted for:

- a) *reasonable domestic water needs in the Rural Zone, and*
- b) *reasonable stock water needs for drinking water*
- c) *fire fighting but domestic takes should not occur in areas where reticulated supply is supplied to the site. (Chapter 5, p104)*

policy DO18.3.11 rate of water takes

The rate of water take should be as low as practicable for permitted and consented water takes. Where practicable, the take should be uniformly distributed over 24 hours. (Chapter 5, p104)

policy DO18.3.12 monitoring fee

Require all water permit holders for water takes to provide a monetary contribution or fee for the purposes of monitoring. (Chapter 5, p104)

policy DO18.3.13 water user management groups

Encourage and support the establishment and functioning of water user groups with representatives, as appropriate, to:

- *assist the Council to prepare a water conservation plan, and*
- *assist the Council in managing water usage during drought periods, including assistance with rationing or rostering, and*
- *assist the Council in implementing programmes of education and advocacy for good practice methods in water use. (Chapter 5, p105)*

7.5.92. According to the explanation to DO18.3.13 there is a water conservation strategy already in place for the Maitai. This is located within Appendix B of the Water Asset Management Plan 2012-2022. Refer to section 2.1 above.

7.5.93. The objective in DO18 relates to the diversion of water, relevant to this application in terms of the return of water to the South Branch from the reservoir. The objective and policies are provided below.

objective DO18.4 diversion of water

The natural functioning of ecosystems is not disrupted by the diversion of surface water.

Explanation and Reasons

DO18.4.i It is necessary to ensure that diversion of surface freshwater does not cause environmental stress. Stress can arise from reduced flows if the water is diverted for any length of time or not returned near to the source from which it was taken. Stress can also be caused by chemical or physical changes to the quality of the water during the period of diversion. (Chapter 5, p106)

policy DO18.4.1 diversion of water

Require any water that is diverted from a surface water body to be returned as near as possible to the source from which it is taken, and in the same state or better than when it was diverted. (Chapter 5, p106)

7.5.94. According to the Cawthron Report 2810, it is the water quality effects of discharging reservoir water into the South Branch that causes the adverse water quality identified. Refer to section 6.0 above. As a result, it is more a matter of water quality than water quantity and that is addressed under the next subheading.

Discharges to freshwater and freshwater quality (DO19)

7.5.95. As set out in Section 5, the NRMP (Freshwater Plan, Appendix 28.4) contains Nelson’s water quality classifications. The applicable water classifications have been previously described and are shown in Map 5 of the Map Bundle (**Attachment A**). DO19 explains the role of these classifications in the management of this valuable natural resource in terms of discharges to freshwater and water quality.

7.5.96. DO19 contains one objective and twelve supporting policies. The objective is to quite simply to achieve the highest practicable water quality, with the explanation providing the reasoning for this:

objective DO19.1 highest practicable water quality

All surface water bodies contain the highest practicable water quality.

Explanation and Reasons

DO19.1.i Water quality is a key factor in the character and health of all ecosystems, terrestrial as well as aquatic. However, monitoring undertaken to date indicates some of Nelson’s urban and rural streams are highly degraded as a result of historical and present practices.

DO19.1.ii Healthy water bodies are valued for ecological, recreational, cultural and spiritual reasons. The entire region benefits from having unpolluted swimming holes, good quality habitat for fish and other aquatic life and clean water for water supplies, irrigation and industrial use.

DO19.1.iii This objective is adopted to ensure that the uses and values of Nelson’s rivers can continue. The most effective way to meet this objective is to:

- avoid further degradation, and*
- identify priority rivers or streams for restoration or enhancement, and*
- develop a restoration programme which involves all stakeholders (and local communities) and which includes non-regulatory methods. (Chapter 5, p108)*

7.5.97. The policies then set out how this objective is to be achieved. The first set of policies (DO19.1.1 to DO19.1.6) involve the use of a water classification system to identify water quality priorities to be identified and to guide resource consent decision making. Policy DO19.1.1 and the accompanying explanation describes this in detail:

policy DO19.1.1 classification

To classify Nelson’s water bodies based on water quality standards.

Explanation and Reasons

DO19.1.1.i The water quality of Nelson’s rivers has been assessed and classified into five categories from Class A (excellent) to Class E (very degraded).

DO19.1.1.ii In order to set clear management objectives for each water body it is necessary to establish the current water quality of Nelson’s rivers and then set minimum standards for maintaining that level of water quality. Classification standards provide a “baseline” below which water quality should not be degraded.

DO19.1.1.iii Freshwater quality classifications have been specifically developed for Nelson’s water bodies using the quantitative ANZECC guidelines (Australian and New Zealand Guidelines for Fresh and Marine Water Quality) and the narrative water quality standards in the Resource Management Act 1991. This process is also in line with the Nelson Regional Policy Statement policy WA1.3.1 regarding classification of water bodies based on their values. (Chapter 5, p109)

7.5.98. Class A water bodies such as the South Branch of the Maitai (above the weir) are expected to be *preserved* in their natural state:

policy DO19.1.2 Class A freshwater – natural state

Preserve Class A water bodies in their current state.

