

BEFORE THE CANTERBURY REGIONAL COUNCIL AND ASHBURTON DISTRICT COUNCIL

IN THE MATTER OF the Resource Management Act 1991

AND

IN THE MATTER OF five resource consent applications filed by **Rangitata Diversion Race Management Limited** under section 88 of the RMA in relation to:

CRC170651 for earthworks

CRC170652 for earthworks

CRC170653 to disturb and remove vegetation from river

CRC170654 to abstract water

CRC170655 to take and use surface water

CRC170656 to take ground water

CRC170657 to dam water

CRC170658 to discharge dust to air

CRC170659 to discharge contaminants to air

CRC170660 to discharge contaminants to land

CRC170661 to discharge water and sediment to river

CRC170662 to discharge water and sediment to river

CRC182535 to discharge water and sediment to river

CRC182536 for a non-consumptive take of water

CRC182537 to disturb the bed of a river for construction

CRC182538 to discharge sediment to river

CRC182539 to extract gravel

CRC182540 to use land for earthworks

CRC182541 for the emergency discharge of water to river

CRC182542 to change conditions of consent

CRC182630 to use water for storage

CRC182631 to use water under consent for storage, irrigation and stock water purposes and to generate electricity

CRC184147 to dam water

LUC16/0067 to construct and operate a water storage facility including new spillway and sluicing channel

LUC17/0122 to construct and operate a mechanical rotary fish screen

REPORT AND DECISION OF HEARING COMMISSIONERS

PAUL ROGERS (CHAIR), YVETTE COUCH-LEWIS AND GREG BURRELL

Dated 6 July 2018

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1 INTRODUCTION

- 1.1 Paul Rogers (Chair), Yvette Couch-Lewis and Greg Burrell were appointed as independent hearing commissioners by the Canterbury Regional Council (CRC) and Ashburton District Council (ADC) under section 34A(1) of the Resource Management Act 1991 (RMA) to decide on multiple applications by Rangitata Diversion Race Management Limited (RDRML). This decision sets out our findings on the applications, focusing on the principal issues in contention and the reasons for our decision.
- 1.2 In addition to the evidence and submissions provided by RDRML, submitters at the hearing, and the Section 42A Reports of Mr Nick Boyes and Ms Natalia Ford (Section 42A Reports) we record that we have all read and taken full account of the application documents, including the Assessment of Environmental Effects (AEE) forming part of the applications and all of the written submissions. Although not every witness and submission is referred to in our decision, this does not mean that they have not been considered, simply that we have endeavoured to focus on issues we have identified as “key” and, where possible, avoid repetition in our decision.
- 1.3 In accordance with section 113(3) RMA, we have also cross-referenced, footnoted and adopted parts of the AEE, the Section 42A Reports, and written evidence throughout this decision as appropriate.
- 1.4 To assist the reader, we have attached at **Appendix 1**, a list of the acronyms and abbreviations used throughout this decision.
- 1.5 To further assist the reader, we note that the proposal (as described in detail at paragraph 4 of this decision) involves many individual applications seeking resource consents for activities from both the CRC, primarily to do with taking and using of water and a range of discharge consents, and two land use consents from ADC both relating largely to construction activities.
- 1.6 RDRML have adopted an approach of both seeking consents for the full proposal or alternatively seeking consents for some of the individual component parts of the proposal, for example the proposed fish screen.
- 1.7 RDRML have intimated we may conclude that a consent for the water take is appropriate on a flow sharing basis. A further option is that RDRML have signalled staging of the storage facility (described in greater detail at 4.9) as an option.
- 1.8 While we acknowledge staging within the decision, the approach we have taken to assess the effects is to consider the entire proposal. We consider this provides us with a worst case scenario in terms of assessing those effects.
- 1.9 RDRML confirmed¹ subject to this decision, parts or elements of the proposal will proceed irrespective of the outcome for the full proposal. Those parts are the fish screen and related canal modifications including a new fish bypass.
- 1.10 Also for the sake of clarity we record that the Application provides that all other aspects of the proposal such as the proposed white water

¹ Ms Hamm, Reply Legal submissions paragraphs 121-125 page 29.

course (WWC), the construction of the proposed Fish Screen, the establishment of formal and legal pedestrian access from the river end of the existing Shepherds Bush Road to the Rangitata River and the ecological refuge would all proceed as part of the first stage.

- 1.11 The approach we have adopted to our decision is to keep a full proposal perspective in mind, while at the same time focusing on the matters in contention. What this means for our decision is that we focus on the issues we consider to be in contention arising from the water take, the use of water, water storage, construction and the Fish Screen and to a lesser extent issues arising related to terrestrial ecology.
- 1.12 Our focus on each component of the proposal includes identification of the principal and relevant issues enabling a consideration of effects of the activity on the environment, allowing for appropriate conditions to avoid, remedy or mitigate those effects, and a consideration of the provisions of the planning documents that are engaged by each component. This is effectively our section 104 and section 104D assessment and findings.
- 1.13 While focusing on each component we endeavour to identify, by reference to identifier numbers, the relevant resource consent application. This means that not all of the resource consent applications will be mentioned. We have nevertheless considered all of the resource consent applications before us.
- 1.14 We then draw on the conclusions of our considerations of the component parts to determine whether or not the entire proposal or some amended form of it, allowing for conditions, is in accord with the purpose of the RMA and so deserving of consent. We undertake this step toward the end of this decision. This is effectively our Part 2 RMA consideration and findings.
- 1.15 We provide early in the decision (see paragraph 4) a comprehensive description of the full proposal to ensure there is no doubt this decision is considering and determining the entire proposal.
- 1.16 Additionally, early in the decision we provide our view as to the existing environment. This enables us to better consider the effects on the environment if consents are granted, which is particularly important in the context of the water take.
- 1.17 RDRML lodged with both CRC and ADC two suites of applications. Dealing first with CRC - suite 1 of the CRC applications included a fish screen component consisting of a permeable rock bund and infiltration described as the rock bund screen. Suite 1 also included the additional abstraction of 10 m³ per second of flood flow water, the construction and operation of the storage dam plus a new spillway sluice channel back to the Rangitata River, construction and operation of a WWC realignment of Shepherd's Bush Road as well as some modifications to intersections on expected transportation routes for vehicles involved in the construction the creation of the ecological refuge.
- 1.18 It was noted that a further consent was required because the modified canal included a damning activity. CRC determined it was appropriate to add this activity to suite 1 so application CRC 184147 was added but notification did not occur.

- 1.19 We record that RDRML sought consent for the discharge to air of dust from construction activities under CRC170658. Since making application the Canterbury Air Regional Plan has been made fully operative as at October 2017 and the relevant rules changed so that this activity is now permitted. We cannot grant a consent for an activity that is permitted so we will not consider CRC170658 any further.
- 1.20 Suite two resulted from further consideration research undertaken by RDRML relating to an alternative fish screen design to the rock bund screen namely the rotary drum screen. Changing the fish screen necessitated a new resource consent application.
- 1.21 Adopting a new fish screen required an additional take of some 5 m³ per second from the Rangitata River to enable the efficiency of sediment removal and aid safe fish return passage. This additional take is directly linked to the operation of the rotary drum fish screen and will be discharged back into the Rangitata River via the fish return approximately 850 metres from the existing intake.
- 1.22 This take is in addition to the existing consented water take (CRC 011237). So suite two includes a proposal relating to the alternative replacement fish screen, the rotary fish screen associated with the operation of the Rangitata diversion race. In addition suite 2 includes discharge of water and sediment to the Rangitata River associated with the emergency discharge from the proposed storage dam and finally the use of water in the RDR canal and the amendment of existing consent CRC 11237 to remove the requirement for the existing bio acoustic fish fence (BAFF).
- 1.23 Turning to the ADC consent applications. Both suites are land use consents to construct, operate and maintain a new irrigation water storage facility called the Klondyke Storage Facility (KSF). The second of the two ADC consent applications also stems from changes made to the fish screen included in the first application as with the CRC consents.
- 1.24 The design of the rotary fish screen necessitated a change and the location of the screen and the bypass channel. Therefore the second consent (LUC 17/0122) was notified and is being heard together with the original application (LUC 16/0067) while the second application states that it is supplementary to rather than replacing the original application is we are approaching the issue of the fish screen on the basis that only one of the fish screen proposals will be consented.
- 1.25 This decision addresses and determines the combined proposal that is Suite one and two together but on the understanding the rotary drum fish screen application is replacing the rock bund fish screen.

2 DECISION OUTCOME

- 2.1 For reasons contained in this decision with the exception of CRC170661 which RDRML withdrew and CRC182630 which we have declined, we have decided to GRANT consents for the RDRML proposal, subject to the conditions discussed throughout this decision and attached as Appendix 4 to 23 of this decision.

3 PRELIMINARY PROCEDURAL AND LEGAL ISSUES

Procedural Issues

- 3.1 The first issue we wish to address is the death of Ms Mandy Waaka-Home, an expert witness on kaitiakitanga for Te Rūnanga o Arowhenua (TRoA) who sadly passed away during the course of the hearing. Ms Waaka-Home's tangi was held on 27 April 2018 and it was requested of the Panel that no cultural evidence be heard on this day. TRoA submitted on behalf of Ms Waaka-Home, seeking that her evidence be accepted and taken as read by the Panel. The Panel were informed that representatives of TRoA would attend the hearing to answer any questions on Ms Waaka-Home's evidence.
- 3.2 We agreed to both requests receiving verbal submissions from TRoA representatives later during the hearing.
- 3.3 Kiwi Rail and New Zealand Transport Authority (NZTA) sought to lodge submissions out of time. Those applications were not opposed by RDRML and were duly granted.
- 3.4 Rangitata Water Limited (RWL) raised two procedural issues. RWL contended the application is incomplete as it does not include the ability to store water taken under RDRML's existing consents or the ability to increase the frequency of discharges from RDRML's existing sand trap. In relation to the storage issue RDRML did lodge an additional resource consent in November 2017 which was publicly notified on January 2018 (CRC 182630). In any event the position adopted by CRC as evidenced in Ms Ford's Section 42A Report was that a resource consent for the use of water storage is not required. For reasons we will later explain we agree. Therefore RWL's first procedural issue is resolved.
- 3.5 Mr David Greaves (planner for RDRML) formed the opinion that the operation of the sand trap under CRC 011241, an existing RDRML consent, will not alter beyond the constraints of the existing consented level as a result of the proposal. Mr Greaves explained this is because the sand trap is manually operated and as such the volume of water discharged, the duration of each discharge and the frequency of discharges are able to be managed to remain within the restrictions imposed by the existing resource consent.
- 3.6 It was Mr Greaves' opinion which we accept that there are no amendments or additional resource consents associated with the sand trap required in order to give effect to the proposal. We understood from his evidence that he raised this matter directly with CRC and as far as we understand it CRC has no issue with Mr Greaves' opinion on the matter. This resolves the second RWL procedural issue.
- 3.7 At the hearing Mr John Ell made an application for adjournment of the hearing based on the following reasons:
- (a) That it was not possible for the hearing to proceed because RDRML were in breach of the Rangitata River Water Conservation Order (WCO) and did not have an effective fish screen in place;
 - (b) Given that RDRML were in breach of this order it was not entitled to have this application heard; and

- (c) Continuing with the hearing effectively legitimises RDRML's illegal abstraction of water.
- 3.8 At the hearing we declined Mr Ell's application providing reasons and explained that reasons would be provided in a fuller form in this decision. Those reasons are as follows:
- (a) An application of this nature should have been submitted at an earlier date, prior to commencement of the hearing to avoid delay and prejudice to participants;
 - (b) This hearing was lawful and able to proceed and a proper process had been undertaken including public consultation, public notification and hearing;
 - (c) The issue of whether the existing fish screen satisfied the requirements of the WCO is a matter to do with enforcement. That is a matter for CRC to address and not this Panel;
 - (d) In any event adjournment at this time would have placed both unfair and unreasonable prejudice on the parties and would serve no useful purpose; and
 - (e) We were satisfied that there was sufficient evidence for the hearing to continue.
- 3.9 On 14 June 2018 we received a memorandum of counsel for the Early Family Trust withdrawing the two Early Family Trust submissions on the basis an agreement had been reached with RDRML. We were also advised that the Early Family Trust would be providing RDRML with written approval to the applications which are currently before CRC and ADC.
- 3.10 Prior to the hearing we issued prehearing directions which included circulation of expert evidence and directions for expert witnesses to caucus. RDRML experts, Section 42A Reporting Officers' experts and submitter experts caucused. The results of that caucusing lead to many joint witness statements between those experts. That outcome certainly assisted the hearing, our deliberations and decision writing because it narrowed the principal issues in contention.
- 3.11 While we return to conditions later we note at the commencement of the hearing RDRML presented a condition set in draft form. We made it clear circulation of draft conditions or indeed conversations or questions arising during the hearing were expected to occur but should not be seen as predetermining the outcome. Rather given the importance of conditions all parties should take the opportunity to comment upon them. We signalled we would find such comments of assistance.
- 3.12 As the hearing progressed we were informed by RDRML from time to time that discussions were occurring on the conditions with hearing participants. Toward the conclusion of RDRML's presentation at the hearing and also accompanying the written reply, we received updated further amended conditions sets. We utilised those sets particularly when the Section 42A Reporting Officers presented their views following on from hearing RDRML and submitters.
- 3.13 Following the hearing we issued further directions seeking further exchanges between participants in relation to the conditions. In the

main those exchanges did occur as directed. However some lay submitters expressed difficulty in complying with those directions due to time and the complexity of the conditions. Ultimately after some extensions a condition set inclusive of mark ups which detailed some exchanges between participants was provided to us.

- 3.14 We observe the specialist Section 42A Reporting Officers were engaged in discussions relating to conditions throughout the hearing and as directed by us following the hearing. So the final condition set provided to us, has, we consider, undergone a thorough process allowing for review and reconsideration by the hearing participants. Ultimately we were left with some decisions to make on conditions which are set out in the condition Appendices attached to this decision.
- 3.15 The only other preliminary matter to note and it is important is that, RDRML recorded formally in opening it was withdrawing CRC170661 being an application to discharge water and sediment from the KSF to the Rangitata River via a sluicing channel. The potential effects of this application along with the potential effects of the water take application resulted in Ms Ford recommending that consent for these two applications be declined.

Legal Issues

- 3.1 In addition to the preliminary issues outlined above, a number of legal issues arose which we address here.

Is resource consent required for the use of water for storage?

- 3.2 RDRML included an application to take water for storage (CRC182630) in their second suite of consent applications. In her S42A Officer Report, Ms Ford stated that there was uncertainty whether consent was required for this activity and RDRML cautiously submitted an application. CRC subsequently determined through legal advice² that the 'storage' is not a use of water but is 'damming', which is covered under application CRC170657. Ms Ford further stated that because storage cannot be considered a 'use' of water, section 14 of the RMA does not apply and that consent cannot be issued for this activity.
- 3.3 Ms Hamm noted that CRC has previously issued resource consents that included the use of water for storage, which infer that resource consent is required for the use of water for storage³. These include CRC151133 for Opuha Water Limited to "divert, take and use water", where the consent conditions state that water shall only be used for irrigation or storage. Also the S42A Officer Report and CRC decision granting consents to Barrhill Chertsey Irrigation Limited for a 1.6Mm³ storage pond (decision 1 September 2017) suggest that a consent for the use of water for storage was needed but not sought (it would be sought at a later stage). Accordingly, RDRML applied for CRC182630 to use water for storage, to err on the side of caution.
- 3.4 However, Ms Hamm concluded that

"The impounding of water is the same as storing water. For that reason, storing of water in a dam (or storage facility) is the activity of damming. It is not a use. In contrast, the uses which s 14 of the

² Ms Ford, CRC Section 42A Report, paragraph 32.

³ Ms Hamm, Opening Legal Submission, paragraphs 71-85.

RMA looks to regulate, are the 'end' uses of water such as irrigation, hydro-electricity generation, stock water, municipal water supply etc."

- 3.5 She noted that CRC agreed that consent was not required and that if we agreed with her analysis, then the consent application for the use of water can be declined.
- 3.6 Ms Prudence Steven QC, legal counsel for RWL, strongly opposed the above views. It was Ms Steven QC's opinion that RDRML and S42A Reporting Officer had an unduly narrow view of what is captured under section 14 of the RMA⁴. She stated that the use of water for storage as an intermediary prior to its subsequent use for irrigation was no less a use of water than putting water in bottles, to be ultimately consumed by humans. In particular, Ms Steven QC opined that the narrow view overlooks Policy 4.53 of the Land and Water Regional Plan (LWRP), which specifically deals with conversion of run-of-river takes to storage.
- 3.7 Policy 4.53 of the LWRP states: "*Any change to a resource consent to abstract surface water for irrigation as a "run-of-river" take to a "take to storage", is subject to the following conditions to mitigate any adverse effects...*"
- 3.8 Ms Steven QC's argument is that if CRC and RDRML are correct that no consent is required for storage, then Policy 4.53 would be redundant, if not ultra vires.
- 3.9 However, we note that the proposed water take consent (CRC170654) and dam consent (CRC170657) include extensive conditions of direct relevance to Policy 4.53, particularly in relation to avoiding adverse environmental effects.

Findings regarding the requirement for consent to use water for storage

- 3.10 In considering the above arguments, we conclude that consent CRC182630 to use water for storage is not required. That is because consent to store water does not provide any additional environmental safeguards or certainty regarding the use of water than those already afforded by proposed water take CRC170654 and dam consent CRC170657. These other applications already address relevant provisions in the RMA and LWRP in relation to avoiding adverse effects.

Derogation issue

- 3.11 In opening, Ms Vanessa Hamm addressed RWL's submission on derogation. The issue of derogation arose because RWL contended water that should be available to RWL under a water sharing consent (CRC134810) and a water exchange agreement with RDRML, will no longer be available if RDRML applications are approved.
- 3.12 RWL's reason for this is because water will go into storage at the KSF and will no longer be available to RWL. According to Ms Steven QC for RWL approving water storage pursuant to the proposal will result in a derogation of RWL's water exchange consent. Further, Ms Steven QC considered the relevant context against which to understand RWL's consented position was to see RDRML's scheme as a run of river scheme with no storage.

⁴ Ms Steven QC, Legal Submission dated 2 May 2018, paragraphs 38-46.

Approach

- 3.13 To address this issue we need to first understand what RWL's consented position actually is and then determine whether or not what RDRML proposes would amount to some form of derogation of RWL's consented position. We use derogation to mean to 'modify' RWL's consented position to make it inferior or to reduce it in some way.

Relevant background and submissions.

- 3.14 Ms Hamm, in opening, first provided her view of the factual background. She informed us that both RDRML and RWL hold their own resource consents for the take and use of water for irrigation in relation to the Rangitata River. Both sets of consents are subject to usage limits which restrict the volume of water which may be taken. She informed us there is a water exchange agreement dated 14 August 2013 in place between them both. She advised under that agreement both parties agreed to apply for consents to permit them to offer each other any unused allowances under their own consents.
- 3.15 Essentially under that agreement, Ms Hamm advised, if either party entirely ceased using its own allocation it agreed to offer the complete volume to the other. However she said under the agreement this reallocation can be terminated at any time. She further advised that if either party used less than its total allocation it agreed to offer the remaining balance to the other party where practicable. Again she advised that this allocation can be terminated at any time by giving 10 days' notice to the other party. We did not understand either Ms Steven QC's submissions or the evidence of Mr Rooney to differ from Ms Hamm on these points.
- 3.16 Ms Hamm confirmed both RDRML and RWL obtained resource consents CRC 134808 and CRC 134810 (water exchange consents) which permitted each party to use any allocation which the other was entitled to take. She noted that these consents did not contain any requirement that either party offer their allocation to the other, nor did it require either party to use less than its total allocation. However she noted each consent was conditional on the use of any take being within the usage allowed by the prior consents.
- 3.17 Ms Hamm further advised us that since the water sharing agreement had been entered into, RDRML had made water available to RWL, about two thirds of which had been made available when the Rangitata Diversion Race (RDR) was fully shut down and one third when it had been taking part of its allocation. She observed that in the future if the KSF is not built water will still be available to RWL when the RDR is fully shut down. However she said there is no guarantee that partial water will continue to be available and it is expected to decline for a number of reasons, primarily scheme expansion and storage.
- 3.18 As to the current RDRML scheme being seen as a run of river scheme Ms Hamm strongly rejected this claim. First she noted RDRML's resource consents enable it to take water all year round. She noted that during the irrigation season if irrigation demand is met then water goes to hydro electricity generation. She noted that during the winter water also goes to hydro electricity generation, so in the absence of the flood flow take there is no fundamental change.

- 3.19 Even if storage is provided, she advised, that when the RDR is fully shut down, all RDR water will still be available to RWL, which water she said, accounts for most of the water RWL has received to date. Mr Ben Curry for RDRML confirmed this in his evidence.
- 3.20 Ms Steven QC for RWL submitted that prior to these applications RDRML consent (CRC 011237) was a "run of river" consent. Therefore RDRML could not practically use its entire allocation of water. She submitted if that water could not physically be taken by RDRML it would remain in the river thus being available to be taken by RWL under the new water exchange consents. However with water storage it would not be available for RWL.
- 3.21 Further, she said the water sharing agreement and water sharing consents had to be understood in the run of river context applying at the time the agreements were entered into (August 2013) and when the water sharing consents were granted (2017) which date she observed was prior to lodgement of RDRML's current proposal.
- 3.22 Expanding this submission she submitted that the parties' respective rights under the water exchange agreement were subsequently converted into statutory rights with the grant of the water exchange resource consent to each of the parties. She further submitted that the water exchange agreement does not contemplate RDRML amending its run of river scheme to a water storage scheme. Ms Steven QC presented in evidence copies of the application for consent CRC 134810, copies of the consent details and finally a copy of the water exchange agreement.

Consideration

- 3.23 A critical part of Ms Steven QC's submission was that the original RDRML resource consent was a run of river consent. The important point emerging was that if RDRML for whatever reason did not make use of its water allocation it would remain in the river and thus available for RWL.
- 3.24 In the absence of this flood flow application there is no fundamental change. In other words RDRML has available to it a water allocation which it can use all year round and it does so. For these reasons we prefer Ms Hamm's view that the original consents are not restricted to run of river consents.
- 3.25 However we think the actual applications for and the conditions of the grant of water exchange consents are much more critical to the derogation issue than deciding if current RDRML consents are "run of river" or not.
- 3.26 The applications for the water exchange consents, prepared by Pattle Delamore Partners (PDP) included in evidence by Mr Rooney for RWL, clearly states that the application is strictly for two subservient resource consents to take and use water because RDRML already held a consent for the same water allocation.
- 3.27 The AEE further states that the water exchange consents are to take the others water when they are not using it. Words to that effect are set out in section 3.0 and section 7.6 of the AEE. This is important because it sets the scope or provides a limitation on these water exchange

consents. The water is only available to RWL under the water exchange consents when RDRML is not using it and when RDRML makes water available to RWL. So in its own terms the water exchange consent is constrained.

- 3.28 Ms Steven QC, when we were discussing the PDP application with her, agreed that section 3.0 of the application discusses filling storage reservoirs. So in any event at the time that these water sharing consents were being applied for the possibility of RDRML applying for water storage was a live issue. In other words the applications were being made with knowledge of storage for RDRML being a possibility with the likely consequence water would no longer be available for RWL. This circumstance reinforces, we think the key point that water is only available to RWL if RDRML does not wish to use it.
- 3.29 We agree with Ms Hamm that it was never open to the consent authority to restrict RDRML's use of water pursuant to its original resource consents and furthermore the water exchange consents could not, and in their own terms, do not do this.
- 3.30 We have also considered the water exchange agreement. Our view of that agreement is consistent with the submissions made by Ms Hamm. The water exchange agreement clearly provides the agreement can be terminated. So if RDRML does in fact terminate the agreement then notwithstanding RWL holds these water exchange consents it will not be able to utilise them without RDRML's agreement.
- 3.31 Further the agreement provides that water is only available to RWL if RDRML first decides it does not want to use water that is allocated to it under its original consent. The choice and decision is for RDRML to make. We do not interpret the water exchange agreement or the water exchange consents as some form of unconditional transfer or assignment of RDRML's allocation of water under its original consents to RWL.
- 3.32 In any event, based on our questions, Ms Steven QC accepted that if we agree with RDRML's proposition that a resource consent for storage as a use is not required then the derogation argument would fall away leaving only the reasonable use argument. We have reached the view a resource consent for storage is not required. So this is another reason why we do not agree with Ms Steven QC's submissions on the derogation issue.

Findings on derogation issue

- 3.33 So in the end we consider Ms Steven QC's argument on derogation fails because the application for the water exchange consents explicitly recognises that those consents are subservient to the original consent held by RDRML.
- 3.34 Second the terms of the water exchange agreement are clear. RDRML has not agreed to transfer or assign any water available it has it simply agreed to make available water that it does not wish to use. This is a choice for RDRML to make.
- 3.35 Third if RDRML wishes to use water for storage in our view that is recognised in the water exchange agreement, the application for the water exchange consents and the water exchange consents themselves.

Fourthly the water exchange agreement can be terminated and if it is terminated RWL notwithstanding it holds a water exchange consent would have no rights to access water allocated to RDRML as there would be no agreement allowing for that access. Finally as Ms Steven accepted if we find a storage consent is not required, which we have, her argument on derogation falls away.

- 3.36 So against this finding of RWL having a limited of condition interest in the RDRML water we conclude that the effect of the current applications on RWL rights does not amount to a derogation of them.

4 DESCRIPTION OF THE PROPOSAL

- 4.1 The notified proposal requires twenty one consents from CRC and two from ADC. The resource consents seek to authorise the entire proposal. RDRML has provided a detailed description of the proposal within the Application.⁵ We adopt that information provided in the Application and provide the following summary.

Abstraction from the Rangitata River

- 4.2 RDRML is proposing to abstract an additional 10 cubic metres per second (cumecs) of water from the Rangitata River into the RDR. The full 10 cumecs of water is to be taken at flows in the Rangitata River exceeding 142.6 cumecs. At river flows between 132.6 and 142.6 cumecs, water can be abstracted provided it does not drop river flows below 132.6 cumecs. No water is to be abstracted when river flows are below 132.6 cumecs.
- 4.3 As a result of the proposed abstraction, RDRML will be required to undertake deepening and widening works on the canals between the Klondyke take point and the proposed KSF. These works and activities are described in detail below.

The Use of Water

- 4.4 The relevant application for the use is CRC182631. The intended use of the water is for storage, irrigation and stock water purposes, and to generate electricity at Montalto and Highbank Power Stations.
- 4.5 RDRML explained that the proposed flood flow take enhances the security of supply provided by the KSF by reducing the pond footprint as 'refill' of the pond is enabled more quickly and more regularly. For example, 22Mm³ of storage is required to meet reliability demands based on current application rates. With the proposed flood flow take, only 14Mm³ of storage need to be built to deliver the same reliability target.⁶
- 4.6 RDRML further explained that the flood flow take will also help manage against the impact of climate change and the increase in minimum flows in the Ashburton River.⁷
- 4.7 Looking forward, the flood flow take would also give RDRML the ability to use the water for other purposes, such as irrigation outside of the RDRML area, Targeted Steam Augmentation (TSA) and Managed Aquifer

⁵ Lake Klondyke: A Proposed Water Storage Facility July 2016 Section 1.5 Pages 9-25.

⁶ Mr Veendrick, Evidence in chief, at 7.13 and Table 4

⁷ Mr Veendrick, Evidence in chief, at 10.4

Recharge (MAR) (although RDRML acknowledges further resource consents would be required for these activities) and to convert to an irrigation application rate that is closer to peak evapotranspiration rates.⁸

- 4.8 Finally, as the flood flow take reduces the volume of storage required to achieve reliability of supply, the flood flow take will increase the economic efficiency of the development and the cost of the facility construction.

The Klondyke Storage Facility

- 4.9 RDRML is proposing to build a large-scale water storage dam which we describe as the KSF capable of impounding up to 53 Mm³ of water. Approximately 700,000 m³ of this water will be 'dead storage' and therefore not able to be conveyed out of the KSF. It is likely that the KSF will be built over a period of five years. The KSF is located at 906 Shepherds Bush Road, Ashburton.
- 4.10 The KSF will have the following attributes:
- (a) The KSF structure, including embankments, will extend over 286 hectares;
 - (b) The KSF itself will likely take up 245 hectares;
 - (c) The highest embankments will be a maximum of 30.5 metres above the existing ground level (southern embankment); and
 - (d) The KSF will be lined with a geo-synthetic liner to minimise water loss via seepage.
- 4.11 Approximately 11,000,000 m³ of earthworks will be required to construct the KSF. Only 1,000,000 m³ will need to be disposed of as a result of the creation of the KSF.
- 4.12 Approximately 12,000 to 31,000 tonnes of sediment could be expected to accumulate in the KSF each year, which will be retained within the KSF.
- 4.13 Approximately 130,000 m³ of rock 'rip-rap' will protect the upper portion of all embankments from wave action. The 'rip-rap' will be 1.4 metres thick.
- 4.14 The toe of the KSF will be set back at least 100 metres from the edge of the terrace associated with the Rangitata River to ensure that the KSF embankments are not threatened by potential erosion.
- 4.15 The RDR will be permanently diverted from its present alignment to allow for the installation of a new control gate which will regulate the flow between the RDR and the KSF. An ADC stock water race will be diverted permanently around the proposed KSF.
- 4.16 The main race of the Mayfield Hinds Irrigation Scheme (MHIS) will also be diverted around the northern and western boundaries of the storage dam whilst it is being constructed. This diversion will be maintained to

⁸ Mr Veendrick, Evidence in chief, at 7.16 and Table 4

ensure reliability of supply to users if there are issues with the KSF in the future.

- 4.17 The inlet from the RDR into the KSF intake area, Klondyke Terrace, will consist of the following structures:
- (a) A new control gate and bypass weir to regulate flow down the main race;
 - (b) A new control gate to regulate flow into the KSF;
 - (c) A new spillway and stilling basin to dissipate the energy from flows being discharged into the KSF from the RDR; and
 - (d) A new control gate to direct flows into the realigned MHIS main race during the construction of the KSF.
- 4.18 The above channels and outlets will be able to hold a volume of 40.7 cumecs.
- 4.19 In detail as a result of the proposed additional 10 cumec abstraction, RDRML proposes to undertake deepening and widening works on the canals between the take point and the proposed KSF. We refer to this as the 'canal modifications'. These works will result in earthworks taking place within an area of approximately 50,000m² (5 hectares). In addition, 10,000m³ of soil will need to be disposed of, with 24,000m³ of suitable fill being imported.
- 4.20 These proposed works will require several new flow control structures to be constructed in and adjacent to groundwater sources. Groundwater will therefore need to be extracted in order to lower the water table and allow for construction at depth. All extracted water will be treated in a settling pond to remove unwanted contaminants before being discharged back into a watercourse such as an irrigation canal.
- 4.21 As part of the dewatering, construction of the new control gate and bypass to regulate flow down the main race will require the diversion of the RDR through the left bank and construction of coffer dams within the RDR to keep water out of the active construction site. This will require temporary shutdown of the RDR for a period of one week for the initial division to be installed, and an additional one week to remove the diversion once construction is complete. We were told in practice the shutdown will be sufficient time to align with other maintenance and upgrade works on the RDR race.
- 4.22 In addition, the canal modifications will require three road bridges (referred to as Bridges 3, 4 and 5) that cross the RDR to be raised so that there is sufficient freeboard when the modified RDR is operating at full flow. The extent of the works is shown in the aerial photographs (identified as Figures 2, 3 and 4) within the ADC Section 42A Report.⁹
- 4.23 RDRML has proposed a sluicing outlet which will enable water and sediment to be discharged to a channel which then discharges to the Rangitata River. The outlet will include a stilling basin which will minimise erosion potential by dissipating excess water velocity.

⁹ Mr Boyes, ADC Section 42A Report, page 6.

- 4.24 An emergency discharge spillway has been proposed from the KSF to the channel which runs to the Rangitata River. The spillway would also include a stilling basin.
- 4.25 For the drop structure in the riverbed the concrete colour will be darkened with either an admixture or a surface coating, to achieve a mid-grey colour and reduce the visual impact of having a man-made structure within a natural environment.
- 4.26 The outlet works from the KSF feed into the downstream galley to return excess and scale water back to the river. The galley will be modified to carry these flows and the works will include construction of a channel down the gully, a drop structure and a river return channel.
- 4.27 The proposed works will require several new flow control structures to be constructed in and adjacent to groundwater sources. Groundwater will therefore need to be extracted in order to lower the water tables and allow for construction at depth.
- 4.28 All extracted water will be treated in a settling pond to remove unwanted contaminants before being discharged to ground.

Depots

- 4.29 Contractor's depots are shown on the plans attached to the Engineering Report prepared by MWH Limited dated July 2016 attached as Annexure 2 to the Application. The general site layout is shown in Figure 6 in the ADC Section 42A Report¹⁰.
- 4.30 The AEE document states that each depot will contain an array of buildings (all relocatable and temporary), a fenced compound, a vehicle parking area (which will be graded and metalled), a staff rest/lunch area, ablution facilities and areas where materials can be stored while they are waiting to be used on site. Depots 1 and 2 will also have defined fuel storage area(s) and a defined hazardous substances goods store.
- 4.31 If the decision is made to batch concrete on site, rather than to transport it to the site, the concreting batching plant will be accommodated in either, Depot 1 or Depot 2. The Application makes it clear that it will not be located in Depot 3, due to the proximity to the Rangitata River. Depot 3 will also be removed should a large flood be forecast, and only reinstated once the flood has passed.

Shepherds Bush Road realignment

- 4.32 As to Shepherds Bush Road, the proposed realignment is shown in Figure 1 of the ADC Section 42A Report¹¹. The construction of the KSF will require the relocation of Shepherds Bush Road from its present alignment. The proposed new alignment is approximately 650 metres to the south being nine metres from the toe of the proposed embankment.
- 4.33 The new road will be seven metres wide, contained in a 20 metre wide road reserve and will be approximately 2.4 kilometres in length. Roadside swales will be constructed to capture stormwater from the road.

¹⁰ Mr Boyes, ADC Section 42A Report, page 10.

¹¹ Mr Boyes, ADC Section 42A Report, page 5.

- 4.34 To enable vehicles to safely turn into the new alignment (both during and following the construction of the KSF), improvements are proposed to Ealing Montalto Road, where it will intersect with the new alignment (refer to Figure 8 of the ADC Section 42A Report¹²). This will include Ealing Montalto Road being widened (by up to three metres) for approximately 120 metres of its length. The Shepherds Bush Road alignment will cross three watercourses / components of the KSF, which will include the construction of new bridges.