Explanation and Reasons

DO19.1.2.i Freshwater ecosystems in their natural state have excellent water quality which meet the Class A standard. Class A water is suitable for the most sensitive of uses such as primary contact recreation, drinking water, and sustaining a very high diversity of aquatic ecosystems.

DO19.1.2.ii Nelson’s Class A water bodies are mostly in the Conservation Zone and occur in the upper reaches of the Roding, Maitai and Whangamoā rivers as well as the Oananga and Omokau Bay streams near Cape Soucis. As this land is largely under some form of protection, either administered by the Department of Conservation or by Nelson City Council as a waterworks reserve, it is achievable to protect the existing high quality water bodies. Only discharges which meet Class A quality standards should occur in these water bodies. (See Appendices 28.4 – 28.7 for the classification of Nelson water bodies and discharge standards.) (Chapter 5, p109)

7.5.99. Policy DO19.1.4 states that Class C water bodies are to be *upgraded where practicable*:

Policy DO19.1.4 Class C freshwater – moderately affected

Upgrade Class C water bodies to Class B where practicable.

Explanation and Reasons

DO19.1.4.i Class C water bodies still retain healthy ecosystems overall but improvement is desirable where possible. In some instances it will be unrealistic to upgrade water quality in Class C water bodies. Class C water bodies are moderately affected by human activity such as rural streams receiving some contamination from grazing or urban streams receiving runoff from paved surfaces. They are suitable for secondary contact recreation, stock drinking water, and sustaining fish species and aquatic invertebrates.

DO19.1.4.ii Class C water bodies are moderately affected by human activity, plantation forestry, pastoral farming, runoff from roads and streets and other similar effects arising from concentrated urban activities. These water bodies currently include the mid to lower reaches of the Maitai, Wakapuaka, and Whangamoā rivers as well as many of the tributaries of these rivers. The urban mid reach of Brook Stream and lower reach of Maitai River are also classified as Class C.

DO19.1.4.iii Where steps are taken, and Class C water bodies are improved to Class B quality, they will then be considered suitable for contact recreation such as swimming. Two of the factors which distinguish Class B and C water quality are the amount of faecal material and the amount of sediment entering the water body. Reducing the amount of faecal material entering water bodies is critical to ensuring compliance with both stock drinking water and contact recreation standards.

DO19.1.4.iv Rivers carrying a high sediment loading have a downstream adverse effect on estuaries as well as adversely affecting the habitat quality for native fish and trout. Reducing the amount of sediment entering water bodies through best land management practices will help to address these issues.

DO19.1.4.v Improvement of water quality in Class C water bodies will also assist with improving water quality in the coastal receiving environments of Nelson Haven, Delaware Inlet, Whangamoā Estuary and Omokau Bay. (See Appendices 28.4 – 28.7 for the classification of Nelson water bodies and discharge standards.)

7.5.100. Policy DO19.1.5 states that Class C is the minimum acceptable standard. The Maitai is identified as being a “Third” priority for improvement.

7.5.101. Policy DO19.1.6 seeks to identify and take opportunities to enhance water quality. The middle and lower section (see Map Bundle – **Attachment A**) of the Maitai is an example given in this regard due to Class B being the standard expected for contact recreation such as swimming:

policy DO19.1.6 enhancing water quality

To identify and take opportunities to enhance existing water quality.

Explanation and Reasons

DO19.1.6.i Appendix 28.4 (classification of Nelson water bodies) lists the current classification of each water body from A to E (from excellent to very degraded). This classification draws on the monitoring undertaken since 2000 and the key factors which are influencing each classification are listed. The table also shows what uses and values the water body currently has. Appendix 28.4 is included in the Plan to assist applicants and decision-makers to assess the potential effects of proposed activities.

DO19.1.6.ii The first priority is to avoid further degradation and to maintain the qualities of mid to higher value watercourses. However, a guide of priorities for improvement is also listed. Top priority has been assigned to those water bodies where the classification is not appropriate for the uses and values of it. For example, the mid and lower reaches of the Maitai River are high priority for improvement because they have a Class C water quality but some uses and values associated with it, including swimming, require Class B quality water. The priorities for enhancement which are listed in Appendix 28.4 are a guide only, and all improvement projects will need to be considered on a case by case basis.

DO19.1.6.iii This table should be taken into consideration whenever someone applies for a resource consent to discharge to water bodies or land because there is an opportunity, particularly with new resource consents for existing discharges, to achieve an enhancement in water quality. This can occur when the consent holder re-examines the discharge activity and makes use of technological advances in the reduction, recycling or treatment of contaminants. There will also be opportunities outside of the resource consent process to enhance water quality.

DO19.1.6.iv Contaminants include any substance which, when discharged into a water body, changes or is likely to change the physical, chemical or biological condition of the water.