New River Access

- 4.35 A locked gate is to be installed below the last bridge to prevent vehicular access to the riverbed. A small gravelled car park is to be constructed between the last two bridges as shown on Figure 9 in the ADC Section 42A Report¹³. The Application states that a formal easement is to be established that enables pedestrian access from the end of the new road alignment down to the Rangitata River. A ford in the discharge channel is being advanced as part of the proposal. This ford is designed to ensure that the owners of the lower terrace paddocks to the south of the discharge channel can continue to access their land.

Roading Modifications / Construction Traffic

- 4.36 As to the intersection modifications as part of the construction works, RDRML proposes to chip seal Montalto Road, between the existing end-of-seal 100 metres north of Moorhouse Road and the northern most site access to a width of 6.3 metres. This will provide a sealed pavement consistent with existing sealed widths on adjoining sections of Moorhouse Road.
- 4.37 An access to the construction site will be developed along the southern end of the KSF, off Ealing Montalto Road. As identified, the access road will act as a replacement to the inundated section of Shepherds Bush Road upon completion of construction. The construction access road is proposed to connect to Ealing Montalto Road, approximately 650 metres south of Shepherds Bush Road. As with the access on Montalto Road, the intersection of the new access on Ealing Montalto Road will be provided with widening of the access way to withstand heavy vehicle turning manoeuvres.
- 4.38 The Arundel Rakaia Gorge Road intersection with Ealing Montalto Road will have significant increases in heavy vehicle movements at a complex arterial/local road intersection during the construction of the KSF. Permanent truck warning signs on the Arundel Rakaia Gorge Road approaches to the intersection will be installed to inform motorists of the likelihood of crossing / turning trucks. The intersection at Moorhouse Road and Mayfield Klondyke Road will require treatment to allow drivers to safely turn right from the western Moorhouse Road approach.
- 4.39 The current Ealing Montalto Road and Shepherds Bush Road intersection would not suit westbound traffic approaching the site. It is proposed that the intersection layout is altered to make priorities between Moorhouse Road and Shepherds Bush Road clearer.

¹² Mr Boyes, ADC Section 42A Report, page 12.

¹³ Mr Boyes, ADC Section 42A Report, page 12.

- 4.40 Given the significant increases in heavy vehicle volumes on some of the surrounding roads, the construction has the potential to deteriorate road surface conditions. RDRML proposes that during construction the conditions of the roads to the west of Arundel Rakaia Gorge Road being used by heavy vehicles associated with construction are the subject of precondition surveys, monitored during the construction period and maintained as necessary.
- 4.41 RDRML acknowledges that temporary traffic management or semi-permanent traffic management solutions are required in several locations that will experience an increase in heavy vehicle movements during construction.

Landscape Planting

- 4.42 Replacement shelterbelt planting is proposed adjacent to both Montalto and Ealing Montalto Roads. A gap in the shelterbelts will accommodate views from Montalto Road over the less elevated parts of the KSF to the Tara Haa Range and Mount Peel.
- 4.43 In addition, two pockets of native planting will be established at both ends of the proposed embankment near Montalto Road, as indicated in Figure 10 in the ADC Section 42A Report¹⁴.
- 4.44 The native plantings will be made up of species such as flax, kowhai and cabbage trees, through to larger species. The total area of proposed planting is in the order of four hectares. Plans showing the respective plantings are contained within the Landscape Assessment, being attached as Annexure 2 to the AEE. Once established, all of the planting areas will be managed in accordance with an Ecological Refuge Planting and Management Plan ('ERPMP') that is to be developed by an appropriately qualified and independent landscape architect and administered by RDRML.

White Water Course

- 4.45 As part of the proposal, RDRML is proposing to install a "white-water course" (WWC) which will be downstream of the KSF (southwest corner of the KSF) and off-line from the MHIS main race. Being off-line allows the use of the WWC to be maximised. Flows from the WWC will be returned to the main race of the MHIS. The general layout of the proposed WWC is set out in Figure 7¹⁵ of the ADC Section 42A Report, taken from the Riley Consultants White Water Course Engineering Report attached as Annexure 2 to the original suite of applications lodged.
- 4.46 A standing wave and drop in zone will be created downstream of a control gate. This is the key feature of the WWC and is expected to attract swimmers, surfers, body boarders and kayakers.
- 4.47 A car park for up to forty vehicles will be provided in association with the WWC. As noted by Traffic Design Group Limited (TDG) in the Transportation Assessment (Annexure 2 to the original suite of applications), the car park will be informally marked. Toilet and changing facilities will be constructed adjacent to the car park and these will be confirmed during detailed design.

¹⁴ Mr Boyes, ADC Section 42A Report, page 15.

¹⁵ Mr Boyes, ADC Section 42A Report, page 11.

- 4.48 However, it is anticipated that there will be one male and one female toilet as well as associated changing areas for males and females. Each of the changing areas are expected to be no larger than 4m², and three metres in height.
- 4.49 In terms of earthworks, approximately 2,000m³ of stripped earth will be removed from the area nominated for the WWC during construction. It will be placed in one of the disposal areas associated with the formation of the KSF. Rock, concrete and reinforcing steel will be transported to the site to construct the WWC.

Fish Screen Replacement

- 4.50 RDRML is proposing to decommission and remove the existing fish screen which is located on the RDR intake. RDRML intends to proceed with a Mechanical Rotary Fish Screen, the layout will be as below in Figure 2 Layout of modified canal and fish bypass taken from AEE Figure 3 (dated November 2016 but submitted to CRC January 2018).
- 4.51 The design consists of nine 'units' comprising two 4,900 millimetre rotating drums with two millimetre stainless steel mesh or wedge wire. The end screen will be comprised of a travelling screen, which essentially is a mechanical screen that is installed vertically. The travelling screen is proposed to be in the order of 10–15 metres long and four metres in height.
- 4.52 The proposed design will require the RDR canal to be modified to enable the effective movement of fish and water through it. This includes a widened channel and concrete structure for the Fish Screen to be positioned at a small angle (less than 10 degrees) to the flow and the construction of a new fish return channel to the Rangitata River.
- 4.53 The design may result in up to two bypass channels. The upstream channel would be primarily designed to remove coarse sediment from the RDR, while the second would facilitate the removal of fish. It is anticipated that the first channel would flow into the second, ensuring that there is only one point of return to the river.
- 4.54 The fish return will use a constant supply of water from the canal. RDRML currently has consent CRC180974 which authorises the diversion of up to 3,000 l/s to run the BAFF fish screen and bypass channel, however up to an additional 2,000 l/s is needed to run the Rotary Drum Screen. A proposed non-consumptive take of five cumecs is therefore proposed, which will provide for a bypass flow of approximately 10% of the proposed maximum take into the RDR including the flood flow of 40.7 m³/s. RDRML has proposed to surrender consent CRC180974 should they proceed with the Rotary Drum Screen.
- 4.55 ADC consent is also required to construct and operate a new mechanical rotary fish screen on land that is zoned Rural B. Relevant to the ADC consents is the construction of the fish bypass return is on the bed of the Rangitata River and within the 20 metre setback; and the upgrading of a utility structure exceeding the rural zone and geo-conservation area earthworks standards.
- 4.56 Riley Consultants (on behalf of RDRML) estimate that up to 15,000m³ of material will need to be removed as part of the construction of the rotary fish screen (second application). This material will be placed at

one of the disposal sites associated with the proposed KSF. Riley Consultants also estimate that an additional 3,750m³ of rock will be needed. Concrete, pipes and reinforcing steel will also be used.

Ecological Refuge

- 4.57 RDRML is proposing to create an ecological refuge on the Rangitata River, adjacent to the proposed sluice channel.
- 4.58 The refuge will include:
- (a) One hectare of lizard habitat;
 - i) The lizard habitat will see rock piles that are located within the footprint of the dam being relocated to the bottom terrace;
 - ii) Lizards will be progressively captured and relocated;
 - (b) Two hectares of native planting;
 - i) This will include river terrace dryland and wetland species, such as broadleaf and hardwoods;
 - ii) Exotic species will be removed from the area;
 - (c) Three hectares of wetland habitat;
 - i) The wetland habitat will use the natural groundwater level, old river swales and natural seepage to create habitats;
 - ii) A gravel island will be located within the centre of the pond;
 - iii) The habitats are proposed to suit riverine and wetland birds, as well as deeper water for fish refuges.
- 4.59 The refuge will be created in a staged manner during the site establishment works, prior to the commencement of major construction activities through to the completion of the KSF.
- 4.60 The wetlands will be created by clearing existing old river channels and widening and deepening these to expose groundwater. The wetland habitat will be separated from the outlet channel with open shrub land and the lizard habitat forming a buffer between them. The lizard habitat will be constructed by moving the stone piles out of the KSF site onto the refuge site to recreate a rocky habitat interspersed with native plantings. The construction of the ecological refuge can be completed independently of the outlet channel from the KSF.
- 4.61 The clearance work described above involves the clearance of materials from the riverbed and removing that material to the upper terrace spoil sites without intermediate stockpiling. The work will be carried out within a closed excavation, that is, the excavation site will not be opened to the river and sediment created during construction will be constrained within the enclosed excavation. A plug of gravel or a coffer dam between the river and open excavation will provide this separation. The excavation is however prone to overtopping and flood events.

- 4.62 To deal with this circumstance the contractor will set up a flood warning system with CRC to ensure that it receives adequate warning of river flows that are sufficient to inundate the works area and are thus able to move plant and other equipment and materials to higher ground.
- 4.63 So as to ensure any adverse effects associated with construction of the refuge are minimised, if not avoided, control of run on water, separation of clean and dirty water, protection of the land surface from erosion and prevention of sediment from leaving the site will be required.
- 4.64 A soak pit will catch sediment at the low point in the excavation. The finer sediment in the soak pit is likely to be washed out by flood events several times a year. However the amount of additional sediment according to RDRML is minimal when compared to natural sediment loads and the riverbed.

Staging

- 4.65 The Application notes that the KSF constructed may be less than 53Mm³. In the event that occurs, RDRML will advance a process whereby the smaller pond is constructed as Stage 1. Further stages may proceed as demand increases and/or the economic conditions improve.
- 4.66 The Application assumes that any proposal to construct a smaller pond, or to progressively extend a pond to 53Mm³ will not cause the environmental effects to be greater than those associated with the construction of the larger storage facility in one stage.
- 4.67 However, should the construction be staged, the Application makes it clear that Shepherds Bush Road will only be reconstructed when the water storage facility would extend over the existing alignment.
- 4.68 The Application also states that all other aspects of the proposal, such as the WWC, the construction of the Fish Screen, the establishment of formal (and legal) pedestrian access from the 'river end' of the existing Shepherds Bush Road to the Rangitata River, and the ecological refuge would proceed as part of the first stage.

Management Plans

- 4.69 Conditions requiring a Construction Management Plan (CMP) are proposed to ensure that construction areas will be fully fenced to mitigate health and safety risks for the public and security risks for the contractor.
- 4.70 The effects of stormwater run-off and general erosion and sediment issues will be effectively managed using standard mitigation methods that will be outlined in a series of management plans.
- 4.71 As to construction and operation, the Application documentation includes a 'Construction Methodology Report' prepared by MWH Limited (July 2016). This report was attached as Annexure 2 to the AEE.
- 4.72 That report outlines the construction activities involved and demonstrates how erosion and sediment effects and hazardous spills can be mitigated. It also outlines the management and monitoring requirements in order to confirm that the mitigation measures proposed to be implemented during construction are effective.

- 4.73 This report will be supplemented by the CMP included in the suite of conditions recommended by RDRML. Additional details regarding the construction methodology is also included in section 1.5.9 of the Ryder Consulting AEE document (page 17).
- 4.74 As well as the CMP there are a range of other sub plans under which construction activities will occur. They are:
- (a) an erosion and sediment control plan;
 - (b) a hazardous substance and spills management plan;
 - (c) a vibration management plan;
 - (d) a waste management plan;
 - (e) a works in the river management plan;
 - (f) a smoke management plan;
 - (g) a dust management plan; and
 - (h) a land contamination remediation action plan.

Operations

- 4.75 Once operational, the level of activity on the site will reduce significantly. The Application states that no buildings or offices are proposed. Rather, RDRML will continue to deploy its staff from its existing workshops, offices and depots in mid-Canterbury. RDRML anticipates, however, that additional full time equivalent positions will be created to assist RDRML with the increased operations, maintenance and monitoring workload that arises as a consequence of the proposal.
- 4.76 The WWC will operate continuously throughout the peak irrigation season (being from 1 November to the 30 April each year). Outside of this period, the WWC will be operated for events that have been scheduled (in advance) with RDRML. While the WWC is operating, RDRML will maintain the parking area, toilets and changing areas in a clean and tidy state. Users of the WWC will be asked to take their rubbish with them, although rubbish bins will be strategically located, monitored and cleared by RDRML staff as part of their routine operations and maintenance activities.
- 4.77 Similarly, RDRML proposes to maintain the pedestrian car park at the end of the realigned Shepherds Bush Road so that it is useable all year. However, unlike the WWC, RDRML does not propose to control litter at that location, or to provide ablutions or changing facilities.
- 4.78 RDRML anticipates the following on-going operational activities (amongst others):
- (a) Site personnel will undertake surveillance and monitoring of the various structures (as constructed and/or modified by the proposal). This includes:
 - i) recurrent civil safety inspections and audits, in keeping with the applicable dam safety guidelines and/or regulations,

- ii) weed and pest control; and
 - iii) the need for various structures to be maintained;
- (b) Recurring maintenance, which might include:
- i) re-grading and re-gravelling of the access road associated with the KSF;
 - ii) clearing obvious debris away from the new Fish Screen;
 - iii) removing weed species from within the KSF footprint and on the landward margins of all of the components associated with the proposal;
 - iv) trapping/culling pest species (such as Canada Geese that take residence in, or on the margins of the KSF);
 - v) addressing any incidence of significant erosion;
 - vi) rectifying matters that could cause the WWC to become unsafe;
 - vii) replacing (on a like with like basis) the components associated with all of the proposed gates and outlets;
 - viii) re-grading/re-forming the discharge channel after a large flood event (which includes the reinstatement of the ford); and
 - ix) addressing matters to ensure the structural integrity and functioning of all bridges and culverts associated with the proposal.

5 RESOURCE CONSENT APPLICATIONS

5.1 The table below identifies the relevant resource consent applications and links them to the component parts of the proposal.

Number	Purpose	Date	Status at Hearing	Comment
CRC170651	Land use consent for earthworks on the lower terrace, adjacent to the Rangitata River, to create a six hectare ecological refuge comprising of one hectare of lizard habitat, two hectares of native planting and three hectares of constructed wetland. In addition, earthworks are required to construct the gully race, drop structure	Lodged July 2016	Active	Ecological Refugee Component.

	for the white water course and the river outlet channel.			
CRC170652	Land use consent for earthworks to construct the 53 million cubic metre storage pond and to upgrade part of the RDR Canal.	Lodged July 2016	Active, amended to remove earthworks associated with the construction of a rock bund fish screen.	Storage Facility Component and Fish Screen Component
CRC170653	Land use consent to disturb, and to remove vegetation from, the bed of the Rangitata River for the purposes of constructing a sluice outlet and fish bypass channel.	Lodged July 2016	Active.	Fish Screen Component
CRC170654	Water Permit to abstract an additional 10 cumecs from the Rangitata River, when the flows exceed 142.6 cumecs (as measured at Klondyke). The additional abstraction will be used to fill the storage pond and to provide supply to the RDR.	Lodged July 2016	Active.	Water Take Component
CRC170655	Water permit to take and use surface water at a rate not exceeding 0.5 cumecs from the Rangitata Diversion Race canals for construction purposes (i.e. dust suppression).	Lodged July 2016	Active.	Storage Facility and Fish Screen and Ecological refuge Component
CRC170656	Water permit to	Lodged	Active.	Ecological Refugee Component.

	take groundwater for dewatering purposes. Dewatering will only be required on the lower terrace where earthworks are being undertaken to create the ecological habitat.	July 2016		
CRC170657	Water Permit to dam up to 53 million cubic metres of water outside of the riverbed.	Lodged July 2016	Active.	Storage Facility Component
CRC170658	Discharge permit to discharge dust to air from construction activities.	Lodged July 2016	Withdrawn.	No longer required following decisions to the CARP.
CRC170659	Discharge permit to discharge contaminants to air from the combustion of diesel from a generator during construction.	Lodged July 2016	Active.	Storage Facility and Fish Screen and Ecological refuge Component
CRC170660	Discharge permit to discharge construction-phase stormwater and dewatering water to land via sediment retention ponds and soakage pits.	Lodged July 2016	Active.	Storage Facility and Fish Screen and Ecological refuge Component
CRC170661	Discharge permit to discharge water and sediment from the storage pond to the Rangitata River via a sluicing channel / emergency spillway.	Lodged July 2016	Withdrawn.	Sluicing aspect of proposal no longer advanced.
CRC170662	Discharge permit to temporarily discharge water and sediment in the Rangitata River as a result of the works to be undertaken under resource consent CRC170653.	Lodged July 2016	Active.	Fish Screen Component
CRC184147	Water permit to dam water	Lodged July 2016	Active.	Canal modifications component
LU C16/0067 (Ashburton District Council)	Land use consent to construct and operate all of the aforementioned	Lodged July 2016	Active.	Storage Facility Component

	activities on land that is zoned Rural B. This includes replacement of three bridges, re-alignment of Shepherds Bush Road and carparks, creation of carparks and toilets associated with white water course.			
CRC173531	Water permit to use water for storage.	Lodged December 2016	Withdrawn.	Replaced by application CRC182630.
CRC182535	Discharge permit to discharge water from the take authorised under CRC182536 and suspended sediment to the river via the fish bypass return.	Lodged November 2017	Active.	Fish Screen Component
CRC182536	Water permit for a non-consumptive take of up to 5 cumecs of water from the Rangitata River associated with the operation of a fish screen.	Lodged November 2017	Active.	Fish Screen Component
CRC182537	Land use consent to disturb the bed of the Rangitata River for the construction of the fish bypass outlet.	Lodged November 2017	Active.	Fish Screen Component
CRC182538	Discharge permit to temporarily discharge sediment to the Rangitata River as a result of the construction and maintenance of the fish bypass outlet.	Lodged November 2017	Active.	Fish Screen Component
CRC182539	Land use consent to extract gravel for the construction and periodic maintenance of the fish bypass outlet.	Lodged November 2017	Active.	Fish Screen Component
CRC182540	Land use consent for use earthworks over an aquifer associated with the construction of the rotary fish screen and bypass.	Lodged November 2017	Active.	Fish Screen Component
CRC182541	Discharge permit for the emergency	Lodged November	Active.	Storage Facility Component

	discharge of water to the Rangitata River.	2017		
CRC182542	Section 127 to change conditions of CRC011237 to enable an alternative fish screen design to be used.	Lodged November 2017	Active.	Fish Screen Component
CRC182630	Water permit to use water for storage.	Lodged November 2017	Active.	Storage Facility Component
CRC182631	Water permit to use water under CRC170654 for storage, irrigation and stockwater purposes, and to generate electricity at Montalto and Highbank Power Stations.	Lodged November 2017	Active.	Use of Water Component
LUC17/0122 (Ashburton District Council)	Land use consent to construct and operate a Fish Screen on land that is zoned Rural B. This includes the construction of the fish bypass return on the bed of the Rangitata River and within the 20 metre setback	Lodged November 2017	Active.	Fish Screen component

6 NOTIFICATION, SUBMISSIONS AND HEARING

- 6.1 The 13 original resource consent applications, suite one applications CRC170651-CRC170662 were publicly notified on Saturday 2 September 2016 in The Press, Ashburton Guardian and Timaru Herald; and on Thursday 8 September 2016 in the Ashburton Courier, with the wording as per paragraph 71 of Ms Ford's Section 42A Report.
- 6.2 The following parties were specifically notified of the proposal:
- (a) 227 owners and occupiers within the three KSF dam breach flood inundation areas;
 - (b) nine owners and occupiers within areas potentially affected visually by the proposal;
 - (c) Te Rūnaka o Arowhenua;
 - (d) Te Rūnanga o Ngāi Tahu;
 - (e) Department of Conservation (DOC);
 - (f) Fish and Game New Zealand Central South Island Region (Fish & Game);

- (g) Royal Forest and Bird Protection Society of New Zealand Incorporated - Canterbury/West Coast Regional Office, and South Canterbury Branch (Forest and Bird);
- (h) Community and Public Health - Public Health Unit;
- (i) Kiwi Rail;
- (j) NZTA – Christchurch Regional Office;
- (k) Jet Boating New Zealand;
- (l) New Zealand Salmon Anglers Association – South Canterbury;
- (m) Rangitata Water User’s Group;
- (n) Save the Rivers – Mid-Canterbury Incorporated;
- (o) South Canterbury Anglers Club;
- (p) South Canterbury Farmers Irrigation Society;
- (q) Opuha Water Limited;
- (r) Whitewater New Zealand;
- (s) ADC – District Planner;
- (t) Land Information New Zealand;
- (u) Transpower New Zealand Limited – Asset Manager;
- (v) Electricity Ashburton;
- (w) Timaru District Council – District Planner;
- (x) Air Rangitata;
- (y) Rangitata Rafts;
- (z) Ministry of Education;
- (aa) RWL;
- (bb) (MHIS); and
- (cc) Ministry for the Environment (MfE).

6.3 The notification of the proposal resulted in 98 submissions, with 42 of those wishing to be heard in support of their submission. The breakdown of submitters for each notified consent processed by CRC are listed in Ms Ford’s Section 42A Report.¹⁶

6.4 The main points raised by submitters were:

¹⁶ Ms Ford, CRC Section 42A Report, paragraph 74 page 21

- (a) That the existing fish screen is not effective and is adversely affecting fish populations. Any new screen must successfully exclude fish and be required to demonstrate this;
- (b) The taking of an additional 10 cumecs from the Rangitata River will adversely affect the fish populations of the river by increasing temperatures and also sedimentation;
- (c) That declines in the recreational fisheries could lead to flow on economic effect to local business that benefit from recreational fishing;
- (d) The taking of an additional 10 cumecs will affect the flow of silt in the river and cause blockages at the river mouth which will prevent fish migration and cause flooding;
- (e) The discharge of sediment should only be allowed to occur during high flows;
- (f) The risk to property and infrastructure in the area if a dam breach occurs and who would be responsible for compensating affected land owners. Lack of emergency response plan if a dam breach occurred;
- (g) The proposal is not keeping with the intent of the WCO;
- (h) Effects of dust on neighbouring properties;
- (i) Positive effects such as economic growth and increased flexibility and reliability of supply to farmers receiving the water.

6.5 The additional resource consent applications (suite two applications CRC182535-CRC182631) were publicly notified on Saturday 20 January 2018 in The Press, Ashburton Guardian, and Timaru Herald; and on Thursday 25 January 2018 in the Ashburton Courier, with the following wording as detailed in paragraph 76 of Ms Ford's Section 42A Report.

6.6 The parties specifically served notice on the Application were those notified and/or those who submitted on the first suite applications. The breakdown of submitters for each notified consent processed by CRC are listed below: Table 4 – Summary of submissions received on Suite two paragraph 79.

6.7 The main points raised by submitters were:

- (a) Concerns about the effects of the takes and discharge of sediment on the Rangitata River and game fisheries;
- (b) The new Fish Screen must have strict and regular monitoring and its installation must be fast tracked;
- (c) Proposal is contrary to WCO;
- (d) Use of water from 10 cumecs take hasn't been adequately justified;
- (e) Proposed consent duration of 35 years too long;
- (f) Dangers of emergency discharge to people and assets; and

(g) Water storage will enable water to be used more efficiently.

6.8 The hearing began on 23 April 2018 at 9:00am and ran until Friday 4 May 2018 (excluding 25 April 2018 – Anzac Day) at the Trust Event Centre in Ashburton.

6.9 A site visit undertaken on 27 April 2018. We discuss this in more depth under the 'Existing Environment' section.

7 THE EXISTING ENVIRONMENT AND SITE VISIT

Introduction

7.1 In this section of our decision we set out, based on the Application, evidence and submissions received, our view of the existing environment. We do that so when considering the Application and those submissions received we are able to better understand any actual and potential effects on the environment of allowing the activity subject to conditions.

Historic Heritage

7.2 The archaeological assessment was commissioned by Ryder Consultants Limited on behalf of RDRML¹⁷ to establish whether the proposal is likely to impact on archaeological values.

7.3 A visual inspection of the site was conducted 16 May 2016 by Mr Peter Mitchell. The field survey consisted of a drive-by and survey on foot. The lower terrace was not inspected in detail due to the known history of flooding on the terrace. Where a walk over was undertaken, the ground surface was examined for evidence of former occupation (in the form of shell midden, depressions, terracing or other unusual formations within the landscape, or indications of 19th century European settlement remains)¹⁸.

7.4 The KSF is within the Ashburton District and falls within the rohe of Ngāi Tahu, and TRoA who are the kaitiaki Rūnanga for the area. Kaitiaki in written and verbal evidence spoke of the mahinga kai trails into the Southern Alps and across to the Arahura River on the West Coast for pounamu.

7.5 High mobility was characteristic of the southern Maori who would undertake seasonal expeditions over considerable distances, utilising the overland tracks in order to obtain resources throughout the island.¹⁹

7.6 Following European settlement in the Canterbury region with the Kemp purchase in 1848, pressure for sheep farming led to the change in the settlement profile previously dominated by crop farming. New provisions were made for pastoral runs by the end of 1851.

¹⁷ Klondyke Water Storage Facility, Shepherds Bush, Canterbury: Archaeological Assessment, Report prepared for Ryder Consulting Ltd and on behalf of Rangitata Diversion Race Management Ltd, by Sarah Phear (PHD) Peter Mitchell (MA), 2016

¹⁸ Klondyke Water Storage Facility, Shepherds Bush, Canterbury: Archaeological Assessment, Report prepared for Ryder Consulting Ltd and on behalf of Rangitata Diversion Race Management Ltd, by Sarah Phear (PHD) Peter Mitchell (MA), 2016, page 2, methodology paragraph 2

¹⁹ Klondyke Water Storage Facility, Shepherds Bush, Canterbury: Archaeological Assessment, Report prepared for Ryder Consulting Ltd and on behalf of Rangitata Diversion Race Management Ltd, by Sarah Phear (PHD) Peter Mitchell (MA), 2016, page 7, Ethnographies, paragraph 7

- 7.7 Pastoral Run 40 NZR was subsequently named Shepherds Bush by Mrs Moorhouse. The land was notified in the *Canterbury Gazette* on 1 November 1854. It was an area of 40,000 acres and lay between the Rangitata River and South Hinds River. Another estate bordering the site is the Ruapuna or Ballantyne Estate.
- 7.8 Given both Maori and European occupation of the area Dr Clough²⁰ for RDRML records there are no archaeological sites within the footprint and none within four kilometres of the proposed KSF.
- 7.9 A 19th century homestead was said to be located on the lower terrace at Shepherds Bush before it was washed away although its exact location is not known.
- 7.10 The nearest site relating to Maori occupation is over four kilometres to the northeast. Dr Clough records the walking track used to access the Southern Alps may be located in the vicinity of the Rangitata River. No evidence of this track was found during the field survey.
- 7.11 One submission was received from Mr John McGregor Simpson raising concerns of flooding potentially damaging a historic battleground and the casualties buried in that location. Dr Clough notes that the site in question is on the opposite side of the river from the proposed works. The site is also not a recorded site.
- 7.12 Overall, Dr Clough concludes that based on historical information and results from the field survey the potential for unidentified Maori or European archaeological remains to be exposed by works is low across the project.

Cultural Landscape

- 7.1 The Rangitata River catchment sits within the TRoA cultural landscape. For manawhenua this cultural landscape holds important links to the natural environment, enabling manawhenua to participate in their cultural practices such as harvesting and use of mahinga kai. The cultural landscape maintains the connections to their traditional trails and place names throughout the catchment and beyond. As expressed by Ms Waaka-Home in her evidence in chief,

*"Today the Rangitata River catchment keeps local Whānui connected to Te Ao Māori"*²¹

- 7.2 TRoA Kaitiaki²² within their written and verbal evidence expressed their sense of place within the cultural landscape from a catchment or as known by Ngāi Tahu as ki uta ki tai²³ being from its source in the Southern Alps, its turbulent passage through the gorges, spring fed waterways such as the Ealing spring on the north bank and the

²⁰ Klondyke Water Storage Facility, Shepherds Bush, Canterbury: Archaeological Assessment, Report prepared for Ryder Consulting Ltd and on behalf of Rangitata Diversion Race Management Ltd, by Sarah Phear (PHD) Peter Mitchell (MA), 2016

²¹ Te Ao Māori: The principle of holism: Sustainable management must consider the environment and its component parts as a whole and assess effects from the actions across all dimension, spiritual, mental, biophysical, and social [Te taha hinekarō, te taha tinana, te taha whanau], Cultural Values For Rangitata Catchment, Prepared by Tipa & Associates, November 2015

²² Ms Mandy Waaka-Homes, written evidence 20 April 2018, TRoA Kaitiaki, verbal evidence, 3 May 2018

²³ Ki uta ki tai: a comprehensive, culturally based "mountains to the sea" natural resource management framework developed by Ngai Tahu (Te Runanga o Ngāi Tahu, 2003). Cultural Values for Rangitata Catchment, Prepared by Tipa & Associates, November 2015, Ki uta ki tai, page 13, paragraph 1.

McKinnon Stream on the south bank, its network of tributaries and small creeks on the lower flood plains to its interface with the saltwater at the lagoon and coast.

- 7.3 Mr Stephen Brown, on questioning²⁴, said he had not taken the cultural landscape or mahinga kai values into consideration, however, both he and TRoA Kaitiaki agreed that the cultural landscape is shaped by the involvement of manawhenua within the Rangitata River Catchment.
- 7.4 Ms Waaka-Home in her evidence²⁵ described their place in the cultural landscape as the river was used by Ngāi Tahu parties from Canterbury as part of a trail to Te Tai Poutini (the West Coast), as well as Tekapo, Pukaki, and Oamarama. The tūpuna had an intimate knowledge of navigation, river routes, safe harbours and landing places, and locations of food and other resources on the river.
- 7.5 The river was an integral part of a network of trails which were used in order to ensure the safest journey and incorporated locations along the way that were identified for activities including camping overnight and gathering kai. Knowledge of these trails continues to be held by whanau and hapū and is regarded as taonga. The traditional mobile lifestyle of the people led to their dependence on the resources of the river.
- 7.6 TRoA Kaitiaki in describing the landscape²⁶, said it has changed from being developed for farming and horticulture, with invasive weeds replacing remnant wetlands. Mr Russell said whanau are still gathering mahinga kai²⁷ within the catchment, this practice is diminishing as he also acknowledged that the mauri²⁸ within the Rangitata catchment has been severely compromised. Whanau do move throughout the catchment Mr Russell said, it is a time to gather mahinga kai to tell the stories of their locations, place names, the trails and know the wahi tohu (locators) such as Tarahaoa/Mount Peel.
- 7.7 Te Rūnanga o Ngāi Tahu submitted that²⁹, the bank of the Rangitata River is a significant trail to the maunga (mountain) of manawhenua, and it also links to mahinga kai harvesting sites, and the pounamu trails leading through to the West Coast and continues today to be part of the cultural landscape.
- 7.8 The Ngāi Tahu Claims Settlement Act 1998 recognised the Rangitata River as a Statutory Acknowledgement Area, which acknowledges its cultural, spiritual, traditional, and historic significance to Ngāi Tahu.
- 7.9 Seasonal mahinga kai include eels, taken in the greatest numbers during the heke, and white bait; eggs, which were taken at labour

²⁴ Day 3, 25 April RDRML Hearing, Mr Stephen Brown (RDR Landscape expert) response from commissioner Couch-Lewis

²⁵ Ms Mandy Home-Waaka, evidence in chief April 2018, page 5 paragraph 1.11

²⁶ Hearing 3 May 2018, TRoA kaitiaki verbal evidence

²⁷ Mahinga kai: The activities associated with gathering and use of the resources, including cultural harvest, whanau experience and knowledge, and transmission of cultural values and tikanga practices between generations. Cultural Values For Rangitata Catchment, Prepared by Tipa & Associates, November 2015

²⁸ Mauri: *Mauri contains elements of both the biophysical and spiritual. Mauri first and foremost is that water is Papatūanuku blood and cleansing fluid. It is there to feed and nourish everything that is provided by Papatūanuku, Tāne and Tangaroa, so mauri has to be spot on at all times. The next important thing is the source, is it spring, glacial snow or forest based? These beings are what make the water special.* Ms Mandy Waaka-Home 22 April 2018 paragraph 3.3 and 3.4

²⁹ Te Rūnanga o Ngāi Tahu, Evidence in Chief

weekend, and birds; plant resources for food, medicines and material throughout the Rangitata River catchment. Manawhenua are seeing less bird life such as the wrybill and the dotterel, and the reduction of black back gulls with habitat loss to broom.

Application site

- 7.10 The site location and description, as well as the surrounding environment are described in sections 1.3 and 2.0 of the AEE prepared by Ryder Consulting. For the purpose of this decision we adopt the description set out therein, except where otherwise indicated.
- 7.11 To provide some context in summary, the KSF and ecological refuge sites are located on the Rangitata River terraces at the upstream end of the RDR, with the Rangitata River to the west, Ealing Montalto Road to the east, the RDR to the north and farmland to south.
- 7.12 The application site includes properties that are legally described as Lot 2 DP 482124, Pt Lot 1 DP 2767, RS 36179, Lot 3 DP 482124, RES 1002 (original application) and Part Lot 1 DP3403, Sec 1 SO 15627 (supplementary application). Copies of the certificates of title were attached as Annexure 1 to the AEE.
- 7.13 The total land area making up the application site for the purpose of the applications is approximately 500 hectares, which includes the 286 hectares footprint of the proposed KSF, temporary construction works, spoil disposal and pond outlet areas.
- 7.14 The site is generally flat, gently sloping from north to south, with a slight gradient dropping towards the Rangitata River terraces to the west. The site is surrounded by agricultural land uses, including paddocks, shelterbelts and trees, residential and agricultural buildings and roads. The general character and amenity of the surrounding landscape is therefore typical of modified working rural "Checkerboard"³⁰ landscapes in the Canterbury Plains.
- 7.15 There are several large piles of cobbles and boulders located within the paddocks on the KSF site, which now form a habitat for lizards.
- 7.16 The few native plants present within the site are individuals of common species, primarily under some areas of pines in the east of the site, and along fences and canal edges.³¹ Vegetation along the section of the RDR canal for which modifications are proposed consists almost entirely of rough pasture, with some areas of exotic plantation and shelter belts. The vegetation at the location of the proposed Fish Screen site including the re-aligned canal and bypass consists of dense broom and gorse with some more open patches of rank exotic grasses and weeds.
- 7.17 Overall, vegetation of the reservoir, canal, and Fish Screen sites has low ecological value because it is almost entirely exotic vegetation, with no intact native vegetation, and only scattered, common native species present.³²
- 7.18 The existing 'main race' of the MHIS crosses the site, from the northeast corner to the southwest corner, and consists of a steep-sided

³⁰ Mr Brown, Evidence in Chief, paragraph 14

³¹ Dr Sanders, Evidence in Chief paragraph 16.