DO19.1.6.v The Council will have regard to Appendix 28.4 when considering resource consents to discharge contaminants to water bodies from either specific or diffuse sources, which include the following activities:

- i) the discharge of sediment, and*
- ii) contaminant levels in stormwater runoff, including from industrial or trade processes, and*
- iii) inappropriate storage, handling, spill management and application of agrichemicals, and*
- iv) the excessive application of fertilisers to land, and*
- v) discharges from contaminated land, and*
- vi) discharges from landfills, and*
- vii) contaminant levels in wash water and wastewater from industrial and trade processes.*

DO19.1.6.vi This policy is adopted to ensure that opportunities are taken to achieve improved water quality in Nelson's rivers and streams. (Chapter 5, p111-112)

7.5.102. Policies DO19.1.7 to DO19.1.10 relate to the effects of land use activities, stormwater discharges and discharges from new development, none of which are relevant to this application.

7.5.103. Policy DO19.1.11 states an intention to review all discharge consents by January 2006 so that the water quality discharge standards are complied with within 5 years of the freshwater plan becoming operative.

policy DO19.1.11 new and existing discharges to water

To review all existing discharge permits (other than stormwater) by January 2006 and apply a standard condition so that the new water quality discharge standards are fully complied with within five years of the freshwater plan change becoming operative. (Chapter 5, p115)

7.5.104. Finally, Policy DO19.1.12 was inserted into the NRMP under section 55 of the Act as directed by the NPSFM 2014. Clause 2 of this policy states that this policy only applies to a new discharge (which this is not) or a new change or increase in any discharge of any contaminant to freshwater. This is not a new discharge and the discharge is not changing (other than improving) from what has been occurring for many years. Notwithstanding this, the matters listed in Clause 1 have effectively been addressed in section 6 of this application for resource consent.

policy DO19.1.12 Water Quality (NPS – Freshwater Management 2014)

1. When considering any application for a discharge, the consent authority must have regard to the following matters:

(a) the extent to which the discharge would avoid contamination that will have an adverse effect on the life-supporting capacity of fresh water including on any ecosystem associated with fresh water; and

(b) the extent to which it is feasible and dependable that any more than minor adverse effect on fresh water, and on any ecosystem associated with freshwater, resulting from the discharge would be avoided; and

(c) the extent to which the discharge would avoid contamination that will have an adverse effect on the health of people and communities as affected by their secondary contact with fresh water; and

(d) the extent to which it is feasible and dependable that any more than minor adverse effect on the health of people and communities as affected by their secondary contact with freshwater resulting from the discharge would be avoided.

2. This policy applies to the following discharges (including diffuse discharge by any person or animal):

(i) a new discharge; or

(ii) a new change or increase in any discharge of any contaminant into fresh water, or onto or into land in circumstances that may result in that contaminant (or, as a result of any natural process from the discharge of that contaminant, any other contaminant) entering fresh water.

3. Paragraphs (a) and (b) of this policy do not apply to any application for consent first lodged before the National Policy Statement for Freshwater Management 2011 took effect on 1 July 2011.

4. Paragraphs (c) and (d) of this policy do not apply to any application for consent first lodged before the National Policy Statement for Freshwater Management 2014 took effect on 4 July 2014. (Chapter 5, p116)

7.5.105. The applicant is proposing to mitigate, to the extent that it is reasonably practicable to do so, the identified adverse effects of the discharge to the South Branch through the use of operational changes to the backfeed management and/or aeration of the backfeed and / or the reservoir. These measures are described in Section 2.5 above. The intention is to ensure that, after reasonable mixing, the water quality is improved as far as practicable and feasible. Cawthron (**Attachment N**) has however explained the extent to which these improvements are expected to be achieved,

using a probability analysis and with reference to the current standards. Cawthron expects that management of the backfeed may improve some water quality standards to a B category. Cawthron expects that destratification or hypolimnetic aeration of the reservoir will have a high likelihood of improving most of the water quality standards to at least a Class B level.

Freshwater management (DO20)

7.5.106. DO20 is the last resource management issue addressed in Chapter 5 of the NRMP. Objective DO20.1 seeks to ensure the expertise and responsibilities for the protection and use of freshwater are integrated. The explanation and reasons to this objective acknowledge the importance and benefits of shared information, knowledge, data and technology.

objective DO20.1 integrated water management

A management approach that integrates the expertise of relevant statutory authorities and manawhenua iwi and other stakeholders in the community, and recognises the responsibilities they have for the protection and use of freshwater resources. (Chapter 5, p118)

7.5.107. There are three policies that support objective DO20.1. The first identifies the need to consider other relevant management plans when decisions are being made on water management.

policy DO20.1.1 other management plans

Decisions on water management are made having regard to relevant management plans prepared by manawhenua iwi and statutory authorities such as the Department of Conservation, Nelson Marlborough Fish & Game Council and Nelson City Council. (Chapter 5, p118)

7.5.108. Policy DO20.1.2 seeks to ensure liaison and consultation with the Tasman District Council over cross boundary water issues. The Maitai River is entirely within NCC and so this is not a relevant consideration for this application.

policy DO20.1.2 liaison with neighbours

Liaise and consult with Tasman District Council over resource management cross boundary issues. (Chapter 5, p119)

7.5.109. Policy DO20.1.3 seeks:

Policy DO20.1.3 liaison with stakeholders

Decisions on water management are made having regard to the knowledge and experience of stakeholders actively involved in water use and water management. (Chapter 5, p119)

7.5.110. The applicant has consulted with the relevant stakeholders as part of the preparation of this resource consent application. The feedback received has been reported in this application with some changes also made to this proposal in response.

7.6. Summary of the relevant planning documents

7.6.1. The Nelson City Council is in the process of implementing the NPSFM 2014 through its preparation of the new *Whakamahere Whakatū Nelson Plan* (combined RPS and NRMP). Ultimately it will be through the preparation of this new plan that the community and iwi will determine the pathway and timeframes for ensuring the new freshwater management units achieve the national bottom lines. In the meantime, regard must be given to the relevant objectives and policies of the NPSFM. The most

relevant of these are considered to fall under the headings of water quality, water quantity and integrated management.

- 7.6.2. It is considered that this application will, as far as reasonably practicable, achieve the water quality and water quantity outcomes sought by the NPSFM. The proposed changes and improvements to the system are expected to improve both flows and water quality. These changes generally include:
- Backfeed management and/or reservoir aeration;
 - Increased minimum flows;
 - Fish passage improvements; and
 - Potential fishery management.
- 7.6.3. The National Environmental Standard for Sources of Drinking Water (NES) is only relevant in so far as this recognises the value and importance of human drinking water sources to community well-being.
- 7.6.4. In terms of water quality, the NRPS identifies water quality classifications as the principal means of achieving its objectives and policies. This method is implemented through the NRMP.
- 7.6.5. Under the heading 'water allocation' the RPS addresses the matter of water quantity and flows. The availability of water to: maintain the life supporting capacity of aquatic ecosystems; maintain urban water supply; and maintain and enhance recreational opportunities are the three listed water allocation issues. The importance of the abstractions from the Maitai (and Roding) for urban water supply are fully acknowledged within WA2 and policies WA2.2.4, with policies WA2.3.3 and WA2.3.4 also being directly relevant. It is with policy WA2.3.1 that the method using minimum flow regimes in specified rivers (Maitai, Roding etc) are also introduced. This is then implemented through the NRMP.
- 7.6.6. The NRPS therefore provides significant regional context to the water management regime implemented in the NRMP, being:
- "to allocate abstractive uses which provide for the social, economic and cultural well being of the people of Nelson City ..."* (Policy WA2.3.3).
- 7.6.7. As a combined regional and district plan there are a large number of relevant provisions in the NRMP. Logically however the most relevant provisions are contained in the parts of the NRMP that deal with freshwater. Various provisions in Chapter 5 (District Wide objectives and policies) are of particular relevance and assistance to this assessment.
- 7.6.8. The most relevant provisions in terms of the water takes are considered to be contained in DO18. It is here that the use of the Maitai (and Roding) for public water supply are again acknowledged with the planning framework set out accordingly.
- 7.6.9. Fundamental to the planning framework is the flow regimes for specific rivers such as the Maitai. Objective DO18.1 and policy DO18.1.1 set this out, with this approach being implemented through Appendix 28.2 and Freshwater Rule FWr.12.
- 7.6.10. Appendix 28.2 identifies the management objectives, with "public water supply" as being a "priority" applicable only to the Maitai and Roding. This links directly with the NRPS provisions summarised above.

- 7.6.11. It is then through FWr.12 that a reliable supply of Maitai (and Roding) water is allocated for public water supply purposes. In section 3 of this application Rule FWr.12.3 is further explained. The *restricted discretionary* classification of water takes from the Maitai (and Roding), combined with the Prohibited Activity status of other new takes downstream, sets aside water above the minimum flows set out in Appendix 28.2. Hence, the Plan anticipates and provides specifically for large volumes of water to be taken from the Maitai (and Roding).
- 7.6.12. DO18.3 then deals with this issue of allocation and states the priorities for water abstraction as being those identified. Policy DO18.3.5 and DO18.3.6 then provides further guidance as to how abstractions in specific rivers (such as the Maitai) are to be managed, which is in accordance with the flow regimes.
- 7.6.13. The need to manage the potential for increased demands on water from population growth (DO18.1.3) and also the need for efficiency in the management for network utilities (DO14.4) is also relevant to the assessment and determination of this application.
- 7.6.14. In summary, this application for resource consent to take water from the Maitai River is considered to be entirely consistent with relevant objectives and policies.
- 7.6.15. In terms of water quality, the water quality classifications are central to the planning framework. Following the advice from Cawthron, the applicant proposes to undertake all practicable measures to ensure, after reasonable mixing, the South Branch water quality is improved. Likewise, in terms of the Class C water in the North Branch, the applicant has committed to improve water quality in the Reservoir. Combined with the various other initiatives to improve water quality in the Maitai (via Project Maitai etc), the applicant is committed to enhance water quality in the long term.
- 7.6.16. While there remains some uncertainty as to exactly which option will be used to achieve the water quality improvements proposed, this application is considered to be consistent with the relevant objectives and policies.