³² Dr Sanders, Evidence in Chief, paragraph 18.

canal. An existing mature shelterbelt runs parallel to the MHIS canal, which will be re-aligned as part of this proposal.

7.19 The CRC GIS audit has indicated that there is a wetland point located to the west of the site, however there is no other information regarding the wetland point. The same audit has determined that there are no other values of significance, at the proposed water storage site.

7.20 Mr Stephen Brown landscape expert for RDRML describes the broader context in this way which we adopt:

"The Rangitata River acts as a natural point of division or demarcation between the Outstanding Natural Landscape of the Mount Peel (DoC) Conservation Area and associated hill country from the alluvial terraces and fans of the southern Canterbury Plains. Mt Peel (1743m), Little Mt Peel (1311m) and Mt Francis, together with the Tara Haoa Range, provide a dramatic backdrop to both the Rangitata River" and

"These different qualities are reflected in the status attributed to the landscapes surrounding the Rangitata River and application site in the Timaru and Ashburton District Plans. All of the Mt Peel area, Tara Haoa Range and (Four Peak Range are identified as an ONL by Timaru District. In addition, the Peel Forest Recreation Area and Mt Peel Station – extending down to the Rangitata River – are also attributed significance by the Department of Conservation and NZ Historic Places Trust. On the other hand, even though the Ashburton District Plan identifies the River's eastern 'high bank' as an Area of Significant Conservation value, it does not identify the river corridor as an ONL. The Canterbury Regional Landscape Assessment of 2010 also identifies the area west of the Rangitata River – covering both Peel Forest and Mt Peel Station – as being an ONL at the regional level, calling it the "Mt Peel and Four Peaks ONFL". Again, however, this rating is not attributed to that part of the Rangitata River directly east of Mt Peel or its eastern embankment."³³

7.21 The existing landscape of the proposed Fish Screen and bypass canal alignment is a low-lying gravel bank adjacent to the existing RDR canal that is mostly covered in introduced broom. The proposed Fish Screen and bypass alignment area are characterised by a horizontal layering of river banks and terraces that striate the eastern side of the Rangitata River.³⁴ The proposed Fish Screen and bypass alignment are within Geoconservation Site 21 in the Ashburton District Plan (ADP). Geoconservation Site 21 is described as "A very legible flight of seven terraces cut into the outwash gravel."³⁵

Rangitata River

7.22 The following description of Rangitata River is summarised from the PDP (2016) hydrology assessment of effects and the Ryder Environmental (2016) water quality and ecology assessment, except where otherwise indicated.

³³ Mr Brown Evidence in Chief, paragraphs 14 and 15.

³⁴ Mr Brown, Evidence in Chief, paragraphs 87 and 88.

³⁵ As quoted by Mr Callander, Evidence in Chief, paragraph 74.

- 7.23 The Rangitata River is a braided river that drains the Southern Alps and flows to the Pacific Ocean. Upstream of the Rangitata Gorge, the river is braided, before becoming constrained by the gorge, then flowing through a single-thread channel and becoming fully braided again. The river maintains its braided nature down to its mouth and associated lagoon (hapua). The existing RDR intake is located immediately downstream of the gorge.
- 7.24 The Rangitata River is an alpine-fed river, which means that flows are generally lowest in winter and highest in early summer, when snowmelt is occurring. The Klondyke flow recorder site is at the downstream end of the gorge, approximately two kilometres upstream of the RDR intake. Flow statistics for the recorder site from 1971 to 2015 include a median flow of 74 cubic metres per second (cumecs), seven-day mean annual low flow (MALF) of 39.9 cumecs, and a mean annual flood of 1,186 cumecs.
- 7.25 Large floods, in the order of mean annual floods of at least 1,186 cumecs, cover the width of the riverbed, reworking the braid pattern and keeping the bed largely free of vegetation. Smaller floods or “freshes” in the order of 111 to 222 cumecs (1.5 to 3 times’ median flow)³⁶ occur more frequently and play an important role in scouring periphyton and fine sediment. As flows drop to around MALF, habitat availability reduces for some aquatic species. River mouth closure may occur at residual flows (i.e., downstream of all water takes) of less than 30 cumecs and flows in excess of 150 cumecs may be necessary to breach the mouth if it closes.
- 7.26 A total of 54,726 litres per second (54.726 cumecs) of surface water and 553 litres per second of surface water-depleting groundwater is currently allocated for abstraction from the Rangitata River. RDRML is the single largest abstractor, with resource consent CRC011237 to take up to 30.7 cumecs from just downstream of the gorge. The next largest abstractor is RWL, which holds consents CRC001229.1, CRC042094.1, and CRC070924.1 to take a total of 20 cumecs from their intake at Arundel. Other substantial takes include Cumberland Dairy Farm Limited, who hold consent CRC154670 to take 1.5 cumecs from the RDRML intake, and Mesopotamia Station, who hold consent CRC092108 to take 1.5 cumecs from a tributary upstream of the gorge. The majority of water taken is used for irrigation, although the RDRML take is also used for electricity generation, mainly outside of the irrigation season. As river flows increase, so too does the concentration of suspended solids, and water clarity decreases.
- 7.27 Nutrient concentrations are relatively low in the Rangitata River and periphyton (algae attached to the riverbed) growths are typically below nuisance levels. The aquatic invertebrate community is dominated by *Deleatidium* mayflies and chironomid midge larvae, which are resilient to flood disturbance and are common to other braided rivers, including the Waimakariri and Rakaia Rivers.
- 7.28 The Rangitata River is an important habitat for diversity and abundance of birds. Several species classified as Threatened or At Risk are present on the Rangitata River, including black-billed gull (Threatened: Nationally Critical); black-fronted tern (Threatened: Nationally

³⁶ CRC ecologist Adrian Meredith (22 February 2018 memo to Natalia Ford) suggested flows in the range of 1.5 to 3 times median flow are ecologically-relevant freshes, whereas RDRML modelled flows of 3 times median (Ryder Water Quality and Ecology Assessment, July 2016).

Endangered); wrybill, banded dotterel and caspian tern (all Threatened: Nationally Vulnerable), and pied oystercatcher (At Risk: Declining). Most birds are found on the wider, more braided reaches of the Rangitata River, above the gorge and below the State Highway 72 Bridge at Arundel³⁷.

- 7.29 At least 15 native and five introduced freshwater fish species occur in the Rangitata River³⁸. Three migratory species (bluegill bully, common bully and torrent fish) dominate the native fish fauna in the lower river, whereas the river above the gorge is dominated by four non-migratory species (upland bully, alpine galaxias, Canterbury galaxias, and long jawed galaxias). Migratory native species rarely penetrate above the gorge, while most non-migratory native species are rarely encountered below it; only one native (upland bully) and two introduced species (brown trout and Chinook salmon) are widely distributed throughout the catchment.
- 7.30 The Rangitata River is one of the top five rivers fished in New Zealand, with approximately 28,000 angler days recorded in the 2014/15 fishing season³⁹. While the river is popular for both trout and salmon anglers, the river is particularly renowned for its salmon fishery. The majority of salmon angling effort occurs downstream of State Highway One and to a lesser extent between Klondyke and the State Highway. The choice of whether or not to fish is largely determined by whether or not salmon are likely to be present (time of year and recent angling reports), and river flow in terms of its colour, size, and recent flow conditions. Preferred flows for salmon fishing downstream of the RDR intake correspond to flows at Klondyke of between 70 and 110 cumecs, which equate to a residual river downstream of the RDR intake of approximately 40 to 80 cumecs⁴⁰. Fish can still be caught outside this range, but it becomes progressively more difficult as the river either becomes too dirty with higher flows or too clear at lower flows.
- 7.31 Numerous submitters expressed concern over impacts of existing takes on sedimentation and associated ecological and fishery impacts. In particular, salmon anglers observed large areas of fine sediment build-up in the lower reaches of the river, which both affect the ability to catch a fish and also potentially affects general river ecology⁴¹. During questioning at the hearing, expert geomorphologists confirmed that existing takes were likely responsible for the observed sedimentation, although it was unclear over what timeframe this has occurred⁴².
- 7.32 One of the most consistently-raised issues from fish experts and anglers was the impact of the existing RDR intake on migrating fish. The intake location is such that downstream-migrating juvenile salmon (known as smolt) are particularly prone to becoming entrained into the intake. Native fish and trout may also become entrained, but they are less susceptible than juvenile salmon, due to their distribution within the river and migratory patterns⁴³. The RDR has been in place for over 70

³⁷ Dr Sanders, Evidence in Chief, paragraph 20.

³⁸ Mr Bonnett, Evidence in Chief, paragraph 16.

³⁹ Mr Webb, Evidence in Chief, paragraph 30.

⁴⁰ Mr Webb, Evidence in Chief, paragraph 59.

⁴¹ For example: MC Hall (Evidence in Chief, page 7); B Mortimer (Evidence in Chief, page 1); C de Joux (oral evidence for South Rangitata Huts); and combined evidence of the South Canterbury Salmon Anglers Association and the Salmon and Riparian Support Trust (unnumbered pages).

⁴² Oral evidence of Dr M Hicks for Central South Island Fish and Game, and Mr J Cope for CRC.

⁴³ Mr Bonnet, Evidence in Chief, paragraphs 16 to 21.

years and has had no screen to prevent fish entry for most of that time⁴⁴.

7.33 A joint study by RDRML and Fish & Game estimated that the RDR entrained approximately 200,000 salmon smolt in the 1998/99 irrigation season, representing between 5 and 25% of the total number of salmon migrating past the intake⁴⁵. To reduce smolt losses into the RDR, a BAFF was installed within the RDR canal in 2007. Monitoring of the BAFF has yielded disappointing results, with an average of only one third of smolt entering the RDR being excluded by the BAFF.

7.34 White-water rafting, kayaking, and jet-boating are highly-valued recreational activities on the Rangitata River. The gorge section of the river contains technical white-water that is the domain of advanced to expert paddlers, whereas downstream of the gorge the channel is broader, so it produces less challenging white-water that is mainly used by beginner to intermediate paddlers⁴⁶. Flow preferences differ according to the type of white-water use, experience level, and as a matter of opinion, but may be broadly summarised as follows:

- | | |
|-------------------------------|--------------------------------------|
| (a) Beginner kayakers: | 40 to 70 cumecs |
| (b) Intermediate kayakers: | 45 to 170 cumecs |
| (c) Advanced/expert kayakers: | 55 to 250 cumecs |
| (d) Big water kayakers: | 80 to 170 cumecs |
| (e) Rafting ⁴⁷ | 50 to 120 cumecs or 80 to 170 cumecs |
| (f) Jet boating: | over 85 cumecs |

7.35 The existing RDR water take reduces the depth and value the river for jet boating downstream to Arundel, but the gorge and reaches downstream of Arundel remain available for jet boating⁴⁸. The existing take also reduces the availability of preferred kayaking and rafting flows, with median flow reduced from 74.2 cumecs at Klondyke to 41.7 cumecs.

Site visit

7.36 We conducted a site visit on the afternoon of 27 April 2018, accompanied by an employee of RDRML. We were driven to the RDRML intake on the Rangitata River which is located on the river just below the gorge.

7.37 Prior to the site visit, we asked submitters and RDRML for specific views or areas that should be included in the site visit. RDRML recommended we visit all of the component parts of the existing RDRML scheme meaning the intake from the Rangitata River, the intake canals, the stilling pond the existing fish screen and discharge points, the RDR

⁴⁴ Mr Curry, Evidence in Chief, paragraph 8.2.3.

⁴⁵ Mr Webb, Evidence in Chief, paragraphs 84 and 85.

⁴⁶ Dr Rankin (Whitewater NZ), oral evidence.

⁴⁷ Mr Greenaway suggested the lower flow band was preferred by rafters, whereas Whitewater NZ suggested the higher flow band.

⁴⁸ Mr Greenaway, Evidence in Chief, paragraph 58.

canals and related structures. RDRML also recommended we visit that part of the riverbed where the new Fish Screen is proposed to be located as well as the location for the ecological refuge.

- 7.38 For the site visit we took with us some of the construction and layout plans of the proposal and the plans and photomontages prepared by Mr Brown the landscape specialist for RDRML. These plans were helpful in locating the various elements of the proposal such as the proposed Fish Screen, the modifications to existing canals, and the KSF, the ecological refuge, and the location of submitters' properties.
- 7.39 We did visit all of these locations. We viewed the KSF from as many public viewpoints that were available to us including those identified and assessed by Mr Brown. We paid particular attention to the views of the KSF from the Doyle property and the Early property. We viewed the KSF location from the adjacent roads.
- 7.40 While undertaking the site visit we paid close attention to the landscape evidence of Mr Brown in particular his photomontage of the before and after scenarios taken from identified view points of the KSF. We did this because we wanted to understand scale and height of the embankments of the KSF to enable us to better assess amenity, landscape and other effects. We were able to identify many of the viewpoints at which Mr Brown took his photographs. In particular we located viewpoints one and two and examined the view.
- 7.41 To better understand the size and scale of the embankments of the KSF we arranged to meet another employee of RDRML on Ealing Montalto Road who had access to a controlled drone which was capable of being set to fly at a nominated altitude. The altitude nominated matched with the height of the embankment of the KSF enabling a better understanding of embankment heights.
- 7.42 We were, by referencing existing features such as shelterbelts and the like, able to gain a very useful appreciation of the height of the proposed embankments.
- 7.43 Our site visit also included driving down Shepherds Bush Road to understand its location vis-à-vis elements of the proposal and to understand the local roading network and access points to the Rangitata River.
- 7.44 We visited the proposed ecological refuge site to better understand it's location in comparison with the KSF and the river. Visiting the ecological refuge site enabled us to better understand the size and scale of the refuge.

8 STATUTORY CONSIDERATIONS

- 8.1 We provide a summary of the relevant legal framework including the WCO at **Appendix 2** of this document.

9 PLANNING FRAMEWORK

- 9.1 Attached as **Appendix 3** is a summary of the key objectives and policies relevant to the entire proposal. This summary is based on the joint statement of evidence from the expert planning witnesses on the basis we agree with the relevant objectives and policies they identified within that document.

- 9.2 We set out a more detailed planning evaluation of the provisions relevant to the key components later in this decision. We refrain from describing and evaluating provisions normally bearing on a proposal like this which are not in contention.

10 ACTIVITY STATUS

- 10.1 There are a number of RMA planning documents relevant to the proposal. A joint statement of evidence was prepared and lodged by Mr Nick Boyes (planning expert and reporting officer for ADC), Ms Natalia Ford (planning expert and reporting officer for CRC), Ms Treena Davidson (planning expert for Te Rūnanga o Ngāi Tahu), Ms Helen Marr (planning expert for Fish & Game) and Mr David Greaves (planning expert for RDRML) on the 27 March 2018 (hereafter referred to as "joint statement of evidence").
- 10.2 The purpose of the joint statement of evidence was to identify and agree which RMA planning documents were relevant to the proposal, the resource consents required for the proposal to proceed, the objectives and policies relevant to the consideration of the proposal and the matters relevant for consideration in respect of Part 2 RMA.
- 10.3 The required consents have already been identified earlier in this decision and the relevant planning documents will be considered at a later stage. This purpose of this section is to outline the activity status for each resource consent (from both ADC and CRC) and determine the overall activity status of the proposal.
- 10.4 In respect to the two land use consents sought from ADC, the expert witnesses concluded:

Consent number	Activities requiring consent	Overall activity status
LUC16/0067	To construct and operate a water storage facility including a new sluicing channel back to the Rangitata River, replacement of three bridges, re-alignment of Shepherds Bush Road and carparks, creation of carparks and toilets associated with white water course.	Non-complying activity
LUC17/0122	To construct and operate a fish screen including the construction of the fish bypass return on the bed of the Rangitata River and within 20 metre setback and the upgrading of a utility structure exceed the rural zone and geo-conservation area earthworks standards	Non-complying activity

- 10.5 There are a number of regional documents relevant to the regional consents sought from the CRC. Each of the consents have been considered against the relevant regional documents within the joint statement of evidence. A summary of the overall status of those consents has been provided within Ms Ford's Section 42A Report⁴⁹.
- 10.6 We agree with the overall conclusions of activity status for those CRC consents and have adopted the summary table provided within Ms Ford's Section 42A Report with the exception of the activity status for

⁴⁹ Ms Ford, CRC Section 42A Report, paragraph 104 pages 31-45

CRC170655 which was deemed by the expert witnesses to be a non-complying activity.

Consent number	Activities requiring consent	Overall activity status
CRC170651	Use of land for earthworks adjacent to the river bed associated with the construction of the sluice channel, wetland and fish bypass outlet.	Restricted Discretionary
CRC170652	Use of land for earthworks over an unconfined/semi-confined aquifer greater than 100 m ³ and within 50 m of a water body	Restricted Discretionary
CRC170653	The drilling, tunnelling or disturbance in or under the river bed for the installation and maintenance of the sluice channel, wetland and fish bypass outlet.	Discretionary
CRC170654	Taking of 10 cumecs of water from the Rangitata River during flood flows.	Restricted Discretionary
CRC170655	The taking and using of water from the RDR canal for dust suppression and concrete batching during construction.	Non-complying
CRC170656	Taking of groundwater for dewatering to facilitate construction of the Lower Terrace Ecological refuge	Restricted Discretionary
CRC170657	The damming of 53 Mm ³ of water outside the river bed.	Discretionary
CRC170658	Discharge of dust beyond the boundaries of the site during the construction period	Permitted (initially required consent)
CRC170659	Discharge to air from the combustion of diesel in a mobile generator for a period exceeding 5 days duration.	Discretionary
CRC170660	Discharge of construction-phase stormwater	Discretionary
CRC170661	Discharge of sediment to the Rangitata River via the sluice channel	Discretionary
CRC170662	Temporary discharge of sediment to water during construction of sluice channel and fish bypass outlet	Discretionary
CRC182535	To discharge water from the take authorised under CRC182536 and suspended sediment to the river via the fish bypass return.	Discretionary
CRC182536	For a non-consumptive take of up to 5 cumecs of water from the Rangitata River associated with the operation of a fish screen.	Restricted Discretionary
CRC182537	To disturb the bed of the Rangitata River for the construction of the fish bypass outlet.	Discretionary

CRC182538	To temporarily discharge sediment to the Rangitata River as a result of the construction and maintenance of the fish bypass outlet.	Discretionary
CRC182539	To extract gravel for the construction and periodic maintenance of the fish bypass outlet;	Discretionary
CRC182540	To use land for earthworks over an aquifer and within 5 m of the bed of a river;	Restricted Discretionary
CRC182541	The emergency discharge of water to the Rangitata River;	Discretionary
CRC182542	To change conditions of CRC011237 to enable an alternative fish screen design consisting of either a Mechanical Rotary Fish Screen or a permeable rock bund and infiltration gallery;	Discretionary (s127 of RMA)
CRC182630	To use water for storage.	Consent not required - refer to paragraph 32
CRC182631	To use water under CRC170654 for storage, irrigation and stock water purposes, and to generate electricity at Montalto and Highbank Power Stations.	Restricted Discretionary

- 10.1 Ms Hamm in her opening legal submissions⁵⁰ agreed the applications are a noncomplying activity. The triggers for noncomplying activity status she said arise from an overall non-complying activity status under the ADP due to construction activities and the position of rocks associated with the lower terrace ecological refuge, and the deep position of more than 200 m³ of clean fill in the deep position of rocks associated with the construction and armouring of the fish bypass outlet and overall non-complying activity status with the LWRP due to the non-consumptive take of up to 5 m³ of water per second from the Rangitata River associated with the fish bypass for the mechanical Fish Screen where the point of return is located in excess of 250 metres from the point of extraction.

Bundling of consents

- 10.2 The expert witnesses' consider within the joint statement of evidence whether the principles of bundling should be applied to the resource consent applications.
- 10.3 The expert witnesses determined that the applications for resource consent lodged by RDRML were inextricably linked and on that basis the applications should be bundled together and the most restrictive activity status applied.⁵¹
- 10.4 The expert witnesses further referred to pre-lodgement advice from the councils which stated it was standard practice within the Canterbury Region to not only bundle applications across relevant planning documents but also across jurisdictions. The expert witnesses agreed that this practice should be adopted and concluded the applications should be bundled together and considered as a **non-complying activity**.

⁵⁰ Ms Hamm Opening Legal Submissions, paragraph 7.

⁵¹ Ms Ford, Mr Boyes, Ms Davidson, Ms Maar and Mr Greaves, Joint Statement of Evidence, paragraph 3.14.

10.5 We agree with the analysis and approach undertaken by the expert witnesses and agree that the overall proposal should be classified as a **NON-COMPLYING ACTIVITY**.

11 KEY COMPONENTS OF THE PROPOSAL - PRINCIPAL ISSUES IN CONTENTION - OTHER RELEVANT ISSUES IN CONTENTION

11.1 Whilst there are various components to the proposal, we refine our discussion and focus to three of those components on the basis that they, in our view, are the only components that give rise to contentious issues. The three key components are:

- (a) Water take;
- (b) Water storage;
- (c) Fish screen.

11.2 For each of the three key components, there are some *principal issues* arising and some less contentious, but still *relevant issues* arising. We address each of these issues, which are in the main concerned with effects, together with, when needed, the planning provisions relevant to each key component and its related issues.

11.3 We adopt this approach to concentrate on what was in contention between the participants and what was of concern for us as decision makers. Surprisingly for such a large scale application the number of contentious issues were less than we expected. However this outcome does reflect the comprehensive consultation undertaken by RDRML and both formal and informal interactions between experts for RDRML and submitters and for the two consent authorities.

11.4 For the balance components of the proposal, we are, after giving them close consideration, satisfied they give rise to effects that are no more than minor and that they are consistent with the relevant objectives and policies of the applicable planning framework. In that regard, we adopt and accept Mr Greaves' analysis of the relevant expert evidence and his opinions relating to effects and consistency with the relevant objectives and policies of the applicable planning framework.

Key component 1: Ten Cumec Water take

Principal issues

11.5 The following principal issues arise in relation to water take:

- (a) Effects, including cumulative effects of the 10 cumec water take on:
 - i) Hydrology – including related impacts on wetted area, depth and velocity, depths for fish passage, floods and freshes, river mouth opening and sediment transport;
 - ii) Aquatic ecology and water quality;
 - iii) Recreation effects - including effects on recreational fisheries and amenity for rafting and kayaking

- (b) Use of water taken – including the reasonable use of water and indirect effects of agricultural intensification.

Other relevant issues

11.6 There are various other issues which are not principal issues but are nonetheless still relevant. They are:

- (a) Effects, including cumulative effects of the water take on:
 - i) Natural character values of the Rangitata River system;
 - ii) Braided river birds;
 - iii) Cultural effects;
 - iv) Derogation issues.
- (b) Whether the takes conflicts with the WCO.

Key component 2: Water storage

Principal issues

11.7 The principal issues for water storage are:

- (a) Potential adverse effects on the damming of water on people, property and infrastructure taking into consideration the following;
 - i) whether the modelling of the dam breach is sufficient to understand effects – is it reliable and accurate;
 - ii) whether the seismic hazards assessment is adequate;
 - iii) whether the dam design meets NZSOLD guidelines, in particular the Potential Impact Categories (PIC);
 - iv) whether the DSMP, emergency action plan (EAP) and related plans are appropriate?
- (b) Landscape and visual amenity effects during construction and operational phase of the KSF;
- (c) Will the construction, discharge and water quality effects⁵² of KSF and canal modifications, the gully race, drop structure, river outlet structure, be capable of being avoided, remedied or mitigated through utilisation of management plans.

11.8 Other relevant issues for water storage are:

- (a) Effects on terrestrial ecology; and
- (b) Emergency discharge.

⁵² Traffic, noise, vibration, air quality, land contamination, waste management, effects on terrestrial ecology- lizards, effects on archaeological areas, effects on cultural values

Key component 3: Fish screen

Principal issues

- 11.9 The principal issues in relation to the Fish Screen are:
- (a) Fish Screen design criteria;
 - (b) Monitoring of the Fish Screen;
 - (c) Timing of installation and operation of Fish Screen (i.e. the consent lapsing period); and
 - (d) Effects of the five cumec diversion for the fish bypass – including cumulative effects.

Other relevant issues

- 11.10 The other issues relevant to the Fish Screen are:
- (a) Landscape and amenity effects;
 - (b) Construction and related effects; and
 - (c) Benefits or positive effects.
- 11.11 We will now proceed to discuss these principal and relevant issues making findings in terms of effects, having regard to the existing environment earlier detailed. We will also assess these principal and relevant issues against the relevant plan provisions, where required. So in this way, we will undertake our section 104 RMA assessment leading to our section 104D considerations.

12 TEN CUMEC WATER TAKE

Introduction

- 12.1 The greatest number of submissions to the proposal were in relation to the additional 10 cumec water take, application CRC170654. In summary, RDRML and supporting submitters from the farming sector were of the opinion that the additional water would improve irrigation reliability and economic prosperity in the region.⁵³
- 12.2 Submitters in opposition were of the opinion that the river is already impacted by existing water takes and that no further water should be abstracted⁵⁴. Clearly, much of the interest from the farming sector is in relation to the use of water for irrigation, and this matter is addressed separately elsewhere in this decision. The focus of this section is on evidence relating to effects of the 10 cumec water take, CRC170654.
- 12.3 Our evaluation of effects takes into consideration cumulative effects and our assessment takes into account the existing environment, as we have described earlier.

⁵³ For example, submissions from: Mr Philip Everest (MHV Water Ltd), Mr Mark Mulligan (Geraldine Water Solutions), Mr Lionel Hume (Federated Farmers), and Mr Andrew Curtis (Irrigation NZ).

⁵⁴ For example, submissions from: Mr Keith Gunn (Save the Rivers), Mr Douglas Rankin (Whitewater NZ et al), Mr Phil de Joux (South Canterbury Salmon Anglers and the Salmon and Riparian Support Trust), and Mr Mark Webb (Central South Island Fish and Game).

- 12.4 Effects related to the proposal to take up to 0.5 cumecs of water for construction-related dust suppression (application CRC170654) are discussed in the construction effects section. Effects related to the proposed non-consumptive take of 5 cumecs for the operation of the new Fish Screen (CRC182536) and effects of the associated discharge of water and sediment (CRC182535) are dealt with in the Fish Screen section.

Principal issues

Principal issue 1 - Effects on Hydrology

Modelling Assumptions

- 12.5 The proposed 10 cumec take will occur when Rangitata River flows exceed 142.6 cumecs. It is proposed that at river flows between 132.6 and 142.6 cumecs, water can be abstracted provided it does not cause river flows to drop below 132.6 cumecs. No water is to be abstracted when river flows are below 132.6 cumecs (i.e. 132.6 cumecs is the proposed minimum flow for this consent).
- 12.6 RDRML assessed effects of the take on river flows using a spreadsheet model containing a daily time series of river flows for the Rangitata River at Klondyke from 1971 to 2015⁵⁵. A joint witness statement was prepared by hydrology experts Mr Veendrick (for RDRML), Mr Alasdair Keane (for Fish & Game), Mr Ian McIndoe (for RWL), and Mr Graeme Horrell (for CRC).
- 12.7 In their joint statement, all of the hydrology experts agreed that the spreadsheet model assumptions were appropriate for assessing effects of the 10 cumec take and the non-consumptive 5 cumec take for the Fish Screen bypass. Notably, the experts agreed that the model assumptions result in a conservative assessment in terms of the effects on flows in the Rangitata River. That is, the model assumptions result in river flows that are likely to be lower than in reality due to the assumption that water is taken at the maximum consented flow rate whenever this is available in accordance with the flow regime/consent conditions⁵⁶.
- 12.8 Overall, we satisfied that the hydrology modelling approach is appropriate for assessing effects of the proposed 10 cumec take. Effects of the take on river hydrology are likely to be less than modelled, because the model conservatively over-estimates how much water will be taken.

Wetted Area, Depth, and Velocity

- 12.9 In their joint witness statement, Mr Veendrick, Mr Keane, and Mr Horrell agreed that the proposed 10 cumec take does not result in a reduction in wetted area, depth or velocity when Rangitata River flows (at Klondyke) are below 132.6 cumecs. They further agreed that the reduction in wetted area, depth and velocity is small when flows are above 132.6 cumecs, and therefore that the effects on wetted area, depth and velocity are less than minor⁵⁷. Mr McIndoe was not in a position to comment, as he had not reviewed this item prior to the

⁵⁵ Mr Veendrick, Evidence in Chief, paragraph 8.1.

⁵⁶ Hydrology Joint Witness Statement, dated 15 March 2018, page 3.

⁵⁷ Hydrology Joint Witness Statement, dated 15 March 2018, page 3.

caucusing meeting, and it was outside the scope of the evidence he submitted at the hearing. Given that we heard no other evidence from experts to the contrary, we agree that the effects of the proposed 10 cumec take on wetted area, depth, and velocity will be less than minor.

Fish Passage

- 12.10 Low flows can restrict upstream migration of fish through shallow reaches and the WCO includes a requirement to protect salmon passage. RDRML stated that adult salmon have the greatest water depth requirements for passage (0.24 metres)⁵⁸. Based on the relationship between flows and water depths at the Arundel reach downstream of the RDR take, RDRML stated that there should be adequate water depth for adult salmon passage for flows down to 15 cumecs. RDRML pointed out that flows in the affected reach would not drop below 17.7 cumecs during the adult salmon migration season as a result of RDR abstractions, including water for the Fish Screen bypass.
- 12.11 Fish passage was not a matter raised by ecologists during expert caucusing. Dr Meredith (for CRC) made a general comment that he felt habitat models do not adequately assess fish passage because they do not specifically take into account water depths at shallow riffle crests⁵⁹. However, we note that the 2-D data presented by RDRML included simulated water depths throughout a river reach that included shallower riffle areas. We also note that the same 2-D modelling was used to help inform minimum flow setting as part of the original WCO application. As such, we consider that adequate information has been provided on fish passage.
- 12.12 We accept RDRML's assessment that the proposed 10 cumec take will not affect salmon passage, based on habitat modelling results. This is supported by the fact that existing minimum flows in the WCO were implemented, in part, to protect salmon passage and the proposed take will conform to the existing minimum flow regime.

Floods and Freshes

- 12.13 Small floods, or "freshes", are important for scouring periphyton and fine sediment, and can act as migratory cues for fish⁶⁰. We heard that ecologically-relevant freshes in the Rangitata River are in the order of 1.5 times median flow (111 cumecs) to 3 times median flow (222 cumecs)⁶¹. The average annual frequency of these freshes is referred to as FRE1.5 and FRE3. We heard that existing takes reduce FRE3 from 5.9 to 4.3 and reduce FRE1.5 from 11.3 to 9.1 downstream of all takes, relative to the natural state⁶². The proposed 10 cumec take is predicted to result in a further reduction of FRE3 from 4.3 to 4.0 and a reduction in FRE1.5 from 9.1 to 8.4, downstream of all water takes.⁶³
- 12.14 All hydrologists giving evidence on this matter (i.e., Mr Veendrick, Mr Horrell, and Mr Keane) agreed that the effect of the 10 cumec take on freshes was small. However, in response to a question from the

⁵⁸ Ryder Environmental report titled "Proposed Fish Screen for the RDR: Assessment on Rangitata River Water Quality and Aquatic Ecology", dated November 2017, page 14.

⁵⁹ Mr Meredith, Memorandum, dated 22 February 2018, page 4.

⁶⁰ Dr Ryder, Evidence in Chief, paragraph 31.

⁶¹ Dr Ryder, Evidence in Chief, paragraph 31; Dr Meredith Memorandum, page 7, dated 22 February 2018.

⁶² Mr Keane, Evidence in Chief, page 6.

⁶³ Mr Keane, Evidence in Chief, page 6

Commissioners, Mr Keane said that the scale of effects is larger when considering the change from the natural to change between the natural state, existing state and potential future state with the 10 cumec take. Mr Horrell also pointed to the potential for cumulative effects in his assessment. However, all hydrology experts deferred to other experts in ecology and sediment transport when questioned about the significance of any effects. Sediment transport and ecological effects are therefore discussed further below.

12.15 Large floods, in the order of mean annual floods of at least 1,186 cumecs, cover the width of the riverbed, reworking the braid pattern and keeping the bed largely free of vegetation. Thus, large floods are important for maintaining the braided character of the Rangitata River. In his oral evidence, Dr Murray Hicks (for Fish & Game) stated that the magnitude and frequency of channel-forming flows would be unaffected by the proposed 10 cumec take. This was not disputed by any other experts.

12.16 In summary, hydrology experts agreed that the proposed take will have a small effect on the frequency of freshes, but that others were best to interpret effects on ecology and sediment transport. However, it is clear that the proposed take would not affect the sort of flood flows that are important for maintaining the braided character of the Rangitata River.

River Mouth Opening

12.17 Concerns were raised by a number of submitters regarding impacts of the proposed 10 cumec take and existing takes on the Rangitata River mouth and its associated lagoon, or hapua. Mr Veendrick stated that closure of the Rangitata River mouth has been recorded on only a very limited number occasions, when flows have dropped below 30 cumecs, and that flows in excess of 150 cumecs may be necessary to breach the mouth if it closes. Mr Veendrick concluded that the proposed 10 cumec take would not affect river mouth closure, because water will be abstracted at river flows well about 30 cumecs and because the take would have only a small impact on flows above 150 cumecs.⁶⁴ The same conclusion was reached by Mr Justin Cope (expert in coastal processes and geomorphology, for CRC and Dr Hicks)⁶⁵.

12.18 In response to questions from the Commissioners, Mr Cope stated that river mouth openings are undertaken by CRC, funded by a rate from the local hut holders. Openings are generally managed for flood mitigation purposes. He stated that increasing size of the hapua and migration of the river mouth along the coast are caused by low river flows combined with the power of waves to move sediment. He stated there is a "constant battle between the river and ocean", and that during lower flows the sea tends to win, pushing the river mouth northwards. This is the dominant position of the river mouth. The effect of this is that the lagoon gets higher. The length of the hapua is related to the length of time between floods and freshes. Mr Cope stated that the length of time between floods and freshes will not be affected by the current proposal. However, he did state that water abstraction over the last 70 years could have affected base flows and contributed to a more elongated river mouth. That corroborates local observations, and he gives weight to those observations, as they tend to be accurate.

⁶⁴ Mr Veendrick, Evidence in Chief, pages 45 and 46.

⁶⁵ Stated in response to questions from the Commissioners at the hearing.

- 12.19 Mr Hicks agreed with Mr Veendrick and Mr Cope that the proposed 10 cumec take would not affect river mouth opening. However, he did raise issues with sediment transport, which are discussed further in the following section.
- 12.20 Overall, we agree that the proposed 10 cumec take will not significantly affect river mouth openings, because water will be taken at higher river flows than those required to keep the mouth open. Some concerns were raised by submitters about sediment build up in the lower reaches of the river, and they are discussed in the next section.

Sediment Transport

- 12.21 Impacts of the proposed 10 cumec take on sediment deposition was the key issue raised by salmon anglers and Fish & Game. Salmon anglers and hut holders near the river mouth were particularly concerned about effects of existing takes on sediment build up in the lower river, and how the new take would affect that⁶⁶. The concern here being that it is difficult to catch a salmon in such conditions and that fine sediment build up negatively affects the overall river's character. FISH & GAME and Dr Meredith also raised concerns about reduced river flows increasing fine sediment deposition, reducing habitat for macroinvertebrates and fish (discussed further in the following section).
- 12.22 In addressing this issue, Mr Veendrick stated that the key question is the effect of the proposed take on water velocities, due to the relationship between flow, velocity, and turbidity. Mr Veendrick stated that the largest relative reduction in velocity as a result of the proposed take is when flows at Klondyke are 142.6 cumecs; at these flows, the mean velocity at Arundel is reduced from 0.745 m/s to 0.716 m/s, a 3.9% reduction⁶⁷. Mr Veendrick therefore concluded that based on this small reduction in velocity, it is unlikely that settling of fine sediment downstream would change appreciably.
- 12.23 We note hear that Dr Hicks and Mr Cope were the only two experts to present evidence at the hearing who have particular expertise in sediment transport and geomorphology. We therefore relied heavily on their expert evidence to test RDRML's technical evidence and the observations of salmon anglers and hut holders.
- 12.24 Dr Hicks in his verbal address stated that the river is not near some sort of tipping point, in terms of the river losing its braided character. He gave the example of the lower Waitaki River, where reduced flows from upstream dams have resulted in the lower river being prone to invasion by woody vegetation that has to be kept in check by the regional council. He does not see such an issue in the Rangitata River. Dr Hicks said that it is the large floods – in the order of 1,000 cumecs – that do the bulk of work clearing the riverbed, and that these flows are unaffected by existing takes.
- 12.25 However, Dr Hicks stated that based on published literature and his experience in this area, existing water takes from the river are likely responsible for increased fine sediment deposition and reduced bedload transport⁶⁸. In response to questions from the panel at the hearing, he

⁶⁶ For example, oral submissions from: Mr Tim Wakefield, Mr Robert Mortimer, Mr Paul Hodgson, Mr Trevor Isitt (North Rangitata Hut owners), and Mr Ian Watson (Save the Rivers).

⁶⁷ Mr Veendrick's, Supplementary Evidence, dated 24 April 2018, paragraph 53.

⁶⁸ Dr Hicks, Evidence in Chief, paragraph 14.

said that the sand build-up in the lower river observed by salmon anglers is most likely due to the cumulative effects of the large amount of water abstracted. He considered that further abstraction will add incrementally to both fine sediment deposition and reduced bedload transport, and recommended monitoring of both.

- 12.26 At the hearing, Dr Hicks considered that monitoring fine sediment deposition could be done over a relatively short timeframe (several years) in the reach between the RDR and RWL takes (i.e. upstream of Arundel), and that any additional impacts of the increased take could be compared to that baseline. Dr Hicks said that changes in bedload transport could take many years to respond to flow changes. However, he saw value in monitoring bedload transport, in terms of understanding the processes and providing baseline information to inform management decisions. This is clearly problematic from a consent perspective, as we consider it would be virtually impossible to tie any impacts of the 10 cumec take to bedload transport measurements.
- 12.27 While the additional take will contribute to this existing effect, evidence from Dr Hicks and Mr Cope indicate that the magnitude of effect for the proposed 10 cumec take will be small and that it may take many years to be realised. Dr Hicks advocated a precautionary approach of monitoring of bedload transport and adaptive management, whereas Mr Cope considered any effects of the additional take on bedload transport would be difficult to measure and monitor for.
- 12.28 In response to concerns raised by submitters and CRC during the hearing, RDRML has proposed to prepare a River Fine Sediment Monitoring Plan (RFSMP) and a River Geomorphology Monitoring Plan (RGMP) as a condition of consent which we have included in the conditions (CRC170654 condition 13). The purpose of RFSMP is to gather information on the deposition of fine sediment on the bed of the Rangitata River between the RDR intake at Klondyke and the Arundel Bridge upstream of the RWL intake and through to the sea.
- 12.29 The RFSMP is to include:
- (a) A requirement that the monitoring be undertaken by a suitably qualified and/or experienced person(s) who can demonstrate that they understand and can implement appropriate methods for assessing deposited fine sediment (such as but not exclusively those in Clapcott et al 2011).
 - (b) A description of the methods that are to be used for sediment assessments and analysis, including information on sampling locations, the number of sample replicates, sampling or assessment methodology, data analysis and reporting statistics. The sampling or assessment methodologies employed shall be consistent with the sediment assessment methodologies detailed in Clapcott et al 2011 and any other methods that are, in the opinion of the appropriately qualified and independent expert person, appropriate for monitoring river sedimentation.
 - (c) (i) Specify that the monitoring shall be undertaken for at least two full and consecutive years prior to the first abstraction of flood flow in accordance with this resource consent and then

shall continue for at least a further two full and consecutive years following the first abstracting of water authorised by this resource consent;

- i) State the minimum period between monitoring occasions; and
 - ii) Set out the optimal environmental criteria to be met for sediment monitoring to be triggered. The environmental criteria shall include, but not be limited to:
 - the optimum number of days that monitoring is to be undertaken following a flow of magnitude exceeding 140 cumecs;
 - river flow conditions under which monitoring is to be undertaken;
 - triggers that may relate to monitoring following a prolonged period of high flow take; and
- (d) Sets out a benthic macroinvertebrate monitoring programme for the Rangitata River that compliments the sediment monitoring component of the RFSMP and includes:
- i) representative habitats of the river, including sediment prone habitats;
 - ii) sampling methodology to assess invertebrate population density, diversity and distribution;
 - iii) data analysis and reporting content.
- (e) All of the monitoring locations shall include representative samples of river benthic environment including sediment prone habitats. Emphasis shall be on environments that are able to be easily accessed and repeatedly sampled over time².
- (f) The RFSMP shall include a list of the matters to be reported on and shall include, as a minimum:
- i) the existing range of levels of fine sediment deposition (cover and depth) in the river;
 - ii) the daily flows in the river at Klondyke for the previous three years;
 - iii) the estimated daily flows in the river immediately upstream of the Arundel Bridge after RDR abstraction is taken into account;
 - iv) more detail of river flows leading up to each round of monitoring;
 - v) a commentary on the relationship between sediment deposition, river flows and abstraction;
 - vi) Rangitata River benthic invertebrate population density, diversity and distribution; and

- vii) any recommendations for changes to the monitoring programme to better enable the purpose of the plan to be met and to better understand the relationship between fine sediment deposition, river flows and the RDRML take and return flows.
- (g) The consent holder shall within three months of the baseline monitoring required by condition 10A. being complete, prepare a report detailing the results of the monitoring that was undertaken, and shall:
- i) Set out an interpretation of baseline sediment deposition that occurs in the Rangitata River under different flows scenarios;
 - ii) Record the abstraction of water from the Rangitata River by the RDR over the course of the investigations and the discharges of water by the RDR back to the river over this time period;
 - iii) Recommend if there is a need to develop and impose sediment thresholds that constrain when water may be abstracted in accordance with this resource consent (noting that any thresholds would be based on recognised sediment monitoring guidelines, LWRP outcome criteria, the state of the Rangitata River benthic invertebrate community and good scientific practice); and
 - iv) Advise whether the abstraction of water in accordance with this resource consent causes a meaningful (in terms of its impacts on the water quality, habitats, and ecology of the Rangitata River) increase in fine sediment deposition within the Rangitata River. Should the report conclude that fine sediment deposition is increasing as a result of the abstraction authorised by this resource consent and that it is having meaningful adverse consequences for the water quality, habitats and ecology of the Rangitata River, it shall recommend a cascade of management responses that it should, in the opinion of the appropriate qualified and independent person, apply to the abstraction flow regime.
- 12.30 A copy of this report shall be provided to the CRC, within three months of completing the baseline sampling.
- 12.31 Following certification of the RFSMP by the CRC, the consent holder shall be responsible for undertaking the monitoring and reporting requirements for the section of Rangitata River between the RDR intake and the Arundel Bridge only. Monitoring further downstream is not the responsibility of the consent holder and it is anticipated that it will be co-ordinated by CRC.
- 12.32 The RGMP is to include the following components:
- (a) A requirement that the monitoring be undertaken by a suitably qualified and experienced person;

- (b) The proposed methodology for undertaking topographic surveys of river cross sections, surface-bed material grading and a riverbed long-profile;
- (c) The number and location of survey sites;
- (d) Require that at least one survey be conducted prior to the abstraction of water in accordance with this resource consent: and
- (e) Require the consent holder to undertake surveys every five years for the duration of the consent and to prepare a report after each survey detailing the results of the surveying required by the RGMP. The report shall compare results from previous surveys. A copy of this report shall be provided to the CRC, within one month of its completion.

12.33 Overall, we accept that there is likely an existing effect of water abstraction on sediment deposition, but that effects of the proposed 10 cumec will be minor. However, we also accept that impacts on fine sediment are less certain, largely due to a lack of existing monitoring data. We therefore support RDRML's proposal to monitor fine sediment and channel form between the location of their take and Arundel.

12.34 We also agree that monitoring downstream of Arundel should not form part of a consent to take 10 cumecs, due to the confounding effects of abstraction by other water users further downstream. Sediment monitoring downstream of Arundel would be best co-ordinated by CRC and other water users as part of a catchment programme that is outside of the scope of this decision.

Principal issue 2 - Effects on Aquatic Ecology and Water Quality

12.35 Numerous submitters expressed concern that the proposed 10 cumec take could adversely affect various aspects of the water quality and ecology of the Rangitata River. In his evidence for RDRML, Dr Greg Ryder assessed impacts of the proposed water take on physical habitat, freshes (or "flushing flows"), sediment transport, water temperature, food availability, and cumulative effects. These effects are discussed in the following paragraphs.

12.36 Under worst case conditions, where all consented abstractions are being taken, along with the proposed 10 cumec take (i.e., when the river flow just exceeds 142.6 cumecs at the Klondyke flow recorder), flows downstream of all takes would be reduced from 87 to 77 cumecs. Dr Ryder noted that previous instream habitat assessments have shown that a reduction in flow from 87 to 77 cumecs results in some minor loss of potential physical habitat for some species or life stages (including common bully, torrentfish, juvenile eels, and mayfly invertebrates) and gains in habitat for others (including juvenile salmon, yearling and adult brown trout, and adult longfin eel). He further noted that the changes in available habitat are short-lived and are unlikely in his opinion to be ecologically meaningful, given that the river does not flow continuously above 140 cumecs for very long throughout a typical year⁶⁹.

12.37 Dr Meredith (for CRC) criticised Dr Ryder's use of flow-habitat models to assess effects, and suggested more sophisticated modelling could have

⁶⁹ Dr Ryder Supplementary evidence, paragraph 10, dated 24 April 2018.

been used, such as a bio-energetics approach⁷⁰. In response, Dr Ryder stated that higher flows in the Rangitata River result in lower water clarity and potentially reduced foraging area for drift-feeding fish. However, in his opinion, the change in water clarity associated with flows of between 132.6 and 142.6 cumecs is very subtle, of limited duration and unlikely to be critical to the growth of trout and juvenile salmon. He therefore concluded that applying a bio-energetics approach to evaluating effects of the proposed 10 cumec take would be of limited value for assessing ecological effects.⁷¹

- 12.38 Dr Meredith did not comment on Dr Ryder's explanation for using the chosen modelling approach. However, Dr Meredith in his verbal evidence stated that he felt the application relied too heavily on habitat modelling assessments and lacked a "holistic" view of the activities, including consideration of cumulative effects. He also stated that the river reaches downstream of both the RDR and RWL takes are more "at risk" from abstraction, particularly during summer low flow conditions. He stated that in particular, temperature, nutrients, sedimentation, and development of algal growths may result from abstraction and that these factors should be addressed.
- 12.39 Turning first to temperature, Dr Ryder stated that previous water temperature modelling of the Rangitata River predicted that when river flow decreased from 60 to 30 cumecs, the mean daily water temperature increased by about 1°C over a 50 km length of the river, and the daily maximum water temperature increased by between 1 and 2.5 °C. He also noted that the proposed 10 cumec take would occur at higher flows than those modelled, and previous monitoring of Rangitata temperature showed that higher flows are generally associated with lower water temperatures⁷². Dr Ryder presented temperature monitoring data from the Rangitata River downstream of the existing RDR take, which showed that the relationship between river flow and temperature was weak⁷³. Dr Ryder further stated that *Deleatidium* mayflies are the most common invertebrates in the Rangitata River and that they are relatively intolerant of high temperatures, yet do not appear to be affected by existing takes from the river⁷⁴. Dr Ryder therefore concluded that the proposed 10 cumec take would have minimal effect on water temperature.
- 12.40 At the hearing, Dr Meredith commented that RDRML's temperature assessment was mostly done by modelling. He then stated that CRC has been monitoring temperature and is seeing differences between models and measured data in other Canterbury braided rivers. However, he said that he had not looked at data in any detail, and he was unaware of any other temperature monitoring data from the Rangitata River other than that already summarised by Dr Ryder. While we appreciated Dr Meredith's concerns, we consider that Dr Ryder provided sufficient modelling and monitoring data to support his opinion that the proposed 10 cumec water take would have minimal, or minor, effects on water temperature.
- 12.41 Turning to the matter of nutrients, Dr Meredith expressed concern that the Rangitata River receives increasing nutrient loading from adjacent

⁷⁰ Dr Meredith, Memorandum dated 22 February 2018, page 2.

⁷¹ Dr Ryder Evidence in Chief, paragraph 51.

⁷² Dr Ryder Supplementary evidence, paragraph 13, dated 24 April 2018.

⁷³ Dr Ryder Evidence in Chief, paragraph 141.

⁷⁴ Dr Ryder Evidence in Chief, paragraph 45.

intensive land use, and that RDRML's assessment needed to take this into account. In response, Dr Ryder produced summary plots of dissolved reactive phosphorus and nitrate-nitrogen collected by CRC from three sites in the Rangitata River, including regular monitoring data from 1993 to 2016. Dr Ryder stated that while he had not undertaken any statistical trend analysis, his visual inspection of the data suggested that there is no upward trend in these bioavailable nutrient concentrations in recent times. No other nutrient data was presented by CRC or any other submitters at the hearing. We therefore consider that RDRML has adequately considered any increasing trends in nutrients in their assessment of effects of the 10 cumec take.

- 12.42 Turning to the matter of sedimentation, numerous submitters expressed concerns about effects of the proposed 10 cumec take on sediment deposition and aquatic ecology. As detailed in the previous section, we heard evidence that impacts of the proposed take on sedimentation were likely to be small, but that monitoring was recommended to address uncertainty. Dr Meredith raised the issue of increased fine sediment deposition leading to increased phosphorus avoidable for cyanobacteria blooms⁷⁵. In response, Dr Ryder noted that the Rangitata River carries a naturally high fine sediment load. He then stated that he doubts that fine sediment is currently in short supply and any potential change in fine sediment deposition caused by the proposed 10 cumec take would "seem trivial relative to the normal situation".⁷⁶
- 12.43 Given the interest in the potential effects of sediment deposition, we will cover this matter in some detail here. In his evidence in chief⁷⁷, Dr Ryder noted that at flows of 132.6 to 142.6 cumecs, water clarity is naturally very low and sediment concentrations are naturally high. These factors combine to limit aspects of biological productivity such as algae and plant growth, and feeding by benthic invertebrates and fish. Because large flows that scour the river bed, removing periphyton and fine sediment build-up, are largely unaffected by the proposal, Dr Ryder could see no reason why the biological integrity of the Rangitata River would change.
- 12.44 Dr Ryder's observations of the bed of the Rangitata River are that it carries a naturally high sediment load, with very fine sediments covering larger cobbles and boulders in places, and coarser sand fractions filling the interstitial spaces between the larger substrate materials. Based on a review of the literature and his familiarity with the Rangitata River, Dr Ryder stated that the invertebrate community of the Rangitata River is dominated by *Deleatidium* mayflies and chironomids, and it is similar in community composition to the Rakaia and Waimakariri Rivers. Dr Ryder stated that the invertebrate composition of the river is mainly determined by disturbance events. He concluded that he did not expect the proposed 10 cumec take to alter the invertebrate community at all, either in density or species composition. He further stated that invertebrate densities and community composition will be driven by the frequency of large floods, water clarity and water quality and, in his opinion, these will not change. Dr Ryder also noted that the tolerance of native fish to suspended sediment is variable, but generally high and most will tolerate the range of suspended sediment levels experienced in the

⁷⁵ Memorandum from Adrian Meredith, page 5, dated 22 February 2018.

⁷⁶ Dr Ryder Evidence in Chief, paragraph 152.

⁷⁷ Dr Ryder Evidence in Chief, paragraphs 37 to 40.

Rangitata River at flows in the range affected by the Proposal.

- 12.45 When asked by the Commissioners about the current ecological state of the river, Dr Meredith stated that he has not spent a lot of time on the Rangitata River itself and that much of his evidence was taking a precautionary approach to what he saw as a lack of evidence. He was concerned that he would expect to see some major effects arising, given the total amount of water abstracted from the river.
- 12.46 Differences in opinion between Dr Ryder and Dr Meredith about the scale and significance of ecological effects of the 10 cumec take boil down to Dr Ryder using modelling and monitoring data to assess the incremental effect of the take, and Dr Meredith expressing a more general concern about cumulative effects. While we appreciate the concerns raised by Dr Meredith and other submitters regarding cumulative effects, no ecological evidence was presented to support the contention that the Rangitata River is in a degraded or declining ecological state. At the hearing, Dr Meredith stated that there are no plans for CRC to put an allocation cap on the river any time soon, as there are higher priority waterways being focussed on (mostly smaller foothills-fed or spring-fed streams). Dr Meredith also stated that there are no plans to expand CRC's existing monitoring of the river, despite his concerns that the river may be near some ecological tipping point.
- 12.47 Given the information presented to us, we are inclined to agree with RDRML's assessment that the proposed 10 cumec take will not adversely affect biological communities due to sediment impacts. That is because RDRML's assessment was supported by available modelling and monitoring data, coupled with experience of monitoring the Rangitata River itself. Although there is the potential for cumulative effects, given the scale of existing abstraction from the river, this effect is not borne out by any monitoring to date.
- 12.48 We now turn to the impacts of the proposed 10 cumec take on freshes and associated impacts on periphyton growths. Dr Ryder reviewed hydrological data from Mr Veendrick on FRE1.5 to FRE3 fresh events and associated inter-flood "accrual" periods (when periphyton can grow and accrue biomass). His interpretation of the hydrological data was that the magnitude of predicted hydrological changes are sufficiently small to result in no meaningful increase in the risk of nuisance periphyton growths occurring downstream of the RDR take. While the existing FRE3 is reduced relative to the natural (no abstraction) situation, Dr Ryder considered that the reduction in these flow peaks is relatively modest such that they can still be regarded as flood events and probably still capable of providing some flushing of the river bed. Dr Ryder referred to river flow plots from average and dry years and concluded that in his opinion, the plots indicate that the river's annual flow variation is largely unaltered to the point that it could cause periphyton to bloom⁷⁸.
- 12.49 At the hearing, Dr Meredith acknowledged Dr Ryder's ecological assessment, but he maintained that effects had not been adequately assessed in the lower river. When asked what further ecological assessment he considered necessary, Dr Meredith said he would like to have seen more data collected from the Rangitata River and compared with other braided rivers, to get a feel for the degree of risk posed by the proposed 10 cumec take. However, Dr Meredith said that it would

⁷⁸ Dr Ryder Evidence in Chief, paragraphs 332 and 33.

also be valid to take a stepped approach to development, involving monitoring of an activity and allowing further development if no effects are detected.

- 12.50 As with sediment-related effects, the differences in opinion between Dr Ryder and Dr Meredith regarding hydrological impacts also boil down to incremental versus cumulative effects. While Dr Meredith insisted that more monitoring data was necessary to assess cumulative effects of water abstraction, he was unable to present any CRC monitoring data in support. Dr Meredith further conceded that ecological monitoring of braided rivers presents technical difficulties, which is one of the reasons CRC does not conduct state of the environment macroinvertebrate monitoring in the Rangitata River. Given the information presented to us, we are inclined to agree with RDRML's assessment that the proposed 10 cumec take will not adversely affect biological communities due to impacts on river hydrology. That is because RDRML's assessment was supported by available modelling and monitoring data, coupled with experience of monitoring the Rangitata River itself.

Aquatic Ecology Effects Summary

- 12.51 Overall, we agree with RDRML's position that the proposed 10 cumec take should have minor or less than minor effects on water quality, aquatic habitat, and ecological values. RDRML's assessment included consideration of physical habitat availability, freshes, sediment, temperature, nutrients, periphyton, macroinvertebrates, and fish. Thus, the assessment included all of the attributes Dr Meredith considered necessary to undertake a "holistic" assessment of effects. However, we accept that impacts on fine sediment are less certain and we therefore consider that the monitoring of sediment and macroinvertebrates proposed by RDRML is warranted.

Principal issue 3 - Effects on Recreation

Recreational Fisheries

- 12.52 As noted in preceding sections, salmon anglers and Fish & Game expressed concern that the proposed 10 cumec take would impact salmon and the associated recreational fishery. We note that RDRML did not present evidence from any witnesses who claimed to be expert anglers. However, Dr Ryder presented ecological data and Mr Rob Greenaway, who has expertise in assessing recreational effects, assessed recreational effects, including effects on angling amenity. Mr Mark Webb from Fish & Game stated that his key concern was impacts of the proposed 10 cumec take on fine sediment concentrations and deposition⁷⁹.
- 12.53 The proposed 10 cumec take would occur when Rangitata River flow is 142.6 cumecs, with the take dropping progressively to zero at a flow of 132.6 cumecs. Dr Ryder presented monitoring data showing that in this flow range, the clarity of the river is low, with visibility in the order of only 9 to 12 cm. Mr Webb stated that salmon angler activity targets Klondyke flows between 70 and 110 cumecs and that angling activity declines rapidly in flows over 110 cumecs as water clarity deteriorates. Mr Webb noted that RDRML's proposed 10 cumec take will occur at flows from 132.6 cumecs, when the river is dirty. He concluded that the net effect of the proposed take and existing takes will be to reduce the

⁷⁹ Oral reply to a question from the Commissioners regarding impacts of the 10 cumec take.

lower river flow to 77 cumecs, and that at times this flow will have the clarity of the river above Klondyke and be unsuitable for angling.

- 12.54 We are not inclined to agree with Mr Webb's argument regarding effects on fishable flows in terms of water clarity. That is because the proposed take will occur at flows that are already deemed to be higher than preferred, due to poor water clarity. That the take would draw flows down to a level that would be more readily fished, if the water were clear enough, is irrelevant if the flows were not previously fishable anyway.
- 12.55 Mr Webb also stated that maintaining flow variability is important, both in terms of providing a cue for salmon to migrate, and for providing suitable flows for catching fish. He stated that during the salmon fishing season, a rapid rise in flow preceding a flood or fresh peak will provide a short period of time when flow and clarity are within the preferred fishing flow band of around 70 to 110 cumecs. After the flood peak, as flow gradually recedes, the period of time the river spends in the preferred fishing band is longer and attracts concerted angler effort if this occurs during peak salmon fishing periods. The post-flood peak fishing band is that which is most commonly used by anglers because it is easier to predict and it is longer in duration. In Mr Webb's opinion, the fact that angling success is higher also indicates that salmon abundance and behaviour are more likely to favour angler catch.⁸⁰
- 12.56 As discussed in the preceding section, in weighing-up the evidence presented, we agree with RDRML's position that the proposed 10 cumec take will have minimal effect on flow variability. The river will remain a flood-disturbed river with a naturally high fine sediment load, and the hydrographs presented at the hearing showed little impact of the proposed take. On that basis, we consider that the proposed take will not affect flow variability to the extent that it would impact on migratory cues for salmon or preferred flows for salmon anglers.
- 12.57 Fish & Game proposed 1:1 flow sharing conditions to partially mitigate impacts of the take. When questioned about the value of 1:1 flow sharing, Dr Hicks did not see any real benefit in terms of sediment transport, because it will not affect the total quantity of water being taken. No other scientists with expertise in sediment transport presented evidence to the contrary.
- 12.58 In terms of impacts on reliability, Mr Veendrick stated that 1:1 flow sharing of the entire 10 cumec take would reduce water availability to RDRML by approximately 7% compared to an unrestricted take⁸¹. However, this assumes that all of the 10 cumecs could be taken; we heard from Ms Hamm that only 5 cumecs could be taken in a 1:1 flow sharing situation, because the application under consideration is to take water when flows are between 132.6 and 142.6 cumecs⁸². This means that 1:1 flow sharing would result in only 5 cumecs being taken, which would slightly reduce hydrological and ecological impacts of the new take (the effects of which are already assessed as being small), and reduce water availability to RDRML (such that the impact on reliability would be greater than the 7% modelled by Mr Veendrick).
- 12.59 We have previously discussed impacts of the proposed 10 cumec take

⁸⁰ Mr Webb Evidence in Chief, paragraph 62.

⁸¹ Mr Veendrick's, supplementary evidence, dated 24 April 2018, paragraph 48.

⁸² Ms Hamm's reply submission, dated 4 May 2018, paragraph 116.

on fine sediment. In summary, we found that the proposed take may have a small, or minor, impact on fine sediment deposition and we agree with the proposed monitoring to reduce uncertainty.

- 12.60 A related concern from Fish & Game was that reduced river flows could result interact with consented discharges of sediment from the RDR sand trap to increase fine sediment deposition downstream. Mr Webb referred to the 1986-1996 Rangitata River Water Management Plan, which included conditions requiring that the RDR sand trap discharge occurred at river flows greater than 140 cumecs, to avoid impacts on recreational fishing. Mr Webb then referred to the evidence of Dr Hicks and his assessment of the sand trap flushing and the effect that an additional 10 cumec take would have on sediment deposition downstream of the sand trap discharge site. Mr Webb concluded that Dr Hicks' evidence supports the raising of the minimum flow for sand trap discharge events by 10 cumecs to a Klondyke flow of 150 cumecs, to take account of the additional abstraction.⁸³
- 12.61 In response to concerns from Fish & Game, RWL and other submitters, RDRML has proposed a condition for the 10 cumec water take that limits the taking of water to periods when the discharge from the sand trap associated by consent CRC011241 (or any replacement resource consent) is not occurring. We consider that the proposed condition adequately addresses concerns regarding impacts of the proposed take on fine sediment effects associated with the sand trap discharge.
- 12.62 In summary, we are satisfied that effects of the proposed 10 cumec take on the recreational fishery will be minor. We do not see any value in 1:1 flow sharing in this instance, because we heard that it will have no beneficial impact. However, we support the proposal to monitor fine sediment and invertebrates before and after commencement of the 10 cumecs take, to address uncertainty regarding effects and because the proposed monitoring includes a requirement to respond to any unanticipated adverse effects. We also support the proposed condition limiting the proposed take to periods when the sand trap is not discharging.

Effects on Rafting and Kayaking Amenity

- 12.63 A number of submitters expressed concern about effects of the proposed 10 cumec take on rafting and kayaking.⁸⁴ Particular concerns related to impacts of the take on preferred flow bands for rafting and kayaking. Effects on jet boating were not a matter in contention.
- 12.64 Mr Greenaway (recreation expert for RDRML) assessed effects of the proposed take by comparing flow statistics provided by Mr Veendrick with preferred flow bands for jet boating, kayaking and rafting based on literature review and consultation with White Water New Zealand (WWNZ). Mr Greenaway summarised a range of flow statistics, but key messages from his analyses were that the proposed take would result in an increase in the average number of days flows would be in the range of around 80 to 100 cumecs and a reduction in the availability of flows above 100 cumecs⁸⁵.

⁸³ Mr Webb, Evidence in Chief, paragraph 101.

⁸⁴ Submissions from Peel Forest Advocates Group, Mr Mike Pemberton, Mr Kenneth Cooper, Mr David Lerner, and Whitewater New Zealand.

⁸⁵ Mr Greenaway, Evidence in Chief, Table 1, page 10.

- 12.65 There was considerable disagreement between Mr Greenaway and Dr Doug Rankin (expert kayaker for WWNZ) about the significance of effects of hydrological changes on kayaking and rafting. In essence, Mr Greenaway considered that effects were acceptable, and Dr Rankin strongly disagreed.
- 12.66 Mr Greenaway acknowledged that the proposed take results in what he considers to be a small loss to the preferred flows for more advanced kayaker's effects, but he considered that the change would be difficult to perceive due to their scale and occurrence during periods of natural flow change. He further considered that the commensurate increase in (lower) preferred flows for "educational purposes", on a river reach used heavily for teaching kayaking, represents an acceptable balance⁸⁶.
- 12.67 Dr Rankin stated that the proposed take results in what he described as very significant losses in flow availability for intermediate and advanced/expert kayakers, and significantly reduced flow variability. In addition, he considered that losses in high flows are not compensated for by an increased number of days that the river is at lower flows.⁸⁷ Dr Rankin expressed particular concern that the additional 10 cumec take would represent a "tipping point", where the amenity for rafting or kayaking would not be retained as required by the WCO.⁸⁸
- 12.68 To better understand the significance of effects, the Commissioners asked Mr Greenaway and Dr Rankin about how intensively the Rangitata River is used for rafting and kayaking downstream of Klondyke. In response to questions, Mr Greenaway stated that the WCO Tribunal's decision focussed heavily on the educational value of the stretch of river downstream of Klondyke. In response to questions, Dr Rankin stated that the predominant users of that reach of the river are beginner to intermediate users, that advanced paddlers would not seek it out, and that rafters also use that section. The Commissioners asked Dr Rankin how often the impacts would actually be visited on a kayaker or rafter wanting to use that stretch of river. In response, Dr Rankin stated that he could not give a direct answer; that it depends how far away the paddler lives from the river, how frequently they get out, and what sort of year it's been. Dr Rankin said that instead of quantifying the effect, he opted to "put a peg in the ground and protect residual values".
- 12.69 More information on river usage by kayakers and rafters was provided by Mr Grant South, a professional kayak and raft guide, who has an adventure tourism company based at Peel Forest. Following questions from the Commissioners, Mr South confirmed that the section of river downstream of Klondyke is heavily used for educational purposes by schools and polytechnics, with at least one commercial group a week. Mr South considered that flows of 70 to 120 cumecs were optimal for educational trips, as flows were neither too high nor low to be dangerous. At the hearing, Mr South said he did not anticipate the proposed take would have economic impacts on him as a commercial operator, because his rafting business can operate on the Rangitata River at a range of flows.
- 12.70 In response to concerns from WWNZ, RDRML has proposed two particularly noteworthy conditions to mitigate effects of the proposed 10 cumec take.

⁸⁶ Mr Greenaway, Supplementary Evidence, paragraph 9, dated 24 April 2018.

⁸⁷ Dr Rankin Supplementary Evidence, paragraphs 11 and 12, dated 29 April 2018.

⁸⁸ Dr Rankin Supplementary Evidence, paragraph 22, dated 29 April 2018.

- 12.71 The first condition (CRC170654 condition six) is that the water take must cease whenever flows drop below 132.6 cumecs, rather than being based on the mean flow for the previous 24 hour period (as was previously proposed). The purpose of this condition is to respond more rapidly to dropping water levels, leaving more water in the river. We consider that this condition represents good practice in terms of resource use, as it will help ensure water is only taken when it is above 132.6 cumecs and will better avoid impacts at lower flows.
- 12.72 The second condition (CRC170654 condition 24(a)) is that the take is to cease on at least four separate days or part days on weekends between the hours of 8 am and 6 pm from 1 March to 31 May, when flow in the Rangitata River on a flow recession is in the range of 132.6 to 230 cumecs. The take is to cease on a further four days or part days under similar conditions, providing the KSF is in excess of 75% full. We consider that this is a significant concession to WWNZ.

Kayaking and Rafting Effects Summary

- 12.73 We accept that the proposed 10 cumec take will have an effect on flows available for more experienced kayakers and rafters that value higher flows. However, we heard that by far the greatest users of the river downstream of Klondyke are paddlers with beginner to intermediate levels of experience, and that flows of value to them are relatively unaffected, or improved (acknowledging that views differed here). We consider that the proposed conditions adequately mitigate potential adverse effects, such that the kayaking and rafting values of the river are maintained.

Principal issue 4 – use of water

- 12.74 Consent application CRC182631 is for a water permit to use water under CRC170654 (the proposed new 10 cumec take) for storage, irrigation and stock water purposes, and to generate electricity at Montalto and Highbank Power Stations.
- 12.75 RDRML already holds consent CRC121664, which authorises the use of water for: irrigation of up to 94,486 hectares, stock water, hydroelectric power generation, the use of land for farming and the discharge of nutrients to water arising from the use of land for farming. Consent CRC121664 allows for an increase in irrigable area from the current irrigated area of 75,000 to 94,486 hectares. Consent CRC121664 expires in 2019 and RDRML is in the process of preparing a replacement consent application. The use of water beyond the consented 94,486 hectares would require a separate water use consent. Similarly, a separate water use consent will be required should water be used for MAR or TSA⁸⁹.
- 12.76 Two common concerns were raised by submitters in relation to the use of water under this bundle of consents. The first was whether the additional water taken for storage represents an efficient or reasonable use of the natural resource. The second concern was that the additional water would be associated with land use intensification and that this could impact negatively on water quality in groundwater and surface waters. A related question of whether resource consent is required for the storage of water has been addressed earlier in the decision, in the section on preliminary procedural and legal issues.

⁸⁹ Assessment of Effects Report prepared by Ryder Environmental, July 2016, page 54.

- 12.77 The following sections discuss the matters of reasonable use and land use intensification.

Reasonable Use of Water

- 12.78 Concerns were raised by submitters about whether the proposed additional amount of water taken under the water take consent (CRC170654) and the dam application (CRC170657) constitutes a reasonable use of water⁹⁰.

- 12.79 This is really two sub-issues: whether there is a demonstrated need for the water, and whether the water that is taken for irrigation will be applied efficiently, based on irrigation demand. The first issue is directly relevant to the applications at hand, as it relates to the amount of water taken for and stored by the KSF. The second issue is arguably less closely related to the applications before us, because it relates to technical efficiency and that is normally addressed via consents held by farmers or irrigation schemes related to the use of water for irrigation. However, we did hear evidence around this matter, and we appreciate that some degree of understanding of technical efficiency is required to understand the total volume of water taken for storage. We therefore consider matters of the need for water and technical efficiency together in the following discussion.