8. Part 2 of the Act

- 8.1. “An assessment of the activity against the matters set out in Part 2” of the Act must be submitted with each resource consent application (Clause 2(f), Schedule 4). Part 2 contains the purpose and principles of the Act.

Section 5

- 8.2. Given the critical importance of the Maitai Water Supply Scheme to the health and well-being of the community, section 5 of the Act has particular importance. Indeed this application specifically involves managing the use of a natural freshwater resource in a way and at a rate that is contemplated by the planning framework and for the very purpose of achieving these important community outcomes. In addition, the manner in which the water is taken and used is expected to also achieve those three listed conditions of section 5(2).

Part 2 Purpose and principles

5 Purpose

- (1) *The purpose of this Act is to promote the sustainable management of natural and physical resources.*
- (2) *In this Act, sustainable management means managing the use, development, and protection of natural and physical resources in a way, or at a rate, which enables people and communities to provide for their social, economic, and cultural well-being and for their health and safety while—*
- (a) *sustaining the potential of natural and physical resources (excluding minerals) to meet the reasonably foreseeable needs of future generations; and*
 - (b) *safeguarding the life-supporting capacity of air, water, soil, and ecosystems; and*
 - (c) *avoiding, remedying, or mitigating any adverse effects of activities on the environment.*

- 8.3. The applicant also proposes to make changes to the operation of the system for the purpose of ensuring these conditions are achieved, particularly (b) and (c). As set out by Cawthron in its Report 2810 and letter (in **Attachments I** and **N**, respectively) and summarised in section 2.5 above, these improvements will not be immediate and there remains some uncertainty over the degree of improvement that will arise. Importantly, the application is taking best practicable steps to improve the system and the impacts on water quality, while balancing the need to operate an efficient scheme and meet the needs of the community.

Section 6 matters

- 8.4. Section 6 lists matters of national importance. These matters have considerable importance to decision making processes under the Act. Section 6 states that the listed matters shall be recognised and provided for.
- 8.5. Sections 6(b), 6(c), and 6(g) are not considered to be of relevance to this application. These values are not present.
- 8.6. While the general area does contain historic heritage (s6(f)), the physical infrastructure is well established and no further works are currently planned that has the potential to impact on these values.
- 8.7. Similar to Section 6(f), no changes to the scheme are proposed that would impact negatively on the ability for the public to access the subject riparian areas. Section 6(d) is not therefore a significant issue in the determination of this application.

6 Matters of national importance

In achieving the purpose of this Act, all persons exercising functions and powers under it, in relation to managing the use, development, and protection of natural and physical resources, shall recognise and provide for the following matters of national importance:

- (a) the preservation of the natural character of the coastal environment (including the coastal marine area), wetlands, and lakes and rivers and their margins, and the protection of them from inappropriate subdivision, use, and development:*
- (b) the protection of outstanding natural features and landscapes from inappropriate subdivision, use, and development:*
- (c) the protection of areas of significant indigenous vegetation and significant habitats of indigenous fauna:*
- (d) the maintenance and enhancement of public access to and along the coastal marine area, lakes, and rivers:*
- (e) the relationship of Maori and their culture and traditions with their ancestral lands, water, sites, waahi tapu, and other taonga:*
- (f) the protection of historic heritage from inappropriate subdivision, use, and development:*
- (g) the protection of protected customary rights.*

8.8. Section 6(a) is considered to be relevant as the damming, diversion and take of water from this catchment has changed the natural character of this river. While the dams are expected to remain as a core part of the water supply system long term, the operation of the system has the potential to improve the current flows and also water quality. Both flow and water quality would therefore also directly improve the natural aquatic habitat. These issues are inextricably linked and connected to other effects, such as cultural values (relevant under Section 6(e)).

8.9. The applicant is committed to improve the operation of the system and has fully accepted the advice from Cawthron as to how to go about this. It is anticipated that, over time, the natural values will be enhanced. The wider catchment improvements, such as those implemented as a part of Project Maitai, are relevant to the “big picture” also.

8.10. Further in terms of section 6(e), the methodology used in the preparation of the Cultural Impact Assessment has given appropriate regard to these relationships.