Water Requirements for RDRML

- 12.80 Mr Curry (Chief Executive Officer of RDRML) provided an overview of the current and future irrigation needs that RDRML might reasonably be expected to provide for⁹¹. Mr Curry indicated that primary drivers behind the KSF proposal are to provide increased irrigation reliability to existing RDRML shareholders and to provide additional water to irrigate the extra approximately 20,000 hectares of land authorised under CRC121644. In addition, the KSF provides the opportunity to provide for the needs of regional storage, as well as MAR or TSA.
- 12.81 Mr Curry noted that the RDR is primarily a “run of river” scheme, with no major storage. This means that when high flows in the Rangitata River coincide with low water demand from irrigators, the water is unable to be held for times of higher demand. Conversely, low flow restrictions from either the Rangitata or Ashburton Rivers sometimes prevent irrigators from taking water during periods of high irrigation demand. Mr Curry stated that irrigation restrictions can significantly impact on the supply of water to shareholder farms and that this is the principal driver behind the KSF proposal⁹².
- 12.82 It is worth noting here that RDRML currently sources a portion of the water for the scheme from the South Branch of the Hakatere/Ashburton River under consent CRC011245. The Ashburton River is subject to minimum flow requirements, which are included on CRC011245. LWRP Chapter 13 (Ashburton) seeks a staged increase to the minimum flow for the Ashburton, including the South Branch, from 1 July 2023 and again from 1 July 2033. As discussed further below, the increased minimum flow in the Ashburton River will reduce water available for irrigation, and this is one of the reasons RDRML is proposing the KSF.

⁹⁰ For example: Te Rūnanga o Arowhenua, Central South Island Fish and Game, and Rangitata Water Limited. CITATIONS TO BE ADDED HERE.

⁹¹ Mr Curry, Evidence in Chief dated 28 March 2018 and Supplementary Evidence dated 23 April 2018.

⁹² Mr Curry, Evidence in Chief, paragraph 5.3.

- 12.83 Mr Veendrick used the supply-demand model MATLAB to assess irrigation demand, storage requirements, and impacts on flows in the Rangitata River⁹³. The model supplies water to the RDRML area from the Rangitata and Ashburton rivers in accordance with the flow allocation rules in existing consents held by RDRML. The model assumes water is also available from the proposed storage facility at Klondyke and the existing 6 Mm³ storage facility at Carew. In addition, the model assumes complete piping of the supply system to each irrigation area from the RDR and efficient spray irrigation (predominantly centre-pivot).
- 12.84 Mr Veendrick stated that water demand in the model is driven by a soil moisture balance model applied to each of the three shareholder irrigation schemes that takes into account soil type, land use, irrigation, rainfall and evapotranspiration. The irrigation demand model was calibrated using measured irrigation data from five farms within the Barhill Chertsey Irrigation scheme.
- 12.85 Various scenarios were presented to show impacts of different irrigation applicant rates and on irrigation demand and storage requirements, ranging from existing scheme application rates of around 0.41 – 0.48 L/s/hectare up to 0.6 L/s/hectare⁹⁴. The results indicated that to irrigate the existing consented area of 94,486 hectares would require a storage volume of 22 Mm³, if no further water was taken from the Rangitata River and assuming existing application rates of 0.41-0.48 L/s/hectare. Assuming the same application rates, but including the additional 10 cumec take reduces the required storage volume down to 14 Mm³. Increasing the application rates to 0.6 L/s/hectare increases the storage requirements up to 78 Mm³ excluding the 10 cumec take and 55 Mm³ including the take.
- 12.86 Mr Veendrick presented supplementary evidence showing the impacts of the new Ashburton River minimum flow rules in the LWRP that commence in 2023 and come into full effect in 2033⁹⁵. His evidence showed that, assuming existing irrigation application rates and no 10 cumec take, storage volumes required to irrigate the full consented area of 94,486 hectares would increase from 22 Mm³ to 39 Mm³ when the Ashburton minimum flows come into full effect. Adding in the 10 cumec take reduced the storage volume down to 29 Mm³, but then increasing the irrigation application rate to 0.6 L/s/hectare increased the required storage volume to 55 Mm³.
- 12.87 The supply demand model is clearly sensitive to a range of input parameters, particularly irrigation application rates. In his evidence for RWL, Mr McIndoe stated that there was no justification for application rates of up to 0.6 L/s/hectare in the scheme command area⁹⁶. He went on to say that on-farm supply rates affect the storage requirements, the area able to be irrigated and the amount of water that needs to be taken from the Rangitata River. He was therefore of the opinion that it is important to use supply rates that have been justified in terms of meeting crop water demand, rather than just applying 0.52 l/s/hectare or 0.6 L/s/hectare to everything. Notwithstanding these comments, Mr McIndoe also stated at the hearing that it is common to lack information on demand for irrigation schemes at this stage in the planning process;

⁹³ Mr Veendrick, Evidence in Chief dated 12 April 2018, paragraphs 7.1 to 7.7.

⁹⁴ Mr Veendrick, Evidence in Chief dated 12 April 2018, Table 4.

⁹⁵ Mr Veendrick, Supplementary Evidence dated 24 April, Table 1.

⁹⁶ Mr McIndoe, Evidence in Chief, paragraph 50.

that is because irrigators will not completely commit until they know the cost of supply.

- 12.88 In response to Mr McIndoe's comments, Mr Veendrick stated that typical application rates for pasture under pivot irrigation in the Ashburton Lyndhurst and Mayfield Hinds Valetta irrigation area provided by the Irrigation Reasonable Use Database is 0.6 L/s/hectare⁹⁷. Mr Veendrick also stated that this application rate does not allow for predicted increases in evapotranspiration caused by future climate change. He further noted that the Irrigation Reasonable Use Database is used by CRC to determine reasonable and efficient use.
- 12.89 At the hearing, Mr Horrell considered that the supply demand model was adequate for providing an indication of the storage required for irrigation needs. In response to Mr McIndoe's criticism of the demand modelling, Mr Horrell said that Mr Veendrick's analysis was adequate and that he did not see any issue with it. He also added that raising the application rate to 0.6 L/s/hectare was a good conservative way of factoring in climate change. Mr Horrell qualified his statement by saying that application rates are not his area of expertise, but that he was simply basing his assessment on current use and looking at potential climate change impacts.
- 12.90 We heard from representatives of both the Mayfield Hinds Valetta and the Ashburton-Lyndhurst irrigation schemes about water demand in the RDRML command area. Mr Phil Everest is the director of MHV Water Limited (MHV), which was formed by the merging of the Mayfield Hinds and Valetta irrigation schemes. Mr Everest stated that the scheme draws over 21 cumecs from the RDR for irrigation of over 47,000 hectares⁹⁸. In addition to the economic benefits, Mr Everest said that improved irrigation reliability reduces nitrate leaching to groundwater. That is because storage would allow irrigators to apply water "just in time" rather than "just in case", meaning that more reliable water results in more efficient usage.
- 12.91 Mr Richard Brunton is an environmental engineer and he provided evidence for Ashburton Lyndhurst Irrigation Limited (ALIL) regarding water requirements for its irrigation scheme. Mr Brunton stated that ALIL currently has an agreement with RDRML to take up to 13,287 L/s of water from the RDR, and that they hold consents to irrigate up to 31,600 hectares, of which 28,100 is currently irrigated⁹⁹. He used a similar MATLAB supply and demand model to that used by Mr Veendrick to calculate water demand in the ALIL command area.
- 12.92 Mr Brunton concluded that the KSF storage would allow the ALIL scheme to increase irrigable area under existing consents and/or application rates while maintaining existing reliability. He stated that storage also partially offsets the reduction in reliability resulting from the future increased minimum flows for the Ashburton River. The proposed additional 10 cumec take reduces the storage volume required to offset the effects of the future Ashburton River minimum flows¹⁰⁰.
- 12.93 Ms Holly Simperingham is an environmental advisor for Trustpower and she presented evidence on the benefits of the KSF to Trustpower.

⁹⁷ Mr Veendrick, Supplementary Evidence dated 24 April 2018, paragraph 37.

⁹⁸ Mr Everest, Evidence in Chief dated 30 April 2018, paragraph 3.

⁹⁹ Mr Brunton, Supplementary Evidence dated April 2018, Table 1.

¹⁰⁰ Mr Brunton, Supplementary Evidence dated April 2018, paragraph 9.

Trustpower owns shares in the Highbank and Montalto hydroelectric power schemes, which source water from the RDR scheme. Ms Simperingham stated that the KSF would improve the certainty of water available for generation and provide greater flexibility between power stations and irrigators¹⁰¹. At the hearing, Ms Simperingham said that the improved reliability for Trustpower provided by the KSF is very small, perhaps 1%.

12.94 Ms Glen Greer is a research economist for Plant and Food Research and she presented evidence for RDRLM on economic benefits. Ms Greer concluded that the combination of the proposed 10 cumec take and KSF would contribute an average of \$34 million per year to the GDP of Ashburton District, as a result of increased reliability of supply, and an average of \$43 million if the irrigable area within the scheme boundaries is irrigated¹⁰². The total of \$77 million is equivalent to 3.9 per cent of the GDP generated in 2015. She estimated that an associated 445 jobs would be created on-farm, which represents an increase of 2.4 per cent of the 2015 level of employment.

12.95 Ms Greer went on to say that the total (direct, indirect and induced) effect of increased reliability of irrigation supply and expansion of the area irrigated on the Canterbury regional economy was estimated to be \$116 million in the average season, comprising \$51 million from increased reliability of supply, and \$65 million as a result of expansion of the irrigated area.

12.96 In summary, evidence was presented at the hearing that demonstrated the need for, and value of, somewhere between 22 mM³ and 55 mM³ of water for storage for RDRML. Exactly how much water is required depends on assumptions around irrigation application rates, new minimum flows in the Ashburton River, climate change impacts, and whether or not an additional 10 cumecs of water is taken from the Rangitata River.

12.97 Exactly how much water is needed for the existing RDRML consented area is a moot point if there is a sufficiently large and proven demand for water at a regional level. We therefore now turn to the matter of regional water requirements.

Regional Storage Requirements

12.98 Dr Brett Painter is a hydrologist and he is employed by CRC as the project leader for the Canterbury Water Management Strategy (CWMS) project strategy team. Dr Painter gave a presentation at the hearing on the regional water distribution modelling work he has been involved with since 2011/2012. His presentation was in response to a request from the Commissioners for details on regional demands for irrigation water.

12.99 In his presentation, Dr Painter stated that new minimum flows (either in effect or proposed) throughout mid- and south-Canterbury are designed to protect and enhance environmental values, but they will come at the cost of significantly reduced irrigation supply reliability. This reduced water supply will necessitate significant storage volumes, to maintain existing irrigation reliability. He noted that future climate change may further increase storage requirements.

¹⁰¹ Ms Simperingham, Evidence in Chief dated 2 May 2018, paragraph 13.

¹⁰² Ms Greer Evidence in Chief, paragraph 14 and 15.

- 12.100 Dr Painter concluded by saying that the regional storage needs beyond those required by RDRML total approximately 35 Mm³. He noted that the two main options for storage are the KSF and Lake Coleridge, but that the latter option would require at least some buffering from the KSF towards the southern end of the plains. The total volume required for storage drops below 35 Mm³ if Coleridge is included.
- 12.101 Regarding irrigation reliability, Dr Painter stated that the CWMS target is 95% reliability. However, he said that the issue is keeping water in the root zone so that it does not leach through to groundwater. He added that if there is anything less than 99% reliability (as modelled by RDRML), then you have very little ability to keep soil moisture at the right levels. So 99% is a lot better than 95% in terms of getting the correct soil moisture and reducing nitrate leaching to groundwater.
- 12.102 Mr Nicholas Ward is a farmer and member of Geraldine Water Solutions (GWS), a farmer-initiated group based around the Orari and Temuka River catchments in south Canterbury. Mr Ward stated that new limits for the Orari River in the LWRP will see a marked reduction in minimum flows and reduced allocation from the river, resulting in drastically reduced irrigation reliability¹⁰³. Similar minimum flow and allocation reductions have been signalled for the Temuka River catchment, but are not yet in the LWRP. Mr Ward stated that his group represents approximately 40 farmers with 7,000 to 9,000 hectares of land "at risk" that needs an alternative water source.
- 12.103 At the hearing, the GWS representatives stated that they are looking for approximately 2 cumecs of water for their area and that there are limited alternatives to the KSF. They said that there has been talk about water swap arrangements, using the likes of Lake Coleridge water, or with RWL. They stated that GWS do not have a preference for which option to go with at this stage, and that it will come down to costs. They further stated that on-farm storage is an option to help improve reliability, but that it would not be sufficient on its own.
- 12.104 The Commissioners asked whether taking more water from the Rangitata River to fix over-allocation in other catchments was a little like "robbing Peter to give to Paul". In response, the GWS representatives stated that either the KSF or Coleridge storage options involve taking water from a larger and more reliable water source. This would relieve pressure on smaller rivers such as the Orari and Temuka.
- 12.105 Mr Bob Bower is a groundwater expert and Project Manager for the Hinds/Hekeao MAR Pilot Working Group. Mr Bower gave a helpful presentation on MAR requirements for the Hinds-Ashburton area. His presentation was a response to questions from the Commissioners regarding water demands for MAR. Mr Bower explained the use of MAR to increase depleted groundwater levels and improve flows in spring-fed streams. He was cautious to note that MAR is just one of a number of tools to improve spring flows and water quality, including capping groundwater abstractions, and reviewing permits for actual usage.
- 12.106 Mr Bower said that the MAR Governance Group have set an annual groundwater recharge goal of 125 Mm³ in the first 10 years, and that this equates to an average of 4 cumecs throughout the year. He noted that ADC currently holds water permits to take about 3.5 cumecs or 118 Mm³ and that some of this could potentially be used off-season for

¹⁰³ Mr Mulligan, MacKenzie and Ward, Evidence dated 1 May 2018, paragraph 8.

MAR. Mr Bower concluded that beyond the out of season ADC stock water, the group need another MAR source and the Rangitata River is an obvious source.

- 12.107 We conclude that there is a demonstrated demand for water for regional storage in the order of 35 Mm³, plus requirements for MAR. While this need could have been more clearly outlined in the original application, we were provided with adequate information to confirm water requirements through the course of the hearing from RDRML, experts appearing for CRC, and the evidence presented by irrigators.
- 12.108 We conclude that there is a demonstrated need and economic value associated with the water that is to be taken and stored. While this need could have been more clearly outlined in the original application, we were provided with adequate information to confirm water requirements through the course of the hearing from RDRML, experts appearing for CRC, and the evidence presented by irrigators.
- 12.109 On the matter of technical efficiency we conclude that RDRML has presented sufficient evidence to demonstrate the ability to the water efficiently and that it would constitute a reasonable use. However, we add that this issue will need to be addressed thoroughly for each individual resource consent that involves taking water from the KSF for storage.

Land use intensification

- 12.110 Several submitters raised concerns that the additional water taken for storage would lead to more intensive land use (particularly dairy farming) and associated adverse effects on groundwater and surface water quality¹⁰⁴.
- 12.111 Issues relating to land use intensification are outside the scope of the current consents being sought. Such matters will be addressed via the separate consents held or obtained by irrigators to take the water from storage and use it for irrigation. At that stage, relevant LWRP planning provisions will come into play, including leaching limits for nitrate-nitrogen and the preparation and auditing of Farm Environment Plans.
- 12.112 Mr Curry stated that RDRML manages, on behalf of its shareholders, the management of nutrients and water quality¹⁰⁵. He noted that RDRML has voluntarily adopted an Audited Self-Management Programme for irrigation schemes associated with the RDR. This includes the requirement that all properties within the existing irrigation areas (prior to 1st of July 2016) operate in accordance with Regional Council approved Farm Environmental Plans (FEPs).
- 12.113 Failure to comply with the FEPs by a shareholder means that RDRML may withdraw the provision of water to that particular property via its associated irrigation scheme until such time as compliance is met. Mr Curry said that RDRML considers that this process assists in reducing the discharge of nutrients to the environment in mid-Canterbury and promotes good management practices relating to water quality. From 2019, the management of nutrients and on-farm activities will be the

¹⁰⁴ Notably: The South Canterbury Salmon Anglers Association and the Salmon and Riparian Support Trust, Te Rūnanga o Ngāi Tahu, and Te Rūnanga o Arowhenua.

¹⁰⁵ Mr Curry, Evidence in Chief, paragraph 4.9

responsibility of the Mayfield Hinds Valetta and Ashburton Lyndhurst irrigation schemes under a new land use consent.

- 12.114 In summary, although land use intensification is outside the scope of this decision, we can be confident that such issues are either already being addressed by RDRML via existing consents, or they will be in the future when additional consents are sought.

Relevant Planning Provisions

- 12.115 The LWRP has a number of relevant provisions of relevance to reasonable use and storage. These include:
- 12.116 Objective 3.4 which states that a "*regional network of water storage and distribution facilities provides for sustainable, efficient and multiple use of water.*"
- 12.117 Objective 3.10 which requires that "*water is available for sustainable abstraction or use to support social and economic activities and social and economic benefits are maximised by the efficient storage, distribution and use of the water made available within the allocation limits or management regimes which are set in this Plan.*"
- 12.118 Policy 4.53 states that "*any change to a resource consent to abstract surface water for irrigation as a "run-of-river" take to a "take to storage", is subject to the following conditions to mitigate any adverse effects:*
- (aa) *imposition of reasonable use determined in accordance with Schedule 10;*
 - (a) *a seasonal or annual allocation limit;*
 - (b) *a maximum instantaneous rate of take;*
 - (c) *if an environmental flow and allocation limit has not been set in Sections 6 to 15 a minimum flow that is required to sustain ecosystem or recreation values; and*
 - (d) *if an environmental flow and allocation limit has not been set in Sections 6 to 15 any required cessation necessary to maintain flow variability and freshes in the river."*
- 12.119 Policy 4.65 states that "*the rate, volume and seasonal duration for which water may be taken will be reasonable for the intended use.*"
- 12.120 Policy 4.6 requires that "*water abstraction for irrigation is managed so that:*
- (a) *winter flows are available for abstraction to storage, while ensuring ecosystem recovery through the maintenance of flow variability; and*
 - (b) *unless specified otherwise, abstraction is for a defined annual volume determined in accordance with Schedule 10."*
- 12.121 We consider that the proposal is consistent with the above LWRP policies. Regarding compliance with the Schedule 10 Reasonable Use Test, we note that the irrigation demand model was audited by Mr

Horrell and found to be an appropriate tool for calculating irrigation demand.

Conclusions on the Use of Water

- 12.122 We conclude that RDRML has demonstrated a reasonable need of water for irrigation. In particular, evidence was presented at the hearing that demonstrated the need for between 22 Mm³ and 55 Mm³ of water for storage for RDRML. Evidence was also presented showing the demand for regional storage in the order of 35 Mm³, plus requirements for MAR. Even if the lower value of 22 Mm³ meets the needs for RDRML and its shareholders, the total volume of storage demand is at least 57 Mm³, when regional storage requirements are added in. This demand is more than the proposed KSF storage volume of 53 Mm³.
- 12.123 We conclude that the indirect issue of agricultural intensification is not of relevance to this hearing, as it is either already dealt with via conditions of existing consents, or will be when new consents are sought by irrigators when they have access to new water.

Other relevant issues

Relevant issue 1 – effects, including cumulative effects, of the water take

Natural character values of the Rangitata River system

- 12.124 Several submitters raised concerns about impacts of the proposed 10 cumec take on the outstanding features of the Rangitata River, including its braided river form and natural character.¹⁰⁶
- 12.125 Mr Brown stated that changes to the Rangitata River's landscape character and natural character values have the potential to affect a small number of river users, being primarily jet boaters, kayakers, anglers, and people walking along the river margins.¹⁰⁷ However, in referring to Mr Veendrick's hydrology evidence, Mr Brown noted that the river's course and gravel bed are extremely dynamic, with the river's wetted area, depth and velocity constantly changing. It was therefore his opinion that the predicted decrease in the river's wetted surface by up to approximately 6% would not be discernible.
- 12.126 Taking into account all of the findings presented by Mr Veendrick (hydrology), Dr Ryder (aquatic ecology), and Dr Sanders (vegetation and braided river birds), Mr Brown concluded that the proposed 10 cumec take would have very low to negligible effects on the biophysical values of the Rangitata River and its natural character and landscape character.¹⁰⁸
- 12.127 While Ms Pfluger did present expert landscape evidence for ADC at the hearing, her scope did not include effects of the water take. No other expert evidence was presented in relation to effects of the proposed water take on natural character or landscape character. However, Ms Ford (CRC S42A Reporting Officer) considered that the 10 cumec take could have adverse impacts on the Rangitata River's natural character,

¹⁰⁶ For example, submissions from: Keith Gunn (Save the Rivers), Kenneth Lloyd, and Royal Forest & Bird Protection Society of NZ.

¹⁰⁷ Mr Brown, Evidence in Chief, paragraphs 30 and 32.

¹⁰⁸ Mr Brown Evidence in Chief, paragraph 34.

based primarily on expert ecology evidence presented by Dr Meredith.¹⁰⁹

- 12.128 We have already examined the issues raised by Dr Meredith and have concluded that they have been adequately addressed by RDRML, and that any residual effects can be mitigated via proposed consent conditions. We therefore consider that Ms Ford's concerns regarding impacts on natural character are no longer an issue.
- 12.129 We conclude that effects of the proposed 10 cumec take on the natural character and landscape character of the Rangitata River will be negligible, or less than minor. Our conclusion is based on the expert landscape evidence presented by Mr Brown and our understanding that there will be an imperceptible impact on river flows and the physical appearance of the river.

Braided River Birds

- 12.130 Several submitters expressed concern regarding effects of the proposed 10 cumec take on river bird habitat¹¹⁰. Dr Mark Sanders (ornithologist and terrestrial ecologist, for RDRML) stated that reduced flow in braided rivers may make nesting sites more accessible to introduced mammalian predators, as well as affecting food sources (aquatic invertebrates and fish). He further stated that the greatest potential for adverse effects are during periods of low and/or declining flow, when conditions can be unfavourable for birds. Water abstraction effects therefore focus on timing and duration of low flows.¹¹¹
- 12.131 Dr Sanders stated that the lack of effect of the take on low to mid-range flows (from approximately 19 to 42 cumecs) meant that river birds will not be subject to low-flow impacts¹¹². Dr Sanders further stated that at flows above 132.6 cumecs, the proposed take is predicted to result in small changes in flow and river form (3.2 to 5.6% reductions in velocity, wetted area or depth) for a small amount of time during high flows. Because these changes would occur for short durations during freshes and floods, it was his opinion that they would not affect river birds. He further comments that the slight reduction in wetted width during floods could reduce the risk of nests getting flooded, but he concluded that this potential benefit would be very small because the area affected would constitute a very small proportion of available nesting habitat.¹¹³
- 12.132 With regards to river birds, Dr Philip Grove (CRC terrestrial ecologist) submitted that RDRML did not adequately assess cumulative effects or effects on feeding habitat.¹¹⁴ In response, Dr Sanders stated that Dr Grove's concerns relate to potential effects on aquatic invertebrate food supplies of birds caused by changes in the flow regime, and potential effects on bird habitat as a result of changes in flow and sediment discharge. Dr Sanders noted that potential effects of the sediment discharges from the KSF are no longer relevant, because it is no longer proposed to flush sediment from the facility.

¹⁰⁹ Ms Ford CRC S42A Report Paragraphs 531, 546, 564, 586, and 658.

¹¹⁰ Submissions from Forest and Bird, Mr Peter Ritchie, and Mr Brian Donaldson.

¹¹¹ Dr Sanders Evidence in Chief, paragraph 80.

¹¹² Dr Sanders Evidence in Chief, paragraph 81.

¹¹³ Dr Sanders Evidence in Chief, paragraph 82

¹¹⁴ Memo from Philip Grove to Natalia Ford, dated March 2018; Appendix 2 to the CRC S42A Report.

- 12.133 Dr Sanders addressed impacts of the proposed take on food supplies in paragraphs 79-83 of his evidence in chief. Based on his experience, subtle differences to intermediate flows, such as would occur with the proposed 10 cumec take, and are of little consequence to river birds, given the existing highly dynamic natural of braided river flow regimes.¹¹⁵
- 12.134 Dr Sanders stated that roosting and breeding habitats of river birds would not be affected by the proposed 10 cumec take. His primary reason for this assessment was that the primary roosting and breeding habitat for river birds downstream of the RDR take location would not be materially affected by the proposed changes in flow regime¹¹⁶.
- 12.135 At the hearing, Dr Grove stated that effects of the 10 cumec take on river ecology, such as impacts on periphyton and fine sediment accumulation, could affect birds, and that these effects had not been assessed. We note that these impacts were assessed by RDRML, as detailed in the relevant sections above. While effects have been assessed as being minor or less than minor, there is uncertainty around impacts on fine sediment deposition, so monitoring has been proposed.

River Bird Effects Summary

- 12.136 We conclude that effects of the proposed 10 cumec take on river birds will be less than minor. That is because the proposed take will not impact on low to medium flows that provide critical nesting habitat, and the take will not have an ecologically significant effect on freshes. However, fine sediment impacts on feeding habitat are less certain, partly due to a lack of monitoring data. We therefore support RDRML's proposal to monitor fine sediment and macroinvertebrates before and after commencement of the 10 cumec take. An important component of the proposed monitoring is the requirement to develop and impose sediment thresholds that constrain when water may be abstracted. This proposed condition provides reassurance that RDRML's may reduce their take, should unanticipated adverse effects arise.

Cultural issues

Ngāi Tahu

- 12.137 In addition to the concerns and issues raised in relation to the proposed KSF and 10 cumec water take, Ngāi Tahu submission was that consents should not be granted as Arowhenua could not state with confidence that the proposal would allow the Ngāi Tahu tribal whakataukī: mō tātou, ā, mō kā uri, ā, muri aki nei (for all of us and our children after us) to be realised.
- 12.138 Issues raised by both TRoNT and TRoA related to:
- (a) The inability for Arowhenua to properly exercise kaitiaki responsibilities;
 - (b) The impacts of the mauri on the Rangitata River;
 - (c) The uncertainty over the need for the ultimate use of the 10 cumec of water sought;

¹¹⁵ Dr Sanders, Supplementary Evidence, paragraph 41, dated 26 April 2018.

¹¹⁶ Dr Sanders Supplementary Evidence, paragraph 42, dated 26 April 2018.

- (d) The quality of the consultation by RDR;
- (e) Uncertainty over the design of the Fish Screen, particularly with regards to effects on whitebait and adequacy of monitoring; and
- (f) Uncertainty over potential benefits and mahinga kai opportunities for Arowhenua and the ongoing involvement of Arowhenua regarding the use of the water.

12.139 The name Rangitata means “dry sky”. From Orari to the Rangitata River this area was known for being bone dry. Ngāi Tahu’s association with the Rangitata is provided for within the Ngāi Tahu Claims Settlement Act 1998 as a Statutory Acknowledgement area. Schedule 55 of the Settlement Act sets out Ngāi Tahu’s association with the Rangitata and acknowledges its immense cultural, spiritual, traditional and historic significance to Ngāi Tahu Whānui.

12.140 TRoA Kaumatua supported Fish and Game water conservation order for the river and gave extensive evidence at the hearing. TRoA “*believe that the catchment has already been adversely impacted by previous water management regimes and that any future course of action needs to include an active habitat restoration programme and a review of all existing resource consents.*”¹¹⁷

Mauri

12.141 Both written and verbal evidence from Ms Waaka-Home and TRoA whānui agree that as kaitiaki it is their inherent responsibility for protecting the mauri of the Rangitata River.

12.142 TRoNT and TRoA, as was the views of other submitters,¹¹⁸ are concerned that the mauri or life force of the river will be adversely impacted by the proposed KSF activity. TRoNT and TRoA submitted “*The Rangitata is one of the few braided rivers left within the takiwā which has not been altered through being controlled by dam structures. The mauri of the Rangitata has been and continues to be severely degraded by abstraction, modification and land use interactions. The proposed activity would add to the already extensive use of the river and its catchment, thus further degrading the mauri of the river.*”¹¹⁹ TRoA contention is that no matter how high the flow is any abstraction will affect the mauri of the river. Cultural expert for RDRML, Mr Mikaere while agreeing that the mauri is a concern to be considered, he acknowledged that in his experience the circumstances of the application and its mauri impact are unique in that the abstraction will harvest water from a flood flow.

12.143 Ms Waaka-Home described the biophysical and spiritual elements of mauri and the interrelationship between the two. Ms Waaka-Home’s evidence does not support the approach of considering the biophysical elements of mauri only. An example she gives is, “*having heaps of water within the river will address the biophysical elements of mauri, however, this does not always mean that we would/should catch and*

¹¹⁷ Cultural Values Rangitata Catchment, Tipa & Associates, November 2015

¹¹⁸ Fishes and recreation users

¹¹⁹ Submission on Storage Facility at Klondyke and all Associated Consents, on behalf of Te Rūnanga o Ngāi Tahu and Te Rūnanga o Arowhenua, 14 October 2016, page 4, 4.1

*eat kai from the river which is the spiritual element*¹²⁰. Mauri is the life force, both biophysical and spiritual. It is *the environmental benchmark by which TRoA measure the present health of the environment. the interlinked wellbeing of mana*

- 12.144 The approach given by Ms Waaka-Home in regard to both the biophysical and spiritual elements was that the biophysical elements have to be considered in relation to the 10 cumec take during a flood flow, such as the quantity of water and the hydrology of the river flows. In considering the spiritual aspects of a 10 cumec take, it does not necessarily mean that the overall health of the river is appropriate to take kai and that the river is capable of performing in the same manner as it has for generations.
- 12.145 In his verbal evidence Mr Russell (TRoA) said, *"you know when the mauri is good as it feels good inside, and that's the based on how you're brought up; seeing, smelling, hearing, tasting the water. An example, he can smell when the mouth of the river is closed"*.
- 12.146 Mr Mikaere agrees that the proposed abstraction has spiritual impact on mauri of the river but given the technical and scientific evidence by Dr Ryder and Veendrick that as the mauri is already compromised by all the other activities associated with it he considers that the abstraction will have a less than minor effect.
- 12.147 However, TRoNT view is that it is the abstraction itself from the river which has the impacts on the mauri, and that effects on mauri would be avoided by not consenting to the abstraction. That is, any effect, whether less than minor or not, has an effect on the mauri.
- 12.148 Mr Mikaere in considering the less than minor effect on mauri *"combined with the mauri enhancing mitigation works proposed in and around the storage site, make a strong case for there being a natural position when weighing the physical and spiritual impact on mauri"*¹²¹
- 12.149 Mr Russell of TRoA when questioned in relation to Mauri *"water from the river was to be transferred to the ponds, the mauri is being removed from the river it will be lost"* also saying *"putting water into a storage pond isn't about the mauri of the water, it is an asset"*¹²². TRoA and TRoNT do not agree with Mr Mikaere conclusion, *"Water abstracted from the river does not "gain" mauri through use in association with storage"*.
123
- 12.150 Ms Waaka-Home concludes; *"water extracted from a river is a privilege, not a right. The only one here who has rights is the rights of the river to flow to the sea as intended, feeding and replenishing all that live in and around the river plain, the wetlands and ecosystems that have evolved over thousands of years. We forget that the rivers and waterways have rights too. Actually, we should be asking, what can we do for the river?" Not 'what the river can do for us"*.

¹²⁰ Ms Mandy Waaka-Home, Evidence on behalf of Te Rūnanga o Arowhenua and Te Rūnanga o Ngāi Tahu, 11 April 2018, 3.1-3.8

¹²¹ Mr Mikaere Summary of Evidence and Supplementary Comments 20, page 5

¹²² Verbal evidence of Mr Kyle Russell, kaitiaki for TRoA, Thursday 3rd May 2018

¹²³ Legal Submission on Behalf of Te Rūnanga o Ngāi Tahu and Te Rūnanga o Arowhenua, 3, May 2018, page 4, 3.4

Kaitiakitanga

- 12.151 The joint submission by TRoNT and TRoA expressed concerns as kaitiaki for the Rangitata catchment that the fragmented approach to the consenting process prevents Arowhenua from meeting its kaitiaki responsibilities to assess the environmental impacts that the increase of activity could have within the Rangitata River catchment.
- 12.152 The cultural expert for RDRML, Mr Mikaere's response to TRoNT and TRoA Kaitiakitanga concerns¹²⁴ were their ability to assess impacts that might arise from increase irrigation and farming that could follow from the completion of the KSF.
- 12.153 Mr Mikaere came to a view from the evidence presented by Mr Curry and Mr Veendrick that it is highly likely that water from the KSF will be used for RDR irrigation. Should water be supplied to other users these users would need to rely on permitted activity rules or apply for a resource consent application. Mr Mikaere did not believe that the approach be advanced by the RDRML is unreasonable.
- 12.154 TRoA and TRoNT contention remains that RDRML has not responded to the question from Ms Waaka-Home in relation to the use of the 10 cumecs take¹²⁵. TRoA is unable exercise Kaitiakitanga while RDR is seeking to increase the take but is unable or unwilling to answer questions on the use.
- 12.155 The concern is that there is already nearly 33 cumecs of the rivers flow is removed by RDR irrigation scheme already. It is the view of TRoA *"the water put down Highgate into the Rakaia can be used to fill up the holding pond. The Rakaia does not need this water. With an annual flow of some 100 cumecs and additional takes above this already occurring any additional takes would threaten the outstanding values it ascribes to the Rangitata River catchment."*¹²⁶
- 12.156 TRoNT and TRoA questioned whether the fragmented approach will meet the principles set out in schedule 3 of Environment Canterbury (Transitional Governance Agreement) Act 2016. Mr Mikaere believes that the *"principles do recognise the exercise of kaitiakitanga and its application to all water bodies in accordance with tikanga Māori. The resource consent requirements compel the vetting of any applications through a cultural lens such as Part 2 section 7(a) RMA considerations."*¹²⁷
- 12.157 TRoNT and TRoA opposed the 35 year-lapse periods again diminishing the ability for Ngāi Tahu to exercise kaitiakitanga. Mr Greaves has acknowledged Ngāi Tahu concern and has recommended within the conditions that the lapsing period is for 15 years. RDRML has adopted the 15 years and Ms Mandy Waaka-Home within her evidence acknowledges RDRML for making the change from 35 years.
- 12.158 Mr Mikaere concludes in his Summary of Evidence and Supplementary Comments that *"the impact on kaitiakitanga is at worst minor"* he

¹²⁴ Submission on Storage Facility at Klondyke and all Associated Consents, dated 14 October 2016

¹²⁵ Evidence of Mandy Waaka-Home on Behalf of Te Rūnanga o Arowhenua and Te Rūnanga o Ngāi Tahu, 3.14, page 9

¹²⁶ Evidence of Mandy Waaka-Home on Behalf of Te Rūnanga o Arowhenua and Te Rūnanga o Ngāi Tahu, 3.11, page 9

¹²⁷ Statement of evidence of Buddy Mikaere, 28 March 2018, 7.34 page 21

interpreted "the kaitiaki concerns of TRoNT and TRoA to be related to a desire for a much larger role in the policy setting, administration and overall management of water resources across the region"¹²⁸

12.159 Mr James Winchester, Counsel for Arowhenua and Ngāi Tahu while not fully agreeing with Mr Mikaere did agree that Arowhenua do want a larger role in the policy setting, administration and overall management of water resources across the region. "More importantly however, it is submitted to be a misunderstanding of kaitiaki concerns expressed by Arowhenua."¹²⁹

12.160 Evidence of Ms Mandy Waaka-Home presented the principles of mauri and Mātauranga, and her inherit responsibility as kaitiaki. Demonstrating that the role and responsibility of kaitiakitanga is wider than "policy setting, administration and overall management of water resources across the region."

12.161 It was important for Ms Mandy Waaka-Home to re-emphasise "while the role of kaitiaki has evolved to accommodate contemporary resource management processes, we are still guided and remain true to our cultural foundations based on mauri and Mātauranga."¹³⁰

12.162 When questioned on kaitiaki engagement at a regional level TRoA confirmed that they are already engaged on regional committees including the CWMS and the Iwi entity Aoraki Consultancy. Kyle Russell said "kaitiaki is being a caretaker for their environment and living species with in it. To protect the mauri of the water, need in depth knowledge of what mauri means at a spiritual level. That you're looking after the living aspect of the river".¹³¹

Ki Uta Ki Tai

12.163 The National Policy Statement for Fresh Water Management (NPSFM) 2014 directs Regional Councils to manage the environment in an integrated manner recognising the interconnected nature of land and water use. This is consistent with the Ngāi Tahu philosophy of "ki uta ki tai" (from the mountains to the sea).

12.164 In evidence, TRoA whānui said that in the context of the management of the Rangitata is necessary to consider the catchment in its entirety and that RDRML's proposal does not address the implications of the activity of the entire catchment.

12.165 TRoNT contention is that the proposal encourages a fragmented approach and does not address the implications of the activity on the whole catchment. Evidence received from Dr Meredith draws parallels between Arowhenua and their description of the river, the description of mauri and Mātauranga are similar to his holistic view. We heard Dr Meredith say, it is his opinion that RDRML has not taken such a direction and that the activities could not be assessed as a small effect in isolation from existing effects. Or solely on effects in the Klondyke to Arundel reach that the assessment of cumulative effects is essential.

¹²⁸ Buddy Mikaere Summary of Evidence and Supplementary Comments12, page 3

¹²⁹ Legal Submission on Behalf of Te Rūnanga o Ngāi Tahu and Te Rūnanga o Arowhenua, 3, May 2018, page 6, 7.2

¹³⁰ Evidence of Mandy Waaka-Home on behalf of Te Rūnanga o Arowhenua and Te Rūnanga o Ngāi Tahu, 11 April 2018, 1.3-1.6

¹³¹ Verbal evidence of Mr Kyle Russell, kaitiaki for TRoA, Thursday 3rd May 2018

12.166 TRoNT have drawn our attention to the Principles in Schedule 3 of the Environment Canterbury (Transitional Governance Arrangements) Act 2016 and the Canterbury Water Management Final Regional Implementation Programme, Including Annex (May 2012) and the Orari-Opihi-Pareora Zone Implementation Programme, which effectively supports the principles of ki uta ki tai. However, Mr Mikaere does not support this contention as RDRML's concern only relates to the development area, and not to the district wide area.

Engagement

12.167 We have read and heard evidence on the quality of consultation by RDRML regarding the kaitiakitanga responsibility of Arowhenua and as to whether it was carried out in an appropriate manner.

12.168 Ms Waaka-Home acknowledges that *"RDRML sought to engage with Arowhenua on the development of the storage facility. Arowhenua has sought participation through allowing TRoNT planning and freshwater technical staff to engage with RDRML experts, to understand the proposal. Arowhenua concluded that they were¹³² unable to support the Klondyke Storage facility or the 10 cumec water take."¹³³*

12.169 In his statement of evidence Mr Mikaere said, *"one of the difficult aspects of this application for my assessment is the minimal participation of Te Rūnanga o Arowhenua (TRoA) particularly in consultation with RDRML and the attempted identification of issues of important to them."¹³⁴*

12.170 In Mr Mikaere, Summary of Evidence and Supplementary Comments he said *"The lack of consultation was a discussion point and as surmised in my evidence at section 4, I can confirm that one reason for a less than satisfactory tangata whenua consultation is a lack of capacity for resources. This is confirmed in the TRoA evidence"¹³⁵*

12.171 During the course of the hearing we heard from RDRML that during the initial discussions with TRoA they expressed concerns in relation to:

- (a) The uncertainty of the design of the Fish Screen potential effects on white bait and preventing native fish from entering the pond;
- (b) The effect of the construction work on mahinga and wahi tāonga;
- (c) The removal of native vegetation and restoration of wetlands on the lower terraces;
- (d) Mahinga kai opportunities in relation to aqua farms; and
- (e) Monitoring undertaken for the Fish Screen and the refuge area.

12.172 To enable TRoA to carry out its responsibilities of kaitiakitanga RDRML has addressed these concerns through mitigation measures and conditions. In regard to the works associated with the KSF and given

¹³² Evidence of Mandy Waaka-Home on behalf of Te Rūnanga o Arowhenua and Te Rūnanga o Ngāi Tahu, 11 April 2018, 2.2., page 6

¹³³ Evidence of Mandy Waaka-Home on behalf of Te Rūnanga o Arowhenua and Te Rūnanga o Ngāi Tahu, 11 April 2018

¹³⁴ Statement of evidence of Buddy Mikaere, 28 March 2018, page 4, 3.2

¹³⁵ Summary of Evidence and supplementary Comments of Buddy Mikaere, 23 April 2018, page 5, paragraph 23

that there are no known sites of significance in the vicinity of the proposal we find RDRMLs proposed conditions in relation to mana whenua values to be appropriate:

- (a) The adoption of an Accidental Discovery Protocol in relation to any archaeological material found during construction condition;
- (b) All draft management plans to TRoA to obtain their feedback on contents prior to submission to CRC and ADC condition;
- (c) Providing all monitoring reports to TRoA when they are being presented to CRC and ADC; and
- (d) Agree to have a cultural monitoring officer (appointed by TRoA and paid by RDRML) on site during the top soil stripping phase of the earthworks.

Derogation

12.173 We have discussed and determined this matter earlier in the decision.

Relevant issue 2 – does take conflict with WCO

WCO Considerations

- 12.174 As noted above, the WCO recognises the following outstanding characteristics of the Rangitata River from the gorge to Arundel: salmon fishing, salmon passage, water-based recreation, and significance for Ngāi Tahu, aquatic macroinvertebrates, scientific-braided river. The following outstanding characteristics are recognised from Arundel to the coast: aquatic bird habitat, salmon passage, salmon fishing, spiritual and cultural values, significance for Ngāi Tahu. The WCO also seeks to protect groundwater linked to the Rangitata River downstream of the gorge, McKinnon’s Creek, and Ealing Springs.
- 12.175 A key method of protecting flow-related outstanding features is via a minimum flow regime, below which abstraction must cease. For RDRML, the effective minimum flow is 132.6 cumecs, which takes into account the WCO minimum flow of 110 cumecs and water already allocated to other water users above 110 cumecs. RDRML will be taking flows above the minimum flow of 132.6 cumecs, and is therefore compliant with the WCO in that respect.
- 12.176 In terms of effects related to the WCO, we have found in the sections above that the proposed 10 cumec take, when taking into account proposed conditions, will have minor or less than minor effects on salmon fishing, salmon passage, water-based recreation, aquatic macroinvertebrates, aquatic bird habitat, or the braided quality of the river.
- 12.177 In terms of significance of the river for Ngāi Tahu, we have concluded that. The Ngāi Tahu Claims Settlement Act 1998 recognised the Rangitata Rive as Statutory Acknowledgement Area, which acknowledges its cultural, spiritual, traditional, and historic significance to Ngāi Tahu.
- 12.178 The intent of the WCO as expressed in the application by the New Zealand Fish and Game Council is to set a baseline that should prevent further deterioration of the catchment.

- 12.179 TRoA Kaumatua supported Fish and Game water conservation order for the river and gave extensive evidence at the hearing. TRoA "*believe that the catchment has already been adversely impacted by previous water management regimes and that any future course of action needs to include an active habitat restoration programme and a review of all existing resource consents.*"⁴¹ One of the perceived short coming of the WCO is its limited scope to address land management issues.

Consideration of planning provisions

NPSFM

- 12.180 NPSFM objectives and policies of relevance to the proposed 10 cumec take are discussed in the following paragraphs:
- (a) Objective AA1: To consider and recognise Te Mana o te Wai in the management of fresh water. Te Mana o te Wai is the integrated and holistic well-being of a freshwater body. Our deliberation has taken into account the wide range of values of the Rangitata River and the range of ways these values could be affected by the take.
 - (b) Objective A2: The overall quality of fresh water within a freshwater management unit is maintained or improved while: a) protecting the significant values of outstanding freshwater bodies; This objective has been met by assessing effects against the provisions of the WCO and concluding that effects are minor or less than minor.
 - (c) 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 of fresh water. We consider that effects of the proposed 10 cumec are sufficient small to be consistent with this objective.
 - (d) Objective B2: To avoid any further over-allocation of fresh water and phase out existing over-allocation. The NPSFM defines over-allocation as "...the situation where the resource: a) has been allocated to users beyond the limit; or b) is being used to a point where a freshwater objective is no longer being met. This applies to both water quantity and quality." Neither the WCO nor the LWRP prescribe limits for abstraction at flows exceeding 132.6 cumecs, when the proposed 10 cumecs will start to be taken. We heard that cumulative effects of existing takes may be affecting the river, particularly in terms of fine sediment deposition, but that there is no data to support it. We consider that the proposed conditions relating to fine sediment monitoring will provide better certainty that effects are minor, whilst also providing the opportunity to reduce the take in response to unanticipated adverse effects. Given this approach to managing effects, we consider that the proposed take is consistent with Objective B2.
 - (e) Objective B4: To protect significant values of wetlands and of outstanding freshwater bodies. This objective has been met by assessing effects against the provisions of the WCO and concluding that effects are minor or less than minor.

- (f) Policy B5: By every regional council ensuring that no decision will likely result in future over-allocation – including managing fresh water so that the aggregate of all amounts of fresh water in a freshwater management unit that are authorised to be taken, used, dammed or diverted does not over-allocate the water in the freshwater management unit. Having evaluated all of the evidence before us and taking into account proposed consent conditions, we conclude that the proposed 10 cumec take is consistent with this objective.
- (g) Objective D1: To provide for the involvement of iwi and hapū, and to ensure that tangata whenua values and interests are identified and reflected in the management of fresh water including associated ecosystems, and decision-making regarding freshwater planning, including on how all other objectives of this national policy statement are given effect to. We have read and heard evidence on the quality of consultation by RDR regarding the kaitiakitanga responsibility of Arowhenua and as to whether it was carried out in an appropriate manner. While consultation could have been better, to enable TRoA to carry out its responsibilities. RDRML have agreed to address concerns through mitigation measures consent conditions and to engage further.
- (h) Policy D1: Local authorities shall take reasonable steps to: a) involve iwi and hapū in the management of fresh water and freshwater ecosystems in the region; b) work with iwi and hapū 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. Yvette to comment here.

LWRP

- 12.181 LWRP policy 4.3 is salient to the proposed 10 cumec take. Policy 4.3 is as follows:
- 12.182 *Policy 4.3: Surface water bodies are managed so that: (a) toxin producing cyanobacteria do not render rivers or lakes unsuitable for recreation or human and animal drinking-water; (b) fish are not rendered unsuitable for human consumption by contaminants; (c) the natural colour of the water in a river is not altered; (d) the natural frequency of hāpua, coastal lakes, lagoons and river openings is not altered; (e) the passage for migratory fish species is maintained unless restrictions are required to protect populations of native fish; (f) reaches of rivers are not induced to run dry, thereby maintaining the natural continuity of river flow from source to sea, (g) variability of flow, including floods and freshes, is maintained to avoid prolonged "flatlining" of rivers; to facilitate fish passage; and to mobilise bed material; and (h) the exercise of customary uses and values is supported.*
- 12.183 We consider that the proposed 10 cumec take is consistent with Policy 4.3, because all identified issues and effects have been assessed as minor or less than minor.

Conclusions on Effects of the New Ten Cumec Water Take

- 12.184 We conclude that effects of the proposed 10 cumec take under CRC170654 will be minor or less than minor. Having taking into account all of the evidence presented to us, including proposed conditions of consent, we are satisfied that any residual effects are sufficiently small that they will not detract from the outstanding characteristics of the Rangitata River recognised in the WCO and are consistent with relevant planning instruments, including the NPSFM and LWRP.
- 12.185 Key factors affecting our decision include that the proposed take is at high river flows, the small size of effects, and that conditions have been offered to mitigate effects or respond to uncertain effects. These conditions include: adjusting the rate of take based on current flows, rather than the average of the previous 24 hours; monitoring of fine sediment and channel morphology (including responses to any adverse effects); ceasing the 10 cumec take when the sand trap discharge is occurring (authorised by CRC011241); ceasing the 10 cumec take on four weekend days and up to another four days when river flows are between 132.6 and 230 cumecs, to protect recreational flows.
- 12.186 Regarding the use of water, we conclude that RDRML has demonstrated a reasonable need of water for irrigation, taking into account their own reasonable requirements and regional storage requirements. For the reasons outlined earlier, issues associated with land use intensification are outside the scope of this decision.

13 **KLONDYKE STORAGE FACILITY INCLUSIVE CANAL MODIFICATIONS AND OTHER COMPONENTS**

Introduction

- 13.1 Detailed here are the resource consent applications that are relevant to the KSF and canal modifications.
- 13.2 Principal issues in relation to this component of the proposal are:
- (a) Potential adverse effects of the damming of water on people property and infrastructure, including:
 - i) is the modelling of the dam breach sufficient to understand effects - is it reliable and accurate;
 - ii) is the seismic hazards assessment adequate;
 - iii) will the dam design meet NZSOLD guidelines, in particular for a High PIC Dam;
 - iv) does the DSMS including the EAP and related plans meet NZSOLD guidelines; and
 - v) is risk insurance and / or bonds required, and if so are insurance and bond conditions appropriate?
 - (b) Landscape and visual amenity effects during construction and operational phases;

- (c) Are the construction, discharge and water quality effects¹³⁶ of KSF, canal modifications, gully race, drop structure and river outlet structure capable of being avoided, remedied or mitigated through utilisation of management plans?

13.3 Other relevant issues are:

- (a) Effects on terrestrial ecology; and
- (b) Effects of emergency discharge from the KSF.

Assessment of Risk and Standard of Proof

13.4 Consent to dam water is required pursuant to section 14 RMA. Taking into account the manner in which section 3 RMA describes effects for the purposes of the RMA, the most significant, actual or potential effect that may arise from the KSF is a catastrophic failure of the dam structure, in particular the ensuing floodwaters and the resulting impact of those floodwaters on people, property and the environment.

13.5 We have set out the full text of section 3 already. Subsection 3(f) is the commencing point for our consideration of the law concerning risk and proof. Subsection 3(f) includes in the definition of effects for the purpose of the RMA;

"Any potential effect of low probability which has a high potential impact."

13.6 We were advised by RDRML dam engineering experts that a catastrophic failure of the KSF embankment structures was unlikely to occur, or in other words the occurrence of such a failure is of low probability. Notwithstanding this, if the embankment structures did fail, the effects, particularly on people and property would be high impact.

13.7 In addressing this potential effect, we need to consider how we should approach our assessment of risk and proof. There have been a number of decisions from both the High Court¹³⁷ and the Environment Court which have established the correct approach to be adopted.

13.8 In respect of matters of risk we take from these decisions that, ultimately, whether or not a risk exists is a matter of judgement. We as decision-makers are not required, on the balance of probabilities to be satisfied that the risk will or will not occur.

13.9 Additionally, because the RMA is not a "no risks" regime where there is a suggested risk of serious or irreversible harm to the environment, including people, within it, coupled with levels of uncertainty as to the extent of that risk, then we should be cautious, but not so inhibited, to the extent of adopting and applying a "no risk" approach.

13.10 Due to the fact that submitters, in a general sense, have raised concerns about this element of risk, we do note that in the *Francks*¹³⁸ High Court decision the Court, in referring to other Environment Court

¹³⁶Traffic, noise, vibration, air quality, land contamination, waste management, effects on terrestrial ecology-lizards, effects on archaeological areas, effects on cultural values

¹³⁷ *Francks v Canterbury regional Council and Christchurch City Council* CIV -2003-485-001131

¹³⁸ Ms Ford, CRC Section 42A Report paragraph 166 to 167 inclusive on page 53.

cases, accepted that subjective community perceptions of risk, unsupported by evidence should not influence a decision maker and we should not be influenced by mere perceptions of risk of adverse effects.

- 13.11 We understand the exercise of determining allocation of evidential and persuasive burden in a RMA context is problematic. So requiring RDRML to demonstrate, on the basis of an evidential burden that risk will or will not occur is not part of the exercise.
- 13.12 After considering all the evidence we think it is a judgement that we have to make about the risks of and/or likelihood of a dam failure and how well, or not, the risk of dam failure has been avoided or mitigated by RDRML.

RMA and the Building Act

- 13.13 Ms Ford records in her Section 42A Report¹³⁹ that the Building Act 2004 (Building Act) contains extensive provisions for dam construction and safety and includes a number of requirements for the development of all large dams as summarised from the guidelines issued in 2015 by the New Zealand Society on Large Dams (NZSOLD).
- 13.14 Building Act requirements must be met independently of this resource consenting process. Those Building Act requirements which relate to safety and construction methodology are extensive.
- 13.15 From the evidence of Mr Woods we understand that peer reviews under the Building Act are required for all elements of the design. Those peer reviews are to be independently peer reviewed as a required by the NZSOLD guidelines.
- 13.16 It is our view that we must consider the purpose of the RMA and in particular Part 2 matters despite the presence of other regulatory regimes and be satisfied that the purpose of the RMA will be met by either granting or refusing consent.
- 13.17 The proposed condition set also recognise the separation between RMA and Building Act issues and further recognises as the proposal develops that there may be design changes. If changes occur at Building Act stage and those changes are beyond what has been consented under the RMA then the conditions require any such changes to be approved through any and all regulatory processes required under the RMA.

Relevant Guidelines-Role of NZSOLD Guidelines in Dam Safety

- 13.18 The NZSOLD Guidelines (Guidelines) have no statutory weight. They primarily focus on recommended practices for the investigation, design, construction, commissioning, assessment and rehabilitation and operation of dams in New Zealand.
- 13.19 However the application of the Guidelines to the damming elements of this proposal was readily accepted as being necessary and appropriate by all the dam engineering experts. Compliance or satisfaction of the investigation, design, intended construction, intended commissioning and the public safety elements such as the EAP were presented to us as a means of demonstrating that dam safety and minimisation of risk of breach and civil safety was appropriate.

¹³⁹ Ms Ford, CRC Section 42A Report paragraph 166 to 167 inclusive on page 53.

- 13.20 The Guidelines are the main source of information and guidance for dam safety in New Zealand. We were told these Guidelines were comprehensively reviewed and extensively updated in 2015. NZSOLD is a technical society of engineering New Zealand (formally IPENZ).
- 13.21 The objectives set out in the first section of the Guidelines are supported by eight additional principles. Given the issues in this hearing, six of them appear to be most relevant. They are:
- (a) The responsibility for safety of the dam rests with the dam owner;
 - (b) The consequences of dam failure must be understood;
 - (c) All natural hazards, loading conditions, potential failure modes and other threats should be identified;
 - (d) A dam safety management system commensurate with the consequences of dam failure should be in place for all dams;
 - (e) The Guidelines set out specific requirements for such plans in particular in section 7 of module three and module five of the guidelines;
 - (f) Effective emergency preparedness and response procedures should be in place.
- 13.22 The Guidelines, in particular module six, consider emergency action plans and provide a template or format to be considered. Those action plans should set out the actions to be undertaken by dam operators in an emergency, including matters such as providing information for external agencies, such as civil defence and the like, so they can in turn include that information within their own emergency planning. A satisfactory emergency evacuation plan may also form part of an emergency action plan.
- 13.23 Module two of the Guidelines describes how dams are classified into one of the three PIC being high, medium and low according to the potential consequences of a failure including impacts on people and property and the environment.
- 13.24 For each category of dam the Guidelines set required standards for the design and maintenance of the dams by defining design loads, required expertise of the dam design team and the level of detail required in the investigation, design, construction, commissioning, surveillance and safety reviews of the dam.
- 13.25 Module three covers the investigation, design and analysis of large dams setting the standards that must be met by dam designers. Finally module five considers dam safety management and informs module six which deals with emergency preparedness.
- 13.26 As we understand it, the essence of Mr Nathan Fletcher's evidence, supported by Mr Woods and Mr Bryan Peters (all dam experts for RDRML), was to demonstrate that the risk of dam failure would be reduced to an acceptable level by following and applying the Guidelines. Additionally, appropriate inclusion of references to the Guidelines within conditions of any resource consent are needed to ensure all relevant matters as to dam safety are addressed and provided for at resource consent stage.

- 13.27 Further, that evidence sought to demonstrate, that applying the Guidelines, ensured robust and achievable emergency plans so as to ensure protection of people and property that might be affected by a possible dam failure.
- 13.28 We agree and accept, based on the expert evidence received, that the Guidelines are an appropriate standard against which the proposal should be assessed, in particular in relation to dam break risk and analysis and providing for public safety and also dam design considerations.

Principal Issues

Principal issue 1 – potential adverse effects of the damming of water on people, property and infrastructure

Is the modelling of the dam breach sufficient to understand effects – is it reliable and accurate?

- 13.29 According to experts, in particular Mr Fletcher, who completed the dam breach study for this proposal,¹⁴⁰ such a study is accepted industry practice in terms of assessing the appropriateness of design standards for dams determined by the Guidelines. It involves modelling the flood effects of a hypothetical breach of the dam. The Guidelines provide for the purposes and or outcomes of a dam break study.
- 13.30 RDRML's dam breach study for both the canal modification and the KSF is found in a number of annexures to it's Application.¹⁴¹ The breach analysis, including flood depth and velocity modelling were updated throughout the processing of the Application.
- 13.31 The dam breach study concludes that the KSF dam should be classified under the Guidelines as being a high PIC. The canal modifications are classified as being a low PIC.
- 13.32 All of the relevant experts accepted these classifications. The Guidelines, taking into account the PICs, establish suitably conservative design, construction, operation, and maintenance requirements for the differing categories of dams in New Zealand.
- 13.33 Notwithstanding the high PIC for the KSF dam, Mr Tim Morris, a chartered professional engineer, qualified and experienced in dam build and dam breach assessments and engaged by the CRC to review¹⁴² and audit the proposal, had concerns as to the adequacy of the dam breach study.
- 13.34 The key criticism by Mr Morris of Mr Fletcher's dam breach study was that it did not satisfy the purpose and outcomes of the Guidelines because it did not properly provide for itinerants and possible cascade effects on other irrigation storage facilities. This meant, he said, we could not understand dam breach effects in RMA terms.
- 13.35 Rangitata South Irrigation Limited (RSIL) also contended that the dam breach analysis lacked sufficient detail for us to properly and adequately

¹⁴⁰ MWH (August 2016) Klondike storage proposal then break assessment being part of the application documents

¹⁴¹ See Ms Ford, CRC Section 42A Report in paragraphs 163 and 164 on page 52.

¹⁴² Memorandum of Mr Tim Morris 7 March 2018

consider effects of a dam breach of the KSF so we could not issue consent.¹⁴³ RSIL was particularly concerned that a cascade scenario of downstream storages potentially following dam breach effects from the KSF had not been modelled.

- 13.36 A number of other submitters raised concerns regarding the risk of dam breach primarily of the KSF and the consequences of breach, including in relation to compensation. In particular, detailed views were provided by RWL and JM Simpson.
- 13.37 Mr Morris, in his memorandum, as part of the CRC Section 42A Report, first notes that the KSF is in fact of very large size even in comparison to international scales. He considers this large size warrants a complete and thorough understanding of potential effects of dam breach. We agree.
- 13.38 Mr Morris agrees with the potential breach locations for both the KSF and also for the modified canal. However he expressed concerns relating to the inundation modelling and consequence assessment which relies on that modelling.
- 13.39 In particular for the KSF he identified uncertainty in relation to some of the model inputs relating to hydraulic roughness which directly affects outputs in relation to depth velocity (DV). Mr Morris was also concerned that the DV estimates have been overlaid on aerial photographs at a very coarse scale which is too coarse for the locations of interest.
- 13.40 The DV of the floodwaters are used to assess the potential loss of life (PLL) assessments. If the value chosen is too high then velocity flows are reduced. Mr Morris considered adopting a lower DV value providing for higher flows would be prudent.
- 13.41 In Mr Morris' view the issue with the coarse scale adopted to illustrate the DV assessment makes it harder for downstream landowners or occupiers to identify whether and/or how they could be affected and what impact the potential dam breach might have on them or their property than would be the case if the mapping in key areas was at a finer scale.
- 13.42 The modelling results for both the KSF and the modified canal leads to the likely effects of those scenarios being quantified as part of a consequence assessment. The consequence assessment assesses impacts on population at risk (PAR), residential houses, critical or major infrastructure, natural environment and finally community recovery time.
- 13.43 For the KSF, Mr Morris raised concerns about the number of the PAR estimates because the estimates did not consider itinerant populations of individuals beyond dwellings within the potential flood inundation area.
- 13.44 Mr Morris was concerned there was a risk that the estimates of PAR and PLL may be underestimated and as a result effects in RMA terms may not be fully understood. Understanding these assessments is, he said, important because they inform emergency planning for matters such as the EAP.

¹⁴³ Submissions of Ms Steven QC

- 13.45 Notwithstanding this, Mr Morris accepted that inclusion of an itinerant population would not alter the high PIC. However in his opinion, excluding the itinerant PAR was not in accordance with the Guidelines and a full understanding of the scale and extent of effects would not be possible.
- 13.46 In his principal evidence Mr Fletcher for RDRML responds to Mr Morris' concerns by in part referring to the joint witness statement completed between himself, Mr Woods and Mr Morris. In addition in his evidence he refers to the key area of disagreement - the question of whether or not a more definitive analysis of the PAR should include a subset of itinerants.
- 13.47 Mr Fletcher records that he and Mr Woods consider doing so was highly subjective and judgement based and therefore is of little value and potentially misleading. He further advised it was not necessary to include the subset of itinerants on the basis that the PAR is raised into the highest PIC category. Inclusion of the itinerant subset would not change this categorisation and therefore it was not necessary he concluded.
- 13.48 Finally Mr Fletcher records in his evidence his opinion that the concerns of Mr Morris regarding itinerants can, and are suitably addressed in the conditions of consent.
- 13.49 In further detail in his evidence Mr Fletcher informs us that PLL is used to differentiate between marginal cases where the PIC is not clear, for example between medium and high PIC. However he points out the Guidelines note that a comprehensive level of assessment would usually also require the completion of a detailed damage and loss assessment unless the PIC was clearly above the high threshold and detailed output was not required for a risk assessment. In this case he points out it is clear that the KSF is high PIC. So in his view this additional step to assess PLL it is not required in order to clarify the PIC.
- 13.50 Finally in relation to Mr Morris' concerns about the DV issue, his opinion is that the DVs shown on the flood modelling maps are appropriate. Further, he said that they indicate the hazards to life and they are consistent with the USBR 2014 method of using case histories of dam failures and flood events with graphical representations of estimated fatality rates as a function of DV.
- 13.51 Turning to the RSIL issue, Mr Fletcher acknowledges that a cascade scenario of downstream storages potentially failing following a dam breach the KSF has not been modelled. He agrees that this will need to be completed as part of a finalised Dam Safety Management Plan (DSMPS) and EAP.
- 13.52 Mr Fletcher noted that the other large irrigation storages which may be affected by a KSF dam breach will have their own dam safety management and emergency action plans in place. In his view if it should be confirmed that the worst case potential failure from the KSF could act as a triggering mechanism of a dam safety emergency of either of the RSIL or MHIL storages then coordination of emergency planning would be required. He agreed modelling may be undertaken in future should further details of these scenarios or confirmation of the cascade breaches be required.

- 13.53 Mr Morris, when presenting the Section 42A Reports referred us to his further memorandum dated 27 April 2018. He maintained his position that a key unresolved technical issue that had not been agreed between the parties relates to uncertainty and estimates of PAR and PLL. He was of the opinion these are two potentially very significant effects of a dam breach event. It was his opinion these uncertainties may mean that the potential effects of a dam breach situation are not as well understood as they may otherwise be.
- 13.54 Attached to his 27 April 2018 memorandum were two tables. Table one provided his comments on evidence received from RDRML engineering experts. He accepted Mr Fletcher's view that estimations of PLL do involve some uncertainty but Mr Morris considered there are recognised methods and techniques available to quantify this estimate.
- 13.55 After pointing out again what he considered to be some confusion in Mr Fletcher's evidence in relation to both PAR and PLL estimates¹⁴⁴, he disagreed with Mr Fletcher's position that PLL parameters are used for differentiating between medium and high PIC.
- 13.56 It was Mr Morris' view supported by reference to Guidelines, particularly Principle one, that these assessments assist owners in emergency planning and preparedness in understanding the risks posed by the presence of the dam and in developing risk reduction measures to address unacceptable risks. It was his view that the risk posed by the KSF are directly proportional to PAR and PLL and it is necessary to have a good understanding of these parameters to understand these risks.
- 13.57 Appendix A attached to Mr Morris' 27 April 2018 memorandum provides a detailed examination of the extracts from the NZSOLD guidelines to demonstrate his point.
- 13.58 So in summary Mr Morris was of the view, injury and/or loss of life are important consequences of a potential dam breach scenario. He considered it very important they were well understood so as to understand possible effects on the environment caused by a low probability risk of a dam breach.
- 13.59 The other key reason why understanding of effects on the environment is important is because only with that understanding will we be able to properly determine if proposed conditions are capable of avoiding, remedying or mitigated that level of effects as appropriate.

Findings on adequacy of dam breach study and understanding of effects

- 13.60 Despite Mr Morris' valid points, we have reached the conclusion that we have sufficient information and expert evidence before us to understand the effects on the environment particularly in terms of risk of loss of life to people who could be affected by a catastrophic flood release from the KSF.
- 13.61 We accept we will never know with absolute precision the number of persons at risk or possible fatality numbers. We observed that on any given day it may be that the local population is swelled by any number of itinerants for any number of reasons. This is the subjective point Mr Fletcher and others for RDRML made.

¹⁴⁴ The Stantec Assessment at one point Provides PAR to be more than 100 elsewhere 80 and 100. This uncertainty is significant according to Mr Morris.

- 13.62 Accepting precision around numbers is not possible. We acknowledge and accept even though the risk of dam breach is low, potentially such an event has significant impact effects at the highest level including placing hundreds of people at very high risk of injury and loss of life.
- 13.63 We also consider we have a sufficient understanding of the possible effects of a catastrophic dam failure to assess the proposed conditions of consent as to the suitability and effectiveness of those conditions intended to avoid and or mitigate the effects of such a catastrophic failure of the KSF.
- 13.64 Additionally, we recognise that the final design of many elements of the proposal including the KSF are yet to be undertaken. The proposed conditions reflect this situation. Only after the final design is provided, can a more detailed modelled assessment of PAR, PLL and possible cascade effects on other irrigation storage facilities be undertaken. This is what the conditions propose. In this way we consider Mr Morris' concerns will be provided for.
- 13.65 Condition 38 to 42 of CRC170657 provides a detailed and elaborate requirement that a range of scenarios, inundation mapping of the zone of potential inundation be identified via modelling and in accordance with the Guidelines. As well the condition requires cascade failures to be considered as appropriate.
- 13.66 This condition further requires that inundation mapping is to include illustration of inundation areas at scales sufficient for the identification of area at risk and include inundation tables which show at key locations such as dwellings, roads, and key infrastructure, a range of parameters such as the arrival time of the first flood waters, the peak velocity and DV parameters. Many other details are included. So the matters of concern to Mr Morris will ultimately be addressed when this condition is given effect to.
- 13.67 We are comfortable that we have a sufficient understanding of the effects that may potentially arise as a result of a dam breach, to prescribe appropriate conditions.
- 13.68 Finally given the state of dam design works some of the matters of concern to Mr Morris such as PAR and PLL and cascade can only be appropriately addressed to the extent or degree he recommends after design completion. That is what the conditions, in our view, achieve.

Adequacy of seismic event assessment

- 13.69 Firstly, we note that the original Institute of Geological and Nuclear Science Limited (GNS) seismic hazard assessment included within the AEE was updated due to changes in Guidelines so as to incorporate updated fault source modelling in the region. The GNS report (2017) (GNS Report) provides a detailed assessment of the ground motions and earthquake sources that the KSF and the canal modifications, will need to be constructed to withstand.
- 13.70 Essentially the GNS Report is a probabilistic seismic hazard assessment for the site. In summary the assessment considers all the recognised active faults, the potential magnitude, distance from the site and the probability of occurrence and combines them to provide a level of shaking at the site.

- 13.71 The GNS Report provides recommendations for the level of shaking that should be considered and provided for in the dam design so as to comply with the requirements of the Guidelines. Based on the evidence received we understand the Guidelines recommend that high PIC dams are designed for a 1 in 10,000 annual exceedance probability earthquake derived from a probabilistic approach. Mr Woods explained in his evidence¹⁴⁵, to provide some context to the rarity of such an event, a normal building would be typically designed for a 1 in 500 year earthquake, while an important structure such as a hospital would typically be designed for a 1 in 2500 year earthquake.
- 13.72 Mr David Barrell who is a senior scientist with GNS was engaged by RDRML to undertake a re-evaluation and revision of the active fault earthquake sources in the vicinity of the proposed KSF the findings of which were to be utilised for the GNS Report. He informed us he had undertaken a 2.5 hour walk and inspection of the proposed KSF site examining the landform features and transacts along the length and width of the proposed embankment footprints. In the main he told us the amendments and revisions largely involved fine tuning of previous information and did not introduce notable changes to the hazard assessment.
- 13.73 Mr Barrell informed us the most significant active fault earthquake source in regard to the proposed scheme is a feature identified as the Hutt Peel 2017 active fault earthquake source. He advised us the ground surface prediction of that feature had been amended to more accurately reflect the geological and geomorphological evidence.
- 13.74 Mr Barrell further advised two other potential active fault earthquake sources had been added to the previously defined active fault earthquake source model namely the Klondyke-Moorhouse source and the Coal Creek source. He advised both of these features have alignments that potentially bring them close to the proposed KSF. However it was his opinion, supported by geological reasoning that these potential active fault earthquake sources are unlikely to extend as far as the footprint of the proposed KSF.
- 13.75 Mr Barrell was able to confirm for us that the Hutt Peel 2017 active fault earthquake source is likely to be the most significant source of seismic hazard to the proposed KSF. In detail he said geological and geomorphological mapping indicates that its surface expression of previous rupture events lies at least one kilometre south-east of the proposed reservoir embankment footprint and therefore a fault rupture hazard is not currently recognised as a potential hazard to the proposed KSF.
- 13.76 Mr Barrell referred to submissions that raised earthquake or fault matters. He referred to the submission on behalf of Save the Rivers by Mr Keith Gunn. That submission raises the question of large earthquakes causing breach of the dam. Mr Barrell noted the issue of appropriate earthquake design parameters are addressed in the evidence of Dr Graham McCleary which we will discuss later.
- 13.77 Mr Barrell referred to the submission of Mr John Stack in which Mr Stack expressed concern that not all fault lines had been evaluated. However Mr Stack did not specifically identify those fault lines that had not been addressed.