Section 7 matters

8.11. Section 7 lists other matters that decision makers shall have particular regard to.

7 Other matters

In achieving the purpose of this Act, all persons exercising functions and powers under it, in relation to managing the use, development, and protection of natural and physical resources, shall have particular regard to—

- (a) kaitiakitanga:*
- (aa) the ethic of stewardship:*
- (b) the efficient use and development of natural and physical resources:*
- (ba) the efficiency of the end use of energy:*
- (c) the maintenance and enhancement of amenity values:*
- (d) intrinsic values of ecosystems:*
- (e) [Repealed]*
- (f) maintenance and enhancement of the quality of the environment:*
- (g) any finite characteristics of natural and physical resources:*
- (h) the protection of the habitat of trout and salmon:*
- (i) the effects of climate change:*

(j) *the benefits to be derived from the use and development of renewable energy.*

- 8.12. A number of these matters are also relevant to this application, including (b), (c), (d), (f), (g) and (h).
- 8.13. As water is a public resource, section 7(b) is considered to have the most specific relevance to this application to renew a significant water take. Efficient use in this context is considered to mean minimising losses in the supply network so to ensure the resource is not wasted, while also encouraging the end user to also reduce demand.
- 8.14. Water losses are, as set out in section 2.1, commonplace in water reticulation systems. The importance and value (both economic and environmental) of reducing losses are well recognised in the various planning documents as well as the documents such as the Long Term Plan and Asset Management Plan. The applicant has committed to reducing these losses for the purpose of making more efficient use of this freshwater resource.

Section 8 matters

- 8.15. The principles of the Treaty of Waitangi

8 Treaty of Waitangi

In achieving the purpose of this Act, all persons exercising functions and powers under it, in relation to managing the use, development, and protection of natural and physical resources, shall take into account the principles of the Treaty of Waitangi (Te Tiriti o Waitangi).

- 8.16. As set out in the Cultural Impact Assessment (Attachment O), the Council's consideration of iwi recommendations and potential options for avoiding or mitigating adverse cultural effects goes some way toward upholding the Treaty principles. On-going engagement with Te Tau Ihu would also recognise iwi rangatiratanga, and can also foster longer term partnerships of management of this natural resource.
- 8.17. Overall, this application is considered to achieve the sustainable management of this valuable natural resource and is consistent with the principles set out within sections 6 to 8.

9. Other Relevant Matters

9.1. Statutory Acknowledgments and Iwi Management Plans

- 9.1.1. The Statutory Acknowledgments and relevant Iwi Management Plans have been considered and addressed within the Cultural Impact Assessment (CIA) contained within **Attachment O** of this application (see section 4 'Relationship of Te Tau Iwi to the Mahitahi River'). These documents have assisted in the identification of interests in and relationships with the Mahitahi River and the surrounding area.

9.2. Nelson City Long Term Plan 2015-2025

- 9.2.1. Nelson's Long Term Plan 2015-2025 identifies the provision of safe and reliable water as a major part of Council's core business (p60). This water supply activity is also described in the LTP as an essential 'lifeline' utility for community and environmental wellbeing. The investment into this system is also identified as considerable.
- 9.2.2. As a part of achieving important community outcomes, the LTP sets out the Council's Priorities for the next three years, and also service levels, performance measures and targets. The LTP also identifies where funds are to be allocated in terms of improvements to the water supply system.
- 9.2.3. The delivery of the identified priorities and service levels is through the Infrastructure Strategy which forms a part of the LTP, along with through the Annual Plans and Water Asset Management Plan 2012-2022. For example, the LTP contains a new measure, being to investigate water loss from the network, as a part of improving reliability of the supply and efficiency was water use. The Draft Annual Plan identifies a target of less than 25% of real water loss from the networked reticulation system.
- 9.2.4. The LTP provides context to the water supply activity undertaken by Council and identifies the measures being taken to achieve the various community outcomes. This document, along with the supporting documents prepared under the Local Government Act, are considered to be relevant documents in that they document Council's commitment to achieving community and environmental outcomes.

9.3. Water Supply Asset Management Plan

- 9.3.1. The purpose of the Water Supply Asset Management Plan (AMP) is set out on page 1 of the document:

The ultimate purpose of an asset management plan is to ensure that assets are operated and maintained in a sustainable and cost effective manner, and that they provide the required level of service for present and future customers.

- 9.3.2. Along with providing a description of the water supply assets, their historical development and improvements made, the AMP addresses the matters of water losses and water conservation in detail.

9.4. Project Mahitahi

9.4.1. Project Maitai/Mahitahi was established by the Council in 2014 and is scheduled to run for 4 years. The project has \$400,000.00 of expenditure dedicated to it each year.



9.4.2. This project aims to improve the health of the Maitai River so that the community feel inspired to look after it, and it is safe to swim in and take kai from it.

9.4.3. The project involves a long list of key stakeholders, such as iwi, the Department of Conservation, Cawthron, Fish and Game, Rotary, Fulton Hogan, Nelmac, and various community groups.

9.4.4. The main areas of current focus for the project are detailed on the following infographic. They include forming a wetland, planting, altering fish barriers, and addressing toxic algae / pollution and rubbish.

9.4.5. It is clear that there are some clear synergies between Project Mahitahi and the current application where improvements in water quality, water clarity, habitat quality, biodiversity and fish passage will be mutually beneficial.