¹⁴⁵ Mr Wood, Evidence in Chief dated 28 March 2018 paragraph 8.3

- 13.78 It was Mr Barrell's opinion that the GNS Report presented a wider and more comprehensive explanation of fault hazards than the 2014 GNS report. It was his view that, that report should address the concerns in Mr Stack's submission. However he pointed out that following standard practice the hazard assessment only addresses those geological faults that are classified as active and does not necessarily identify all faults active or otherwise. It is the active faults he informed us that are of interest.
- 13.79 Turning to the submission of Mr John Simpson who expressed concerns about the accuracy of the fault mapping. Mr Barrell noted that Mr Simpson referred expressly to the maps included in the 2014 GNS report.
- 13.80 Mr Barrell noted that the subsequent GNS Report provides a much more detailed discussion of fault mapping and classification than did the 2014 GNS report. Mr Barrell noted that Mr Simpson submission referred to a Blandswood fault and a Coleridge fault.
- 13.81 Mr Barrell informed us he had not heard of those terms before and he could not comment on those entities without knowing the source of that information or where they were positioned. He noted the submission also referred to an Ealing fault. Mr Barrell confirmed there is an entity called the Ealing fault but it is in a mapped position at least 10 kilometres south of the proposed KSF and is not regarded as an active fault.
- 13.82 Finally Mr Barrell referred to the submission on behalf of TRoA and Te Rūnanga o Ngāi Tahu regarding the proximity of active tectonic faults to the proposed KSF. In common with other responses it was his opinion the updated GNS Report provides a response to these issues.
- 13.83 In concluding comments Mr Barrell noted that the 2017 review he had undertaken of active fault earthquake sources in the wider vicinity of the proposed KSF had resulted in some improvements being made as to the interpretation of those fault sources. Specifically he found no evidence that differential tectonic deformation has effected the proposed KSF site within at least the past 18,000 years. He further noted that the issue of earthquake motions in regard to the nearby Hutt Peel 2017 fault source is covered in the evidence of Dr Graham McVerry.
- 13.84 We understand the significance of the reference to the 18,000 year period is that the MfE's active fault guidelines recommend that high PIC structures should be excluded from areas in which earthquake re-occurrence intervals are less than 5000 years.
- 13.85 We are unsure as to how those MfE guidelines relate to the Guidelines but because all relevant experts supported Guidelines with little mention of any of the MfE guidelines, we accept Guidelines should prevail.
- 13.86 Insofar as proposed conditions, Mr Barrell noted that none of the proposed conditions specifically address faults. However he noted that in the event of an unanticipated fault rupture causing the formation such as offset or buckling of the ground at the KSF, then conditions such as those relating to the EAP would be triggered particularly where the event had associated damage to the KSF's embankments. He noted these matters were addressed in the evidence of Mr Fletcher.

- 13.87 Dr McVerry is a principal scientist and engineering seismologist with GNS. He prepared and presented a brief of evidence to address the assessment of design earthquake ground shaking levels at the site to satisfy the requirements of the Guidelines.
- 13.88 Dr McVerry provided a very detailed brief of evidence. He discussed the seismic mechanisms and types of earthquakes and measures of earthquake ground motions and structural responses and provided background information on seismic hazard analysis.
- 13.89 After identifying the relevant reports on which his evidence and opinions are based he then made recommendations relating to the motions for the design of the proposed KSF. Following on from those recommendations the balance of his evidence covered the basis or supporting reasons for those recommendations including reference to the Guidelines.
- 13.90 It was his overall conclusion that the horizontal and vertical acceleration response spectra recommended in the GNS Report for the proposed KSF satisfies the requirements of the Guidelines both operating bases earthquake and safety evaluation earthquake motions. In addition he was of the opinion that the requirement to consider a range of seismic uncertainties as expressed in the Guidelines had been satisfied.
- 13.91 Dr McVerry commented to a very limited extent on submissions and then turned his attention to proposed consent conditions. He supported the inclusion of a condition requiring the relevant dams to be investigated, designed, constructed, commissioned operated and maintained in accordance with the Guidelines as pertains to a high PIC dam. In this way he said that condition would ensure aspects of the Guidelines dealing with seismic hazard assessment and related design parameters are included.

Findings on adequacy of seismic assessment

- 13.92 The experience and expertise of Mr Barrell and Dr McVerry is well detailed in the briefs of evidence. In our view they are exceptionally well qualified and experienced to provide the expert evidence and assessment they have.
- 13.93 In contrast while we accept the submitters are well motivated and are entitled to raise issues that same level of experience and expertise was not evident among them. While submitters raised questions and concerns about seismic related issues the submitter group did not present expert evidence challenging the adequacy of the seismic assessment.
- 13.94 Most importantly the reason for the update of the first GNS report 2014 to the GNS 2017 report was the update of the earlier work was required to take into account any new knowledge and changes to the Guidelines in 2015. So the seismic assessment is undertaken against the most up-to-date Guidelines which we were told had undergone a significant review since the last publication in the year 2000.
- 13.95 We observe here that the audit of the GNS Report carried out for CRC by Mr Morris concluded that the seismic hazard assessment was appropriate to provide a perspective on seismic hazards relevant to the project for the project resource consent stage.

- 13.96 Mr Morris in his audit did note that a number of matters may require further work as part of the detailed design of the KSF for building consent. In his final memorandum of 27 April we consider Mr Morris was in the main satisfied as to the adequacy of the RDRML seismic assessment and its findings.
- 13.97 So for all of these reasons we conclude the RDRML seismic assessment is appropriate to provide an understanding of the KSF areas seismicity including seismic risk that dam design must provide for.
- Will the dam design meet Guidelines, in particular the high PIC?
- 13.98 Mr Woods, a qualified and experienced chartered professional engineer in geotechnical and civil practice areas with over 20 years' experience in dam engineering (for both hydro-generation and irrigation projects) provided a detailed brief of evidence. That evidence identified and addressed the manner in which natural hazards could impact upon the KSF and how such impacts could be addressed through and by engineering design. He had earlier provided as part of the application an Engineering Report¹⁴⁶ dated August 2016 which also addressed such matters.
- 13.99 It was his opinion that while a detailed design had not been finalised for the KSF, sufficient design had been undertaken in order to test the key elements of the design against the relevant Guidelines and criteria. He noted that those elements that have not yet been designed will be designed and refined as the design develops and will be verified during the peer review and building consent process that must be completed before the KSF can be constructed.
- 13.100 It was his considered opinion that if the KSF is designed, constructed and operated in accordance with the Application before us and the proposed conditions of consent, then the natural hazards that both he and other RDRML experts had identified would be satisfactorily addressed in accordance with the best practice for a dam of this type as defined by the Guidelines.
- 13.101 Mr Woods, after detailing operational reasons for the selection of the KSF site and the benefits of that site over alternate sites then moved on in detail to identify the natural hazards that must be considered and provided for in the dam design works.
- 13.102 The most significant natural hazards he identified related to the geology of the area, the hydrology and the wind that the site is exposed to and the sediment that is carried by river water that enters the KSF.
- 13.103 Mr Woods also identified some operational hazards such as flood flows entering the KSF and the potential for flood flows in the Rangitata River to cause erosion of the river terraces that support the KSF. He considered this last matter could be addressed by providing an appropriate setback from the river terrace to the KSF.
- 13.104 Commencing with geology and turning to the KSF embankments and lining, Mr Woods was of the view, given the research, including test pits of the soil on the river terrace below the KSF, that ground conditions at the site are well-suited to the construction of the proposed KSF embankments. He detailed the ground materials can be excavated using

¹⁴⁶ MWH, Klondike storage proposal-engineering report, August 2016.

conventional earthmoving equipment and re-contacted using vibratory equipment such as rollers to form dense strong embankment fills.

- 13.105 Because of the use of gravelly soils to form the KSF embankment and foundation, a liner will be required. Mr Woods noted a synthetic liner would be appropriate, though the selection of the final lining system will require detailed assessment of liner properties, erosion and puncture resistance, lifespan and cost to determine the final lining system.
- 13.106 Mr Woods advised, that like other issues to do with the building consent it will be necessary to demonstrate via a peer review process that the detailed design process for the final liner selection is capable of meeting the design criteria that are set out in the Guidelines. He noted that the proposed conditions of consent require the design to be in accordance with those design guidelines so that issue will be captured in those proposed conditions.
- 13.107 Addressing seismic hazards and seismic designs he advised us the KSF will be designed for the levels of shaking estimated in the GNS Report. He was of the opinion that the KSF as designed is capable of resisting the recommended levels of earthquake shaking.
- 13.108 In referring to Mr Morris's audit of the GNS Report, while he noted the auditors consider that seismic hazard assessment appropriate for the project for resource consent stage, a number of matters may require further work as part of detailed design. Mr Woods pointed out while he agreed with this, that the additional design work undertaken to prepare a building consent application will ensure that the matters raised by Mr Morris that require additional work will be completed and will be independently peer-reviewed in accordance with the Guidelines.
- 13.109 Mr Woods noted that the recommendation of the GNS Report as detailed in the evidence of Dr McVerry was to use the mean 10,000 year probabilistically determined level of earthquake shaking as required by Guidelines for the safety evaluation earthquake (SEE). He advised us this is the largest earthquake that the KSF would be designed for. He agreed with the GNS recommendation.
- 13.110 Mr Woods noted the primary impact of the seismic shaking on the KSF is, in his opinion, the deformation it will induce into the embankments and the effect that movement could have on the ability of the lining system to retain water. He detailed the ways in which seismic activity could lead to failure of the KSF and how those chain of events, referred to as potential failure modes, could be addressed during design of the KSF.
- 13.111 Turning to flood design Mr Woods noted because the KSF is not an instream storage facility, conventional flood flows are not appropriate. He identified that the largest flow into the KSF would likely result from a failure of the control system such that it kept diverting the 40.7 m³ per second design inflow after the KSF was already at capacity. He added to that an assessment of what would happen if the highest conceivable rainfall occurred and landed on the KSF surface. He was of the opinion that the combined spillways on the KSF and the inlet structure would provide sufficient capacity to safely bypass conceivable inflows to the KSF so as to satisfy the intent of the Guidelines.

- 13.112 Mr Woods considered wind and waves as a hazard noting that the Guidelines set the free board in the KSF so that waves are contained. He estimated of wave heights within the KSF during high wind events, to establish the required free board considering that a free board of 1.5 metres between the KSF at full operating level and the crest of the embankment is sufficient to meet the needs of the guideline. He also recommended in order to dissipate wave energy that they wave band of rock referred to as riprap should be placed around the top of the embankment of the KSF.
- 13.113 Turning to sediment management, Mr Woods' evidence addressed the manner in which he estimated the quantity of sediment that will enter the KSF. He then noted that sediment in the KSF inflow that has not been removed by the sand trap will accumulate in the KSF. In undertaking his assessment he conservatively allowed that all sediment that enters the KSF would settle out into the KSF before being discharged. Allowing for reductions of sediment caused by the sand trap he estimated that the water entering the KSF would deposit between 12,000 to 31,000 tonnes of sediment per year are with a figure toward the lower end of the range being more likely.
- 13.114 Mr Woods assessed the capacity of the KSF to accommodate the sediment noting that the KSF, before it starts to lose storage capacity, could accommodate in the order of 47 years' worth of sediment within the storage limit. He noted that if sediment was to be removed from the KSF a resource consent would be required.
- 13.115 Mr Woods assessed the possible development of the KSF in stages. He set out his views relating to an initial stage of how a 20 or 30 Mm³ KSF would be developed. He noted that if a staged development was to occur the Fish Screen improvements at the RDR intake would remain the same and the KSF maximum operating level would also remain the same as would the sluice outlet channel and the ecological refuge.
- 13.116 Mr Woods addressed in detail the potential failure mode workshops that were held to review the overall design of the KSF. The participants in those workshops included himself, Mr Fletcher, Mr Ben Curry and representatives of Pickford Consulting acting as an independent facilitator, Riley Consultants who are the designers of the modified canal and Mr Morris engaged as CRC's independent dam expert. A summary of the outcome of the workshop was attached to his evidence marked as appendix E.
- 13.117 Mr Woods noted that the Guidelines referred to potential failure modes, noting that formal consideration of potential failure modes is promoted in the Guidelines as an informed approach to reduce the risk of dam failure. He made the point that the proposed conditions of resource consent included conditions that require the design to be in accordance with the NZSOLD guidelines. So he was of the opinion that the review and assessment of potential failure modes would continue throughout the design process and be critiqued by peer reviewers as part of the building consent application.
- 13.118 Mr Wood's detailed some 31 potential failure modes that were identified by the group which were then grouped into subcategories of normal operation, wind conditions, flood conditions and seismic conditions so as to be consistent with the natural hazards that had been identified on the site.

- 13.119 The potential failure modes were classified as either credible or non-credible based on the opinion of the group. A non-credible mode was one he explained where the group could not credibly see failure of the dam occurring due to features that have been incorporated into the dam design. These potential failure modes would not be dismissed as a design progresses rather they would be reviewed to ensure they remain non-credible as the design is finalised. He further explained a credible mode is one in which the potential for failure cannot be reasonably discounted and will in many cases relate to modes with the design is not yet far enough developed to review the details and determine it non-credible.
- 13.120 Mr Woods then explained eliminating or mitigating any credible potential failure modes, would in his opinion, be a key requirement of the design and will be verified by peer review is required as part of the KSF design and building consent processes.
- 13.121 Turning to dam safety management he noted that as required by the Guidelines and the proposed conditions of resource consent a number of standard dam safety documents had been prepared for the KSF namely a Water Storage Commissioning Plan (WSCP), Dam Safety Management System (DSMS) and EAP.
- 13.122 Mr Woods informed us that the WSCP sets out the procedures that must be followed during the first filling of the KSF. It was his opinion this plan will mitigate the risks and any potential effects that may occur during the first filling of the KSF. He noted that there was no legislative requirement for such a plan although the plan is in accordance with the requirements of the Guidelines he said. It was his opinion that in preparing such a plan, RDRML demonstrated that the KSF would be operated in accordance with best practice.
- 13.123 Turning to issues raised by submitters Mr Woods expressed the opinion that the most important outcome from the dam breach assessment is to assign the correct PIC to the KSF so that suitable design standards are implemented and the risk is reduced to an extremely low and acceptable standard.
- 13.124 It was Mr Woods' opinion the assessment of the storage facility as a high PIC will result in the structure being designed, constructed and operated to the highest possible standards. He expressed the view that he had demonstrated that the KSF can be built to the appropriate standards and that this will be independently verified via the building consent process.
- 13.125 Mr Woods noted that 3 submissions¹⁴⁷ raise the issue of the proximity of the KSF to the riverbank and whether any protection works proposed could cause adverse impacts on the side of the Rangitata River. Mr Woods was of the view the setback provided for the KSF from the riverbank is adequate.
- 13.126 It was Mr Woods' opinion that the main braid of the Rangitata River is normally directed towards the eastern bank, that is, the bank below and along the length of the KSF. It was his opinion that the river tends to concentrate its erosive forces at a point on the riverbank for a period of time and then move away naturally. He said if monitoring of the riverbank showed a long-term focusing of energy resulting in significant

¹⁴⁷ Royal Forest and Bird Protection Society of New Zealand, John Ackland, John Stack.

erosion of the riverbank then protection works may be designed and resource consents applied for to address the erosion.

- 13.127 Mr Woods noted the submission of RSIL raised issues around clarification of earthquake sources considered in the seismic assessment. He expressed the view that the GNS Report considered all recognised active faults, the potential magnitude, distance from the site and probability of incurrence and combines them to give a level of shaking of the site.
- 13.128 Based on this assessment of a range of fault sources, Mr Woods advised GNS have been able to provide recommendations for the level of shaking that should be considered to comply with the requirements of the Guidelines. He considered the KSF embankments could be designed to appropriately provide for that level of shaking at the site.
- 13.129 Mr Woods noted the same submitter raised issues concerning the damage that may occur to the lining system when or if equipment is operated on it. That submitter queried what would cause the need of the liner to be replaced. Mr Woods responded noting that the liner would be protected by a protective cover layer which was detailed in the working drawings. That layer is designed for traffic movements during construction and operation. He noted the liner would have a warranty period of 30 to 50 years and it may well last beyond the warranty period. Because the KSF should be considered an intergenerational asset the possibility of needing to replace the liner should be considered.
- 13.130 Mr Woods noted that the CRC River Engineering team had raised concerns about operational releases of water to the Rangitata River and the impact of such releases on its assets in the river such as stop banks and users of the river. He noted the maximum discharge from the KSF excluding the effects of natural rainfall is controlled by the design of the structures to be 40.7 m³ per second. Flows of the scale were not in his opinion of a magnitude that would cause damage to in river structures in a river the size of the Rangitata River. He advised us a consent condition had been developed as a means of notifying CRC River Engineering when such releases would occur. We understood CRC River Engineering, being satisfied with that condition, withdrew their interest in being heard.
- 13.131 Turning to the Section 42A Reports and in particular the 7 March 2018 memorandum of Mr Morris, Mr Woods noted Mr Morris had recognised the potential for large velocities in significant scour potential from releases of water from the KSF down through the natural gully. Mr Morris did nevertheless record that a structure of that nature could be designed and built with appropriate material, so long as facilities to a high PIC standard are provided. Mr Woods agreed with that opinion.
- 13.132 We note Mr Morris in his 27 April 2018 memorandum fully reviewed Mr Woods' evidence. While he recorded a number of points in the memorandum referencing particular paragraphs within Mr Woods' evidence, our view of Mr Woods' comments was that he was signalling some matters would require further work and certain matters would need attention during the detailed design phase. However provided these matters were addressed to the high PIC standard as provided for in the guidelines he did not have concerns with Mr Woods evidence.

- 13.133 In particular Mr Woods noted the WSCP requires the spillway to be progressively tested in increments of 10 cumecs to confirm performance as is expected up to the maximum required flow rate. Mr Woods further noted a specific proposed condition of consent had been included which addresses design of the spillway. Therefore Mr Woods was of the opinion that the review of the design of the spillway would be addressed as part of a building consent review process in any case. However he did support inclusion of this issue in conditions of resource consent.
- 13.134 Mr Woods noted that the CRC harbourmaster Mr Ian Fox had raised issues with respect to safety of river users during discharges from the KSF. Mr Woods confirmed he discussed these issues directly with Mr Fox and agreed that some notification procedures could be put in place morning to users of the river if an emergency release of water was to occur. The proposed conditions of consent have been promoted in that regard.
- 13.135 The last matter raised by Mr Woods covered the suggestion made in the ADC Section 42A Report that RDRML should investigate flattening of the external slopes of the embankments of the KSF so as to soften the visual impact of the embankments sides particularly on the southern side. This matter is referred to in Mr Stephen Brown's evidence.
- 13.136 Mr Woods was of the opinion it would not be possible to flatten the slopes appreciably because there is insufficient spoil material available. In any event he noted it was not a preferred engineering approach to have low strength fill placed on the outside of the embankment. Doing so he said could make differentiation of insignificant surface instability difficult to distinguish from more significant underlying instability. It was his opinion that this recommendation should not be adopted.
- 13.137 Finally Mr Woods referred to the expert conferencing which had been undertaken with Mr Morris himself and Mr Fletcher. He noted the joint witness statement is attached the evidence of Mr Fletcher. He further noted there were no significant areas of disagreement on the scheme engineering acknowledging that a number of aspects needed to be developed further in final design and verified through review processes.
- 13.138 It was his concluding opinion that if the KSF was designed, constructed and operated in accordance with the Application and the proposed conditions of consent, the natural hazards and other hazards he identified would be satisfactorily addressed in accordance with best practice for a storage facility of this type is defined by the Guidelines.
- Findings on dam design meeting the Guidelines in particular high PIC.
- 13.139 Based on Mr Woods' qualifications and expertise in this area coupled with the fact we did not have contrary expert evidence we accept Mr Woods' evidence that he has demonstrated that the design of the KSF is capable of addressing natural and other hazards and complies with the design criteria provided in the Guidelines.
- 13.140 Also based on Mr Morris' audit of Mr Wood's evidence, notwithstanding Mr Morris identified some matters still to be dealt to because he was satisfied with Mr Morris' evidence, provided those outstanding matters were addressed in accordance with the high PIC standards provided for in the Guidelines. We find this is another reason to accept and rely upon Mr Woods' evidence.

Canal Modifications Dam safety

- 13.141 Mr Paul Morgan, a chartered professional civil engineer provided evidence on the canal modifications between the Rangitata River intake and intake to the KSF, the Fish Screen and the WWC at the outlet of the KSF. He noted that the main construction activity will be earthworks with a total of approximately 34,000m³.
- 13.142 His evidence was based upon three reports which were included as part of the AEE. They are the Riley 11835-A February 2016 Klondyke Water Storage Proposal Canal Modification Engineering Report, Riley 150975-C November 2017 RDR Fish Screen Concept Report and finally Riley 11835/3-A July 2016 WWC Engineering Report.
- 13.143 He advised us that he had reviewed and made contributions to management plans prepared by others in regard to the canal modifications, the Fish Screen and the WWC. In particular he had contributed to the CMP, the erosion and sediment control plan, and the DSMP and finally the emergency action plan as they related to these component parts of the proposal.
- 13.144 He advised that the additional 10m³/s increases water levels by approximately 0.5 metres which requires modification to parts of the canal between the intake and the KSF. The modifications will mostly require bank raising with a section of the canal also requiring widening. Three of the existing bridges will also require raising.
- 13.145 Mr Morgan noted that the KMW-435994-21-4132-1 proposed mechanical rotary Fish Screen will also result in a further approximately 0.2 metre rise in water levels upstream of the Fish Screen (i.e. 0.7 metres in total upstream increase). However the existing bank levels between the intake and the location of the Fish Screen are already sufficiently high as to not require any modifications to accommodate the additional flows and Fish Screen.
- 13.146 As to dam breach assessments for the canal modifications he advised that an initial dam breach assessment has been undertaken by Riley Consultants for the canal between the intake and the KSF and indicated that there are three areas along the race that will be constructed in fill which requires consideration. The assessment has indicated that the PIC for the canal is low. Compliance with the design standards that apply as a consequence of this PIC will ensure that any risk of an uncontrolled release from the modified sections of the canal will be low, and in accordance with the applicable Guidelines.
- 13.147 As to dam safety management systems, Mr Morgan noted MWH have prepared a DSMS for KSF which has been assessed as having a high PIC. The Guidelines do not require a DSMS or an EAP for a low PIC dam which the canal has been assessed to be. Given this, and contrary to the suggestion in the Section 42A Report of Ms Ford, he was of the opinion that a DSMS is not needed for the proposed modifications to the canal.
- 13.148 Mr Morgan recommended that the following two mitigations are provided in regard to safety of the canal:
- (a) Maintain an emergency overflow spillway for the canal. The current spillway is located immediately upstream of the BAFF

screen but may need some modifications in regard to level and width for any additional flows into the race; and

- (b) The three fill areas of the canal highlighted in the dam breach assessment are visually inspected as part of existing routine monitoring of the canal.

13.149 While Mr Morris did not appear to agree with Mr Morgan's view that the Guidelines do not require a dam safety management system or an emergency action plan for a low PIC dam. Mr Morris points to module five section 1.1 which states that "*a dam safety management system, commensurate with the consequences of dam failure and incorporating policies, procedures and responsibilities, should be in place for all dams*".

13.150 Mr Morris agreed that the DSMS be appropriate for the canal modifications dam.

Findings on Dam Safety Issues for Modified Canals

13.151 So essentially, while there appeared to be a point of difference between Mr Morgan and Mr Morris, we do not consider there was one. This is because when the canal modifications are designed to the low PIC category, a DSMS and EAP is not part of that design.

13.152 In any event, considering the conditions for CRC184147, we are satisfied that matters to do with canal dam breach risk and safety are adequately provided for. In addition, provided the current spillway within the canal is retained, Mr Morgan's other recommendation will be satisfied.

13.153 We consider that the inspections mentioned by Mr Morris in his paragraph 33.2 of his evidence in chief will need to be carried out to satisfy the conditions of consent.

Is the DSMS including the EPA and other relevant plans appropriate?

13.154 Mr Fletcher dealt with dam safety requirements of the water storage. In that regard he prepared a DSMS which focuses on the operational KSF safety. He also reviewed the WSCP prepared by Mr Woods. Mr Fletcher also prepared the EAP and the iterations of it over the course of the hearing.

13.155 Turning to the WSCP Mr Fletcher confirmed he had checked the WSCP against the Guidelines and he confirmed it had been prepared in accordance with those Guidelines. In short that plan includes a commissioning and testing regime that RDRML will implement for the controlled structures and systems, pumps and the monitoring systems associated with the KSF. This plan will confirm that those systems perform to the design expectations and all applicable legislation and building consents. The WSCP will also provide for surveillance and associated monitoring methods that RDRML will implement during the commissioning of the KSF.

13.156 The purpose of the DSMS, Mr Fletcher explained is to minimise the risks associated with the ongoing existence and operation of the KSF. Mr Fletcher informed us the DSMS follows the Guidelines. The DSMS system deals with the:

- (a) Dam safety governance of RDRML;
- (b) Dam and reservoir operation and maintenance linking with and expanding from current RDRML operation and maintenance of the RDR canal;
- (c) The surveillance protocols based on the WSCP surveillance then modified for future operation of the KSF and linking with existing surveillance of the RDR canal and the appurtenant structures inlets and outlets and associated gates;
- (d) The requirements for annual intermediate dam safety reviews and a five yearly comprehensive dam safety reviews;
- (e) The triggers for special inspections and dam safety reviews;
- (f) Identifying and managing dam safety issues;
- (g) Information management and;
- (h) The frequency of approach to auditing and reviewing the DSMS.

13.157 In Mr Fletcher's opinion the DSMS is appropriate and meets the recommended contents as outlined by the Guidelines.

13.158 Mr Fletcher also informed us he prepared the EAP. The purpose of the EAP is to minimise the potential for dam failure through pre-planned or preconceived interventions and/or actions should a dam safety incident or emergency arise and in the event that a dam failure cannot be prevented to limit the effects of the dam failure on people, property and the environment. He told us the EAP will be used to manage the process for any emergency discharge from the storage within the intended resource consent conditions.

13.159 He advised us the EAP had been prepared with reference to module six of the Guidelines. The EAP includes:

- (a) Maps of the area of land identified via modelling as being subject to inundation in the event of abnormal or excess flow releases from the KSF;
- (b) Contact details for people resident within those areas;
- (c) The contingency plans to be implemented by RDRML for alerting people within the identified areas of inundation and relevant civil defence authorities of the risk of such events; and
- (d) The actions that would be taken to minimise the potential for an uncontrolled reservoir release of water from the KSF.

13.160 Mr Fletcher explained the Guidelines outline best practice in terms of dam safety management in module five. This includes, he said regular inspection and operation and maintenance requirements. Module five also sets out acceptable operating parameters for the dam such as internal water pressures and settlements and a systematic approach to monitoring these parameters.

- 13.161 Many submitters understandably raised dam safety issues. Those submitters¹⁴⁸ are identified in paragraph 7.1 of Mr Fletcher's statement of evidence dated 28 March 2018. In his evidence Mr Fletcher noted these submissions raise concerns with the effects of the potential dam breach generally, insurance and bond conditions and seismic faults. Some of the submissions he said wished to see detailed investigation to be completed, ongoing monitoring of the dam be undertaken and that emergency plans/actions be developed.
- 13.162 In his evidence he detailed a number of consultation meetings he had held with Mr Ben Curry of RDRML and with the submitter group. Much of what he detailed as occurring in these consultation meetings has been addressed in his evidence in chief and we will not repeat it. Suffice to say, in meeting with the submitters he and Mr Curry endeavoured to address the submitters' concerns.
- 13.163 Due to the national and regional significance of the infrastructure that both NZTA and Kiwi Rail administer and are responsible for, we record that these submissions are similar, relating to a specific interest around water and sediment discharge in emergency events. Both expressed interest in the dam breach modelling and potential issues for adverse effects of dam breach floodwaters impacting on both State Highway 1 (SH1) and Bridge 57 for Kiwi Rail.
- 13.164 In their written submissions both NZTA and Kiwi Rail acknowledged the likelihood of a catastrophic storage dam failure was low but both stressed the need to ensure measures are in place to manage these risks, and expressed that those measures should include monitoring and emergency management plans including notification.
- 13.165 Mr Fletcher confirmed that both NZTA and Kiwi Rail will be part of the EAP process for the development, future reviews, any required updates and notification procedures. We were informed by both submitters that following discussions directly with RDRML they were satisfied that the issues raised in their written submissions were capable of being addressed by RDRML and notified us of their intention of no longer wishing to be heard.
- 13.166 Responding to the submitters' concerns in a general way, Mr Fletcher expressed his opinion that the dam design and dam safety provisions, which will be required throughout construction, commissioning, and operation to meet the consent conditions, based on the Guidelines of a high PIC dam, those issues and concerns have been addressed.
- 13.167 Mr Fletcher advised us he was satisfied there has been a detailed investigation into dam safety issues associated with the KSF and that the proposed conditions of consent will ensure suitable monitoring of potential dam safety matters and that the EAP will provide an appropriate response to any dam safety incident or emergency that may arise.
- 13.168 Mr Fletcher also noted that the proposed consent conditions require independent review and certification by a qualified chartered

¹⁴⁸ Kenneth Lloyd, Cliften William/Paul Brown Keith Gunn Rosalie Joy Sonyink Martyn V Baker Rangitata South Irrigation Limited Daniel John Stack Geraldine High School/Carew Peel Forest combined board of trustees Dialan Dairy Pye Group South Park Farm South Stream Dairy and Straven Peel Forest advocates group (Don Murray) Hilary Iles Rangitata Water Limited David and Rebecca Whillans John Stack John McGregor Simpson and Early Family Trust

professional engineer and experienced dam safety expert for the design, construction, and commissioning (WSCP) and for the DSMS and the EAP.

- 13.169 Mr Fletcher further referred us to the expert conferencing for dam engineering and dam safety completed on 15 March 2018. He informed us that he, Mr Woods and Mr Morris were involved in this conferencing. Many topics were covered including the management plans namely the WSCP, DSMS and the EAP and submissions relevant to those plans.
- 13.170 Mr Fletcher presented a joint witness statement covering this conferencing which was attached as appendix B to his evidence. That statement recorded areas of agreement and areas of disagreement. Agreement was reached on the following matters;
- (a) The Guidelines are the appropriate guidelines to be applied to the KSF and if consent is granted these NZSOLD guidelines should be suitably referenced in the resource consent conditions;
 - (b) The PIC of the KSF in terms of the Guidelines should be high. In making this assessment the PAR as defined by the guidelines is estimated as more than 100 people;
 - (c) Example design standards for a high PIC dam are to design for an earthquake with an annual exceedance probability of one in 1000 if developed by a probabilistic approach and for the probable maximum flood;
 - (d) Calculation for the PLL will not change the PIC and design standards of the KSF regardless of the PLL value calculated;
 - (e) While in terms of the modelled dam break scenarios the best estimate of the Mannings n value was not agreed and accepting the potential extent of inundation and loss of life estimated may change the PIC and design standards would not change;
 - (f) The inundation maps presented in Appendix D of the draft EAP will need to be revised based on the final size of the KSF and the requirements of the Guidelines;
 - (g) The inundation maps presented in Appendix D of the draft EAP will need to be refined based on any potential cascade failure of downstream water storages, in particular the Rangitata South storage ponds;
 - (h) A seismic hazard study undertaken for the site has been undertaken by GNS. That site-specific hazard assessment is appropriate to provide a perspective on seismic hazards relevant to the project for the project resource consent stage; and
 - (i) The potential failure modes identified in a workshop held on 6 November 2017 are considered appropriate for the KSF based on present understanding. The potential failure modes will need to continue to be developed and mitigated throughout detailed design.
- 13.171 The areas of disagreement have already been discussed earlier as they relate to the matter of quantifying and/or refining estimates of the PAR.

- 13.172 Mr Fletcher also produced a statement of supplementary evidence dated 3 May 2018. Essentially this was directed at addressing concerns that have been raised by a submitter, Mr Stack.
- 13.173 Mr Fletcher responded to Mr Stack's concerns as to why the rainy day dam breach scenario had not been completed. Mr Fletcher, for reasons he explained, was of the opinion that such an analysis was not necessary to understand the actual and potential effects of a dam breach. His primary reasoning was that flood conditions in the Rangitata River are unrelated to the KSF because of the location of the KSF vis-à-vis the river.
- 13.174 Mr Stack's other concern related to the adequacy of the river terrace setback. As noted earlier the KSF is located on a river terrace above the Rangitata River. Mr Stack was concerned that the Rangitata River would erode the terrace. He contended there was no evidence produced by RDRML that the river terrace would not behave differently if wet from the leakage and under pressure from the storage weight of the KSF.
- 13.175 To address this issue Mr Stack sought a greater setback of the KSF from the terrace edge because he was concerned it was very difficult to control the river direction if this was needed to mitigate river erosion of the terrace.
- 13.176 Mr Fletcher noted the issue of the river terrace setback as being addressed in section 2.2 of the design report forming part of the resource consent application and explained this has been addressed in his evidence in chief and that of Mr Woods. He also observed that Mr Curry and he met with Mr Stack to determine if there was any scientific or technical information upon which Mr Stack's challenge was based. None was presented.
- 13.177 Mr Fletcher agreed that the issue of the distance of the setback would be further considered and refined as part of the detailed design and it will also be peer reviewed. He pointed out for us that consent conditions require the ongoing monitoring of the terrace as part of dam safety inspections. Finally he noted that if terrace erosion became an issue in the future there is always the option of river protection works.
- 13.178 Mr Fletcher stressed that erosion of the river terrace is from river forces and would not be influenced in his opinion by the presence of the KSF. Any leakage from the KSF would drain directly into the foundation beneath the KSF and would not influence river terrace erosion. Mr Fletcher noted erosion of the river terrace and considered it a non-credible failure mode for the KSF.
- 13.179 Mr Stack in his submission also raised the alternative of a multiple pond design. This had been considered by Mr Woods in his evidence. Mr Fletcher agreed with Mr Stack that lower water depth would influence the dam breach effects. Mr Fletcher told us because the total volume of stored water would effectively remain the same there would still be a substantial dam breach flow. It was Mr Fletcher's opinion he could see no civil safety reason to adopt a multiple pond design.
- 13.180 The last issue covered in Mr Fletcher's supplementary evidence related to Mr Stack's concern that it would take 11 days to de-water the proposed KSF which Mr Stack considered was too slow.