10. Overall Assessment and Conclusions

- 10.1. In section 4 of this application the relevant statutory considerations were identified. As a discretionary activity, this application can be considered on its merits, subject to Part 2.
- 10.2. The key considerations, subject to Part 2, are considered to be:
- (a) The relevant actual and potential effects of allowing the activity;
 - (b) The relevant provisions of the planning documents;
 - (c) The value of the investment;
 - (d) The importance of this activity (public water supply) to the health and well-being of the community.
- 10.3. Section 104(3)(c)(i) is of particular importance as it states that a Consent Authority must not grant a resource consent contrary to section 107. Section 107 is therefore a statutory hurdle that has direct relevance to the renewal of this application to discharge contaminants.

Actual and potential effects

- 10.4. An assessment of actual and potential effects of the activities was undertaken in section 6 of this application. The following table summarises this assessment:

Effect	Assessment	Mitigation measures
Hydrology, flow and habitat (Section 6.2)	– Adverse effects are currently less than minor due to management practices retaining more than minimum flow. If activity was to be managed in accordance with consented low flow then effects would be more than minor	Increase consented minimum flow
Water quality (Section 6.3)	– Adverse effects are more than minor	Improve water quality through backfeed management or aeration (either via mixing or hypolimnetic aeration) of the reservoir
Periphyton (Section 6.4)	– Adverse effects cannot be categorically linked to activity, but are likely to be more than minor	Possible reduction in nutrient and metal concentrations through aeration (either via mixing or hypolimnetic aeration) of the reservoir.
Aquatic ecosystems (Section 6.5)	– Adverse effects are uncertain but are likely to be more than minor, and based on the low fish populations,	Improve water quality through backfeed management or aeration of the reservoir, and

	potentially significant.	increase minimum flows. Control of trout in reservoir and North Branch (to offset
Fish passage (Section 6.6)	– At the South Branch weir adverse effects are minor. At the dam spillway the adverse effects are more than minor.	Ongoing improvements, plus fish trap and transfer
Aesthetic values (Section 6.7)	– Adverse effects are more than minor	Improve water quality through backfeed management or aeration of the reservoir, and increase minimum flows
Maori cultural values (Section 6.8)	– Reduced mauri of the awa	Improve water quality through backfeed management or aeration of the reservoir, and increase minimum flows. Implement fish passage improvements
Historic heritage (Section 6.9)	– Less than minor	---
Recreational values (Section 6.10)	– Less than minor + Some positive	Improve water quality and minimum flows. Potential annual release of trout into lower Maitai River
Network utilities (Section 6.11)	– Less than minor	---
Public safety (Section 6.12)	– Less than minor	Monitoring and reporting
Positive effects (Section 6.13)	+ Significant	---

- 10.5. Many of the actual and potential adverse effects involve biophysical complexities that complicate this assessment. The Cawthron assessment letter in **Attachment N** predicts how the proposed changes to the operation of the system will influence water quality in the River and the Reservoir.

Relevant provisions

- 10.6. With reference to Section 7 of this assessment and the summary provided in section 7.6, this application is considered to be entirely consistent with the relevant provisions of the various planning documents.
- 10.7. The planning framework sets up a flow regime for the Maitai which sets aside water above the minimum flow for public water supply. This application seeks to take water well within what is expected and anticipated by the NRMP (and NRPS). In

recognition of likely increased water demands from population growth, the NRMP also openly expects the opportunities to leave more water in the river will reduce. However, there is also a trend toward reduced demand per household and Council is actively seeking to encourage efficient water use.

- 10.8. In terms of water quality provisions, it is appropriate that the extant adverse effects on the South Branch be mitigated. Cawthron has identified what it considers to be the best practicable means of mitigating these adverse effects and some of these have been volunteered by the applicant. Others (such as reservoir mixing or hypolimnetic aeration) may be appropriate but will require more detailed assessment and Council funding. As such, this proposal is considered to be generally consistent with the relevant water quality provisions.

Value of the investment

- 10.9. The community has a considerable financial investment in Maitai Water Supply Scheme. The value of the Maitai Scheme alone exceeds \$20,000,000.00 excluding the Treatment Plant (\$13,000,000.00), and supply pipelines. This system now serves as a 'lifeline' service to the community and so is essential in terms of health and well-being.
- 10.10. The Resource Management Act 1991 specifically recognises the 'value of the investment' as a relevant factor in the consideration and determination of resource consent applications. The local planning documents also recognise the need for the Council to be able to operate these systems efficiently for the benefit of the community for funds their operation and eventual replacement.

Importance of the activity for public water supply

- 10.11. The Maitai (and Roding) water supply scheme is a significant and essential activity that provides for the social, economic and cultural well-being of the people of Nelson. This scheme is managed to provide an affordable reticulated public water supply throughout the year, serving around 19,000 households, the local economy, and a wide range of community facilities and organisations. The significance of this water supply will only increase as time goes by and population increases.
- 10.12. The importance of the activity is highlighted in the NRPS and NRMP. Through these documents, Maitai water (using the flow regime) has essentially been set aside / allocated for public water supply.
- 10.13. The use of the designation process for this network utility is another example of this significance. Indeed, DO14 of the NRMP seeks to enable the efficient use of network utilities given the *essential support* they provide to the community.

Section 107

- 10.14. A full copy of Section 107 is provided in Section 4 of this application. To paraphrase Section 107(1), a consent authority shall not grant consent to the discharge of contaminants or water into water, if, after reasonable mixing, this will give rise to the following listed adverse effects:

- (c) *the production of any conspicuous oil or grease films, scums or foams, or floatable or suspended materials:*
- (d) *any conspicuous change in the colour or visual clarity:*
- (e) *any emission of objectionable odour:*

- (f) the rendering of fresh water unsuitable for consumption by farm animals:
- (g) any significant adverse effects on aquatic life.

- 10.15. As set out in this application, the adverse effects that are currently being experienced in the South Branch below the backfeed have been assessed by Cawthron with recommendations for mitigation. The applicant has committed to backfeed management and an investigation into destratification or aeration options in direct response to these Cawthron recommendations.
- 10.16. The extent of effects arising as a result of the discharge is explained in Section 6 of this application and in detail in the Cawthron Report 2810 (**Attachment I**). Specific expert information and advice on the improvements that are expected as a result of principle mitigation measures are provided in the Cawthron Letter 1620 (**Attachment N**). Backfeed management will provide a medium probability of achieving the B standard for some parameters. Destratification or hypolimnetic aeration will result in a higher likelihood of meeting the Class B standard, and for a wider range of parameters.
- 10.17. Section 107(2) then provides the opportunity for consent to be granted for effects described in subsection (1) if the consent authority is satisfied:
- (a) That exceptional circumstances justify the granting of the permit; or
 - (b) That the discharge is of a temporary nature; or
 - (c) That the discharge is associated with necessary maintenance work.
- 10.18. Subsection (b) does not apply as the backfeed discharge is permanent, albeit intermittent. Subsection (c) is not relevant.
- 10.19. In terms of subsection (a), the Commissioners Decision is granting RM025121, and indeed RM960396, provides relevant context:

8. There is one issue of particular concern arising out of the applications to which I now wish to refer. That arises out of the provisions of Section 107 RMA which provides (in summary):

...

9. Consideration of the provisions of Section 107 is mandatory in this instance because it is apparent from the application papers that there is an impact on the colour or visual clarity of the river water arising as a result of discharge of spillway water into the South Branch. The application acknowledged that under some circumstances this discharge can result in a conspicuous change to the colour or clarity of the South Branch below the discharge point. That issue was raised at the time of hearing of consent RC960396. The Council commissioned Cawthron Institute to undertake investigation of the effects of the discharge (Stark & Hayes 1997) and that report was considered by Commissioner Fowler prior to issue of consent RC960396. At that time the Commissioner concluded that exceptional circumstances existed which enabled issue of the consent notwithstanding its effects. In considering these applications I took the view that I was obliged to readdress the issue of section 107 and could not simply rely upon the finding of the earlier Commissioner. I accordingly requested that Council forward a copy of the Stark & Hayes report to me and I have taken the opportunity of reading that report. Having done so I accept the conclusions and recommendations of that report and in particular the final paragraph which provides:

“We consider that under Section 107(2)(a) of the RMA, there are exceptional circumstances to allow the granting of a consent permitting a conspicuous change to colour and clarity in the Maitai River. These include the fact that influence of reservoir water on the colour and clarity of the river downstream is a direct consequence of the decision to permit the dam to be built in the first place. Furthermore, the discharge is of natural substances, does not appear to

have significant adverse consequences for freshwater life, and any slight negative impacts of reduced water clarity are more than compensated for by the increased flows provided via the backfeed”.

*I accordingly determine that exceptional circumstances exist which allow the relevant water permits to be granted pursuant to the provisions of Section 107(2)(a) RMA. (RM025121, paragraphs 8-9, pages 4-5, refer to **Attachment R, emphasis added**)*

- 10.20. Hence, following the same logic as that used in the grant of RM960396 and RM025121, exceptional circumstances are considered to be available. It is the quality of the dam water that causes the adverse effects on the water quality below the backfeed.
- 10.21. In contrast to the assessment of Cawthron in 1997 (quoted above), Cawthron has identified that there are some significant adverse effects on the South Branch (below the weir) that have emerged. These are still attributed to the backfeed discharge and the quality and characteristics of the North Branch water in flow. Special circumstances therefore remain and are available when it comes to section 104(3)(c)(i). Despite this, the applicant has committed to a range of best practicable options to improve water quality and ecological health. Some of these options can and will be implemented quickly, while others will require further investigation.
- 10.22. In conclusion, this application is considered to achieve the sustainable management of natural and physical resources as set out in Part 2.