- 13.181 Mr Fletcher, in contrast was of the opinion that 11 days de-watering was very fast in comparison to large dams and storages elsewhere. He observed that faster de-watering than what was proposed would mean larger outlet works, a larger channel to the river and a larger flow. He acknowledged he had not considered the environmental effects of these options but he expected them to be higher than those associated with the proposed design. He said there would need to be a compelling civil safety reason to depart from the proposed design and discharge rate regime. We took it that he considered that Mr Stack's concerns did not provide one.
- 13.182 Finally Mr Fletcher provided us with a copy of a letter that he had provided to RDRML for the purpose of sending onto Mr Stack. That letter effectively covered all of the issues addressed in his supplementary evidence.
- 13.183 Mr Morris during the Section 42A Officers' presentation made comments on conditions, two of which we raise here. First under the heading of proposed consent conditions relating to dam engineering he recorded that there was substantial agreement on the conditions.
- 13.184 Second in respect to the EAP which was circulated in draft form on a number of occasions during the hearing, Mr Morris acknowledged that the EAP is incomplete which was understandable given the design was incomplete. He stressed that if consent is granted then the operative version of the EAP should be in accordance with NZSOLD guidelines and the proposed draft consent conditions should require this outcome. He also considered that there should be provision for a certification process of the EAP.

Conditions

- 13.185 Turning to proposed conditions 37 through to 42 of the water permit (CRC170657) provide for the EAP. Summarising, those conditions require an EAP to be provided 40 working days before the first filling of the dam to a range of parties for input into the plan including regional and territorial authorities, New Zealand Police, New Zealand Fire Service, Kiwi Rail and NZTA.
- 13.186 The proposed conditions set out the purpose of the EAP, being to minimise the potential for dam failure through pre-planned or preconceived interventions and/or actions, should a dam safety incident or emergency arise and in the event that a dam failure cannot be prevented to minimise the effects of the dam failure on people, property and the environment.
- 13.187 The proposed conditions require that the EAP be in accordance with module two and module six of the Guidelines and be based on the appropriate 'as built' stage of the KSF. Clearly this condition recognises the EAP will be most effective if it is based on the actual 'as built' KSF as distinct from the KSF in design as it is now.
- 13.188 The conditions are detailed and elaborate, requiring that a range of scenarios, inundation mapping of the zone of potential inundation be identified via modelling and in accordance with the guidelines. As well the condition requires cascade failures to be considered as appropriate. The inundation mapping is to include illustration of inundation areas at scales sufficient for the identification of area at risk and include

inundation tables which show at key locations such as dwellings roads and key infrastructure and the like a range of parameters such as the arrival time of the first flood Law waters the peak velocity and DV parameters. Many other details are included.

- 13.189 Importantly condition 13 provides for certification of dam safety under the Guidelines. That certification is to be provided by a chartered professional engineer suitably qualified and experienced in the design, construction surveillance and documentation required for high PIC dams in accordance with the Guidelines. The certifier is to be independent of the consent holder, dam designers and construction contractors.
- 13.190 Reviews of the EAP are also required and must be completed by an independent certifier when reviews of the DSMS occur. Those reviews will also consider the inundation modelling including whether the downstream environment has changed since the modelling was last undertaken, the contact details of the downstream landowners and notification procedures and finally the actions identified within the EAP.
- 13.191 We do observe that Mr Morris in his 27 April memorandum at table two provided a number of comments on various conditions proposed for resource consent CRC 170657. He noted all of the matters listed in this table two were discussed with Mr Woods, Mr Fletcher and Mr David Greaves on 24 April 2018.

Findings on the DSMS including the EAP and other relevant plans.

- 13.192 Based on the expert evidence of Mr Fletcher, Mr Woods, Mr Brian Peters and Mr Paul Morgan we accept that the DSMS has been prepared in accordance with the Guidelines and largely satisfies those Guidelines. Further, that evidence satisfies us that the sub-plans such as the WSCP have also been prepared in accordance with, and largely satisfy the Guidelines.
- 13.193 We acknowledge Mr Morris in undertaking his audit of this expert evidence has raised a number of issues that needed to be addressed. However by the time his 27 April memorandum had been prepared we understood that the more serious of those matters had been addressed to his satisfaction. By way of support for this finding in that memorandum he records substantial agreement on KSF engineering conditions.
- 13.194 We acknowledge that the EAP in particular is an evolving document and its final form is dependent upon both final design and further assessment modelling of that final design to inform the EAP.
- 13.195 However we acknowledge RDRML, in response to submissions, undertook further iterations of the EAP to address concerns raised by NZTA, Kiwi Rail, the CRC River Engineers team and harbourmaster. Those concerns were addressed either by providing appropriate conditions within the EAP relating to notification to those organisations on the occurrence of an emergency or alternatively providing notice through discrete resource consent conditions.
- 13.196 We also acknowledge Mr Morris recognised that the EAP in particular was still under development. So to recognise and address that issue and the fact other sub-plans of the DSMS are still being finalised, Mr Morris strongly recommended that if consent is to be granted, it is appropriate

that key aspects of the project including DSMS are certified by an independent expert as being in accordance with the Guidelines and that evidence of that certification be provided to the CRC.

- 13.197 In addition Mr Morris stressed that it was very important, if consent be granted, that operative versions of plans such as the EAP be independently certified as being in accordance with both the Guidelines and conditions of resource consent. He considered it very important that the plans be in accord with the Guidelines and that these guidelines be incorporated into any resource consent conditions. We agree with this approach.
- 13.198 As to the matters raised by Mr Stack concerning risk relating to the river terrace setback, we consider that the evidence of Mr Fletcher particularly given Mr Fletcher is an expert adequately addresses Mr Stack's evidence on the river terrace setback risk. In any event we agree with RDRML that any risk arising from a combination of river erosion and a lack of setback is minimal and provided RDRML monitor the position there is ample opportunity for any river erosion risk to be avoided or mitigated through river works.
- 13.199 We do not need to consider Mr Stack's alternatives in terms of storage as we need assess the proposal before us and its effects on the environment rather than some alternative Mr Stack promotes.
- 13.200 Turning to the de-watering of the KSF we prefer the expert evidence of Mr Fletcher on this point finding that the 11 day period for de-watering is appropriate. We accept Mr Fletcher's evidence that a shorter de-watering period would require larger scale outlets being able to convey larger quantities of water likely leading to greater impacts on the river. Given likely risk and given the need to completely dewater would be extreme, we prefer Mr Fletcher's evidence over Mr Stack's on the de-watering issue.
- 13.201 All of the expert dam engineers made it plain that a key consideration is to provide for public safety and to demonstrate within the RMA process that the design, construction and operation practices for the dam will address hazards that have the potential to impact on the environment. The effective tools to achieve that outcome are the conditions of consent inclusive of the DSMS and EAP.
- 13.202 Mr Fletcher, Mr Woods and Mr Morris all agreed that it was appropriate and very important that all relevant high PIC design and performance standards be adopted for the KSF. All agreed that Guidelines consider adoption and implementation of high PIC design and performance standard to be appropriate mitigation for the potential hazard posed by a large, high PIC dam such as the KSF.
- 13.203 Given this, we consider that provided consent conditions are put in place to ensure appropriate plans are produced, reviewed by experts, maintained and implemented in particular conditions requiring the completion and maintenance of a DSMS including an EAP, then the matters of concern relating to safety raised by Mr Morris and submitters would be properly addressed and provided for.

Plan Provisions in relation to dam safety risk

- 13.204 There are no statutory documents prepared under the RMA in relation to water storage in dams.
- 13.205 We have already identified the Guidelines noting these guidelines have no statutory weight. The primary focus of these guidelines is to provide recommended practices for the investigation, design, construction, commissioning, assessment, rehabilitation and operation of dams in New Zealand that are four metres or more in height or impound 20,000 m³ or more of water or other fluid. All of the principles and recommended practices and these guidelines are applicable to dams with the consequences of dam failure would be unacceptable to the public.
- 13.206 Mr Greaves, planning expert for RDRML considered the location of the KSF and its interaction with the Rangitata River in the context of the WCO. He observes, and we agree the KSF is set back at least 100 metres from the current river terrace edge to provide appropriate separation so as to mitigate effects including effects of erosion. The only points of interaction between the KSF in the river are the discharge channel and the fish bypass return. Mr Greaves notes and we agree that based upon expert assessment the proposed structures that interact with the river had been designed to ensure they do not result in the adverse alteration of the natural character of the river, nor the flow and function of the river at the points of intersection.
- 13.207 We accept that construction materials have been specifically identified to ensure the structures maintain the existing character of the river environment with the use of rock, coloured concrete and vegetation being utilised as much as possible.
- 13.208 In combination with the proposed conditions of consent including the suite of management plans we have referred to above we are satisfied the mitigation measures identified by the technical experts both in their evidence and now included within those management plans will be undertaken.
- 13.209 We understood Ms Ford to be in agreement with Mr Greaves' assessments in relation to the NPSFM in all respects other than with the exception that the proposed flood flow take of 10 cumecs may adversely affect the ecology of the Rangitata River.
- 13.210 Turning to regional guidelines, chapter 11 of the CRPS addresses natural hazards but specifically not man-made hazards that pose a threat to people and infrastructure.
- 13.211 Ms Ford did assess the objectives and policies in the CRPS because she considered the potential effects posed by application CRC 170657 (being a water permit to dam up to 53,000,000 m³ of water outside of the riverbed) may be deemed as a hazard. She traversed in detail CRPS objectives 11.21 and 11.24 and policy 11.3.1 in her Section 42A Report¹⁴⁹. We adopt her assessment and outcome that she considered the application is consistent with those objectives and policies.
- 13.212 Ms Ford also reviewed and considered Chapter Four of the LWRP which contains policies relevant to dam and dam breach. She noted these

¹⁴⁹ Ms Ford, CRC Section 42A Report paragraph 173 page 54.

policies mostly refer to the danger of instream damming and the need to manage damming activities in the light of allocation limits and other water users. She identified only policy 4.48 as being relevant. This policy details the needs to take into account the risks of damming into dam design plans, site location, mitigation and dam operation as they affect people, property and infrastructure. In our view, for the reasons already provided we consider the application is consistent with this policy.

- 13.213 Mr Greaves identified objective 3.22 and policy 4.96 of the LWRP as being relevant to dam breach issues because both make reference to the design and construction of dams being appropriate in order to reduce the risk and effects of natural hazards on infrastructure. Making reference to evidence, Mr Greaves noted site selection and design of the proposal had been undertaken so as to reduce the risk and effects of natural hazards on the infrastructure. He referred to the location away from the erosive activities of the river channel and seismic risks. He pointed to the evidence of Mr Woods that the erosion of the river terrace below the KSF undermining the KSF embankments as being a non-credible potential failure mode due to separation distance.
- 13.214 In relation to seismic risks he referred to Mr Fletcher's evidence which noted the design and construction of the KSF and modifications of the canal network will be undertaken with strict adherence to the Guidelines. Mr Greaves also noted as part of the selection process, in the unlikely event of a dam failure, the location of the KSF nearby to the river would provide a route for dam breach waters thus lessening the impact of that water. The river channel would operate to enclose such discharge waters reducing the area potentially affected.
- 13.215 Mr Greaves also referred to Mr Fletcher's opinion that to manage the effects from seismic movement, mechanisms have been put in place to reduce the loadings should damage occur. He also referred to Mr Fletcher's recommendations relating to comprehensive monitoring and a maintenance regime so as to ensure that the safety of the structures are maintained at all times. Mr Greaves noted that these measures are included in the proposed conditions of consent.
- 13.216 It was his view and we agree with the assessments and design responses have ensure that the proposal specifically addresses the matters identified in the relevant objectives and policies of the LWRP in particular objective 3.22 and policy 4.96.
- 13.217 In terms of the operative ADP, that plan does not have objectives and policies directly related to dam safety and risk of dam breach. However we note that both Mr Greaves and Mr Boyes, after considering the relevant objectives and policies, considered that the policy framework overall identifies the need that development should be undertaken in a manner that ensures adverse effects including during construction are avoided remedied or mitigated and that the health and safety of the community is not compromised.
- 13.218 For many of the reasons already mentioned including in the expert evidence, for example matters in relation to the design of the KSF and canal modifications, the conclusion is to ensure the most stringent dam constructed standards under the Guidelines particularly for the KSF being a high PIC category dam as this will ensure the policy framework is adhered to.

- 13.219 In addition both the KSF and canal modifications have been designed to account for seismic activity, undermining from water movement, sediment and loading and leakage. Essentially based on expert evidence, Mr Greaves was of the view that site selection location and design are all directed at ensuring that the safety of the community is not unduly at risk as a result of the proposal.
- 13.220 Accordingly in so far as dam risk dam breach and dealing with safety of the community, both Mr Boyes and Mr Greaves reached the conclusion that the proposal is consistent with the ADP policy framework. This is particularly so when regard is had to the recommended suite of conditions that are intended to appropriately avoid remedy or mitigate the potential effects of the proposal particularly dam risk effects so as to ensure it does not conflict with the relevant objectives and policies of the ADP.

Insurance

- 13.221 RDRML included insurance conditions as part of the proposal from the outset. Proffered conditions based on other storage irrigation proposals have been developed over the course of the hearing in response to input from reporting officers and submitters.
- 13.222 Insurance conditions are included in RDRML's final condition set. The purpose of the insurance conditions is to ensure that there is adequate insurance cover in place in the instance that a dam breach occurs with consequent damage. The policy is intended to provide cover for such damage.
- 13.223 To ensure the insurance policy terms and cover is adequate for the nature of the risk and the probable loss expert advice is required. In addition because an event causing loss, could have far-reaching community effects as shown by RDRMLs modelling we consider that important the community be recognised by including the consent authorities as parties to the insurance policy.
- 13.224 Overall we are satisfied that the insurance conditions we have included will meet the objective we have set out above and are necessary.

Bonds

- 13.225 Consideration of bond conditions arise in two circumstances. The first relates to the KSF. In particular whether RDRML should provide a bond to ensure that it complies with all relevant conditions relating to the construction operation and reinstatement relating to the KSF the other bonding circumstance relates to works undertaken by RDRML on public roads.
- 13.226 In reply¹⁵⁰ Ms Hamm submitted a bond was unnecessary because RDRML is a long-established company and there is no question about the wherewithal of the company to comply with its bond obligations. She also notes insurance will cover construction operation and maintenance.
- 13.227 Finally she submitted that if there is to be a bond then it apply to the construction phase of the KSF. The conditions tabled reproduce the Central Plains Water Limited bond conditions.

¹⁵⁰ Ms Hamm, Legal Reply 4 May 2018 Paragraphs 45-48

- 13.228 We received little direct evidence on the wherewithal of the company to comply with consent obligations. This proposal is we are told one of the largest of its kind in New Zealand, if not internationally. That point as well as considering possible impacts of a catastrophic dam failure, accepting the likelihood is low, supports imposition of bonding of performance of conditions.
- 13.229 We consider we should take every opportunity available to provide as many protections as we can. So we have concluded that bond conditions of the Central Plains Water type are appropriate and we have included them in the conditions set. Accordingly, we consider a bonding condition is appropriate.
- 13.230 While the works on public roads are of a much lesser consequence, because they concern public assets and because the ADC will potentially be put to expense to remedy any shortcomings, we consider that a bond as recommended by Mr Boyes for ADC is appropriate. We have included such a condition because we consider it appropriate.

Overall conclusions on principal issue one potential adverse effects of the damming of water on people, property and infrastructure

- 13.231 We are satisfied that we have sufficient information to assess the likelihood of a catastrophic dam breach of the KSF and we have sufficient evidence and information available to understand the effects on the environment in particular on people if such an event occurs.
- 13.232 We are also satisfied, based on the expert evidence we have received, that RDRML has appropriately identified and assessed both natural and operational risks that may cause or contribute to a catastrophic failure of the KSF.
- 13.233 We are also satisfied that the Guidelines are an appropriate standard to which the KSF should be designed so as to provide for those natural and operational risks.
- 13.234 Based on the evidence we have received from RDRML experts as to dam design, we are satisfied, notwithstanding the dam design remains to be finalised, that the KSF is, or will be, designed in accordance with the Guidelines.
- 13.235 Further, based on the expert evidence we have received from RDRML experts, we are satisfied that matters to do with the safety in terms of construction, operation, and emergency response in the instance of a catastrophic dam breach or something lesser, are in accord with the Guidelines and are appropriate to avoid remedy or mitigate adverse effects of a low probability but high impact event such as a catastrophic dam failure.
- 13.236 Having regard to the comprehensive set of conditions advanced to be included in the consents, in the event they are granted, and given those conditions have been reviewed and critiqued and contributed to by a range of different experts, we are satisfied that those conditions, particularly given they include independent certification clauses, are sufficient to avoid, remedy or mitigate adverse effects of a low probability but high impact event such as a catastrophic dam failure.

- 13.237 As such, after considering all the available evidence, in our judgement we accept that the risk of dam failure is remote. We accept such a risk cannot be completely avoided. In our judgement RDRML, based on its expert evidence, has undertaken all relevant assessment and design steps in accordance with the Guidelines so as to ensure the likelihood of a catastrophic dam failure is remote.
- 13.238 In addition, in our judgement, RDRML has, by following the Guidelines, adequately provided for the remote circumstance of a dam failure through provision of the EAP and other related dam safety plans ensuring that any safety risks to people are minimised as far as practicable.
- 13.239 The instance a dam breach does occur insurance and bond conditions will assist in reducing costs and infrastructure and property loss.
- 13.240 Finally we record our view that insofar as the planning framework contains objectives and policies related to the safety and protection of people and communities from the risks and consequences of dam breach, we are satisfied that the damning elements of the proposal are consistent with that objective and policy framework.

Principal issue 2 - What are the landscape and visual amenity effects during construction and the operational phase of the proposal and can they be avoided, remedied or mitigated?

Visual amenity and natural character effects during construction

- 13.241 Ms Yvonne Pfluger, the landscape expert for ADC, reviewed RDRML's visual and landscape assessments noting there is no visual effects assessment as a specific analysis of the construction effects. It is Ms Pfluger's opinion that the construction effects in visual terms are most likely worse than the permanent visual effects of the KSF following construction completion.
- 13.242 We noted the construction period will range from three to five years. We think this is a lengthy period to experience visual amenity effects. We do agree, given the large area of the KSF, it is likely the construction activity will be dispersed over that wide area during the construction period.
- 13.243 Ms Pfluger's primary concern related to visual and amenity impacts on the properties owned and possibly occupied by JT and J Doyle, and Doyle Farms Limited. Originally she was also concerned about the Early Family Trust, but as we have earlier noted that submission has been withdrawn.
- 13.244 After identifying the location of these properties in respect of the construction works, Ms Pfluger considers the visual effects of construction activity on these private residences would be high. Essentially, Ms Pfluger recommends screening as a mitigation measure. RDRML's proposed mitigation planting contained in Annexure 2 of the AEE is replicated at figure 10 in Mr Boyes' Section 42A Report. On our site visit we visited these properties.
- 13.245 It is Ms Pfluger's opinion that the planting areas and shelterbelts shown in figure 10 do little to screen the Doyle properties from either construction effects of the proposal or the visual effects post

construction. As we understand it this may be caused in part by RDRML's proposal that there be a gap in the shelterbelt to accommodate the views from Montalto Road over the less elevated parts of the storage embankment to the Tara Haoa Range and Mount Peel. She considers preservation of this view may be appropriate post construction but the proposed screening does little to provide screening of the construction activity, which may take place over five years.

- 13.246 Ms Pfluger was also concerned about the visual and amenity impacts of the largest staging area being Depot #1 which is located some 250 metres away from the Glenn Lee residence at 1186 Moorhouse Road owned by JT and JL Doyle. Ms Pfluger considered RDRML should provide additional screening including a bund to mitigate the adverse effects of construction activities on these residences particularly the Doyle's property. In her view, the screening needs to provide a continuous buffer along the Montalto Road frontage including through Depot 1.
- 13.247 Mr Brown for RDRML, in considering Ms Pfluger's opinion, agreed that the later stages of construction would be clearly visible from the Doyle property despite the partial intervention of existing trees on that property next to the road. Mr Brown agreed construction effects would generate effects that are appreciably more significant than those identified on a more permanent basis.
- 13.248 To address these effects he recommended his annexure 3A planting plan be modified to extend the proposed shelterbelt next to Montalto Road from the currently specified 500 metres to one kilometre which would bring the shelterbelt closer to the intersection with Moorhouse Road. Mr Brown said, provided this planting can be undertaken before construction, apart from the current shelterbelt removal, it should provide a reasonable degree of mitigation without being able to entirely screen the site and activity on it. He said he would support such a measure.
- 13.249 Ms Pfluger also had recommendations to make in relation to the landscaping and location of Depot #2. Those recommendations related to both the Early property and the Doyle property.
- 13.250 However in relation to the Doyle property, Mr Brown was of the view that the Doyle residence is located some 1.2 kilometres away from the proposed works and this distance, he said, provides for significant separation. He was of the view, if the depot can be readily relocated then he would agree. However it was his view that he did not regard this measure as being essential.
- 13.251 We heard later from Mr Woods on this matter of relocating Depot #2. He made it clear that was an expensive exercise primarily because the location of Depot #2 had been deliberately chosen so as to minimise construction machinery movement. If Depot #2 was to be relocated there would be an increase in costs, primarily extra fuel costs and time.

Findings on visual amenity effects during construction

- 13.252 Taking these matters into account, particularly given the Depot #2 issue is now only live in relation to the Doyle residence and given that residence is located some 1.2 kilometres away from the construction site including Depot #2, we consider there is a significant separation distance which should suffice to provide mitigation for the Doyle

properties from construction activities occurring at Depot #2. We also consider Mr Brown's recommended extended shelterbelt will provide adequate mitigation for the Doyle properties in terms of visual and amenity effects so that these effects will in our view, be minor.

- 13.253 We note that Mr Boyes for ADC sought to retain a condition intended to provide mitigation of an adverse amenity effects of construction on those living adjacent to the construction site. RDRML considered this was unnecessary because amenity issues were dealt with through a range of construction plans. RDRML considered amenity was protected through mechanisms such as noise restrictions hours of operation and dust management mechanisms. While this is also we think it important to have a condition that deals with adverse amenity effects of construction on those living adjacent to the KSF. For this reason we have included such a condition following Mr Boyes' recommendation.

Visual amenity effects post construction during operations

- 13.254 Mr Brown and Ms Pfluger prepared a joint witness statement dated 26 March 2018 in relation to landscape views and amenity effects following construction. There was general agreement about the level of effects that the KSF would generate for the viewpoints on receiving environments as addressed and considered by Mr Brown in his landscape assessment report.
- 13.255 Ms Pfluger accepted that Mr Brown's Annexures 3A and 3B, that is the planting plans, appropriately addressed planting near Montalto, Ealing Montalto and Moorhouse Roads. It was further agreed that Mr Brown had addressed the issues of relevance in relation to submissions. Both Mr Brown and Ms Pfluger agreed that the majority of submitter concerns had been addressed in the AEE landscape assessment report.
- 13.256 Initially given the height and scale of the embankments for the KSF, we were concerned about the possibility of adverse effects that those embankments would cause on landscape, natural character and amenity values and views.
- 13.257 However taking into account the expert assessment of these potential effects, primarily relating to the height of the embankments of the KSF, and having particular regard to the proposed landscaping treatment advanced by RDRML both during the construction phase and following, our concerns about possible impacts of the embankments has markedly reduced.
- 13.258 We found the site visit to be very informing in helping us better understand these possible impacts and how the landscaping treatment advanced by RDRML would address these concerns. We have detailed the existing environment earlier in this decision.
- 13.259 However what surprised us, was the varied nature of the terrain particularly in terms of the presence of hills and river terraces in close proximity to the KSF site. This varied landscape contrasted markedly with the flat terrain of the plains between Ashburton and the KSF site.
- 13.260 The varied terrain, we considered, created a more accommodating environment for the large scale embankments. The presence of screening around the proposed KSF site, particularly screening that mimics the many shelterbelts already present, will also considerably

assist with visually integrating the KSF into the surrounding landscape. Shelterbelts comprised mainly of pine species were prevalent both through the plains area and in close proximity to the proposed KSF site.

- 13.261 While on our site visit we recognised and agreed with the assessment of Mr Brown that the design and construction of the embankments contain a similar character to the existing landform in the area. The construction and pasture is sympathetic to the working rural character and largely compatible with the landscape of the surrounding area.
- 13.262 Provided shelterbelt screening as provided for in conditions is in place, views of the KSF embankments will be screened from public roads. Taking into account the presence of existing shelterbelt screening when we viewed the proposed KSF site from Ealing Montalto Road, we concluded when travelling by motor vehicle, the time period over which the embankments would be visible from the road would be quite short.
- 13.263 In terms of impacts on natural character values of the Rangitata River system, we agree with the experts that the proposal, primarily the KSF including its emergency outflows system to the Rangitata River, will have a low to very low effect.
- 13.264 This is because forest restoration is proposed along the Rangitata River's main banks together with development of an ecological refuge. These two steps will progressively enhance the overall naturalness of the environment down the northern side of the river corridor particularly in the vicinity of the emergency outflows.
- 13.265 While we did not take a view from elevated advantage points within Peel Forest and further afield we took advantage of Mr Brown's photomontage and we agree with him that the views of the proposal from elevated advantage points within Peel Forest and from Mount Peel will undoubtedly reveal the full extent of the storage facility.
- 13.266 We agree with his finding that when the KSF is full, it will have a reflective glass like surface. We accept that this view is likely to be exposed to a relatively small audience of serious walkers and trampers.
- 13.267 Nevertheless we agree with Mr Brown's assessment that such a view may generate a moderate effect when considering it in the context of the wider rural environment. In common with the planning experts we took this statement to mean the proposal will from this viewpoint result in an adverse effect on the environment that is more than minor.

Relevant plan provisions and findings

CRPS

- 13.268 Objective 12.2.2 refers to the identification and management of other important landscapes that are not outstanding natural landscapes, which may include:
- (a) Natural character resource consent applications
 - (b) Amenity; and
 - (c) Historic and cultural heritage.
- 13.269 The KSF site is not within a landscape that is considered important,

although it is located adjacent to the Rangitata River, which clearly is. The proposed new Fish Screen and fish return are located within a geo-conservation site identified in the ADP. This issue is dealt with when we consider the Fish Screen.

- 13.270 The visual amenity and landscape character effects of the proposal have been assessed by RDRML, Mr Brown and peer reviewed by Ms Pfluger as discussed above. Based on those findings we consider that the proposal aligns with Objective 12.2.2 and related policies.

ADP

- 13.271 Mr Boyes identifies Policy 3.3K as being highly relevant to the proposal. This policy provides:

"Policy 3.3K: Where discretionary or non-complying activities are proposed on sites adjoining an Outstanding Natural Feature or Landscape ensure that the effects of those activities on the values of the Outstanding Natural Feature or Landscape are assessed 258."

- 13.272 In terms of assessing Objective 3.3, we recognise that the ADP does not identify the bed and margins of the Rangitata River as an 'outstanding natural landscape' (ONL). The area of the proposed Fish Screen and associated return is located adjacent to the southern boundary of the ONL (indicated by the thick blue dashed line in Figure 11 in Mr Boyes Section 42A Report).

- 13.273 However Policies 3.3E and 3.3K refer to areas either affected by or adjacent to the proposal. The landscape and visual amenity effects of the proposed KSF, as they relate to the ADC consents, have been assessed by RDRML and peer reviewed by Ms Pfluger.

- 13.274 Whilst a structure of considerable scale, Ms Pfluger has assessed that the receiving heavily modified rural environment has the ability to absorb the proposal. The KSF will be most obvious to immediate residences and those either working or using the Tara Haoa Range for recreational purposes.

- 13.275 However, such a view will be in the context of the modified patchwork of the Canterbury Plains, which clearly identifies as a modified working rural landscape. As noted earlier we agree with her assessment and consider the proposal consistent with these plan provisions.

Findings on landscape and amenity effects post construction

- 13.276 We conclude that a combination of screening coupled with grass cover of the KSF embankments will certainly assist in integrating the KSF into its surrounds.

- 13.277 We consider, even after taking into account effects on nearby residents that landscape effects, effects on views, amenity and landscape character can be appropriately mitigated by the relatively isolated location of the KSF, its placement on a river terrace well above the Rangitata River, grassed vegetation of the embankments and finally screening by pine shelterbelts and pines along both Montalto Road and next to the Rangitata River.

- 13.278 However in terms of impacts on views from the Peel Forest and the ADP

ONL extending across the Rangitata River, effects on views from far away will not be able to be mitigated and will we consider to be a moderate level of effect for more elevated advantage points within Peel Forest especially near the summit of Little Mount Peel.

- 13.279 We also agree that in terms of the Montalto area's amenity values, the KSF will disrupt some key views to the high country nearby but will have little impact on the existing landscape elements and the patterns associated with the local farmland area.
- 13.280 So we agree the KSF would have generally low to moderate impacts on local amenity values east of the Rangitata River rising to moderate levels in relation to elevated views from parts of Peel forest and Little Mount peel being exposed to the temporary effects of construction then the completed permanent KSF.
- 13.281 In terms of the Canterbury Regional Policy Statement (CRPS) and the ADP, we conclude that the suite of conditions recommended on the applications is such that adverse effects of the construction and operation of the KSF can be appropriately avoided, remedied or mitigated.
- 13.282 My Boyes and Ms Pfluger recommended some additional matters for conditions as set out above and based on those minor additions the proposal is considered to not raise any conflict with the relevant objectives and policies of the ADP as assessed above.

Natural Character effects and related objectives and policies

- 13.283 Mr Boyes identifies the following objectives and policies as being relevant:
- (a) Objective 3.4: Natural Character: *Preserve the natural character of the District's coastal environment, rivers, lakes, wetlands and their margins, and protect such areas from inappropriate subdivision, land use and development.*
 - (b) Policy 3.4B: *Avoid modifications or development within the Rakaia and Rangitata River Valleys and the Hakatere Basin which are inconsistent with, or disrupt the patterns, textures, colours and contours associated with the fluvial processes of rivers, lakes and wetlands and their margins.*
 - (c) Policy 3.4C: *Maintain and, where possible, enhance the naturalness, indigenous biodiversity and nature conservation values of lakes, rivers, wetlands and their margins with the restoration of contours and indigenous planting.*
 - (d) Policy 3.4I: *Require the location, design and use of structures and facilities which:*
 - i) *pass across or through the surface of any water body; or*
 - ii) *are attached to the bank of a water body,**to be assessed in relation to their effects on natural character.*
 - (e) Policy 3.4J: *Require a comprehensive assessment of the effects of earthworks, vegetation removal, exotic planting and the erection*

of structures on naturalness, nature conservation and biodiversity values within areas of high natural character.

13.284 The assessment of the objectives and policies above relating to natural character is similar to that set out above in the context of landscapes. It is noted that the fish return and sluice channel/spillway are attached to the riverbank. The effects of these structures have been considered in the expert assessment and found to be appropriate in the context of the receiving environment and the ecological mitigation proposed in order to maintain and enhance natural character.

13.285 Conditions of consent provide that the discharge channel from the KSF to the Rangitata River will receive treatment including placement of rocks within the channel outlet and restoration planting. Rocks will be applied in such a way so as to minimise reflectivity and visual impacts and to help integrate the channel with the surrounding riverbank.

13.286 Mr Boyes further identifies the following objectives and policies to be relevant:

(a) Objective 3.5: *Rural Character and Amenity: To protect and maintain the character and amenity values of the District's rural areas, considering its productive uses whilst providing for non-rural activities that meet the needs of local and regional communities and the nation.*

13.287 The concern regarding the potential adverse effects of structures on rural character and amenity is continued in the objectives and policies contained in Chapter 14 of the ADP relating utilities, those objectives and policies are:

(a) Objective 3.6: Extractive Activities: *Provide for and manage the effects of extractive activities, including earthworks whilst protecting the amenity values of the rural environment and rural resources.*

(b) Policy 3.6D *Control earthworks, including mineral extraction within the District to ensure minimal adverse effects on amenity values and land stability, whilst protecting important geoconservation sites, outstanding natural landscapes, riparian areas and areas of significant nature conservation value.*

13.288 We agree with Mr Boyes, that while the proposal is not extractive in the sense of mineral extraction, it does involve significant earthworks (11Mm³). The KSF is located outside important geo-conservation sites, ONLs, riparian areas and areas of significant nature conservation value and therefore such areas remain protected.

Findings on natural character effects and objectives and policies

13.289 Having regard to the landscape conditions which include planting plans for the discharge channel from the KSF to the Rangitata River and specifications that set out the rehabilitation of the existing RDR where it is affected by the RDR modifications we are satisfied that effects on natural character will be as assessed by the experts and we are satisfied subject to the conditions being met those effects will be no more than minor.

- 13.290 In our view, having regard to the experts' assessment of natural character, and the construction methods including mitigation, we consider the proposal is consistent with the objectives and policies identified above.

Principal issue 3: Are the construction, discharge and water quality effects¹⁵¹ of KSF and canal modifications, the gully race, drop structure and river outlet structure, the White Water Course (WWC) and the fish screen capable of being avoided, remedied or mitigated through utilisation of management plans?

Construction Management Plans

- 13.291 The construction works related to the entire proposal are significant in scale and potentially lengthy in terms of duration. The KSF is the focal point of the construction activities. However construction activities will occur in sensitive environments such as the Rangitata River for the Fish Screen and for gully race and river outlet structures. Also the construction works related to the ecological refuge will be occurring in a sensitive environment.
- 13.292 Mr Morgan advised that it is proposed to construct a white water course at the outlet of the proposed KSF. The WWC is off-line from the MHIS race to allow the control of flows into the course, thereby maximising its potential usage. All flows above the design inflow will bypass the gate and continue as normal to the MHIS race. The construction of the kayak course will include control gates, earthworks in the kayak course, a car park and toilet/change facilities.
- 13.293 The construction activities include:
- CRC 170652 to construct the KSF and modify or upgrade the RDR canal;
 - CRC 170651 for a land use consent for earthworks on the lower terrace, adjacent to the Rangitata River to create a 6 hectare ecological refuge along with earthworks to construct the gully race, drop structure for the white water course and the river outlet channel;
 - CRC 182540 to use land for earthworks over an aquifer and within 5 metres of the bed of a River;
 - CRC 170656 being a water permit to take groundwater for dewatering purposes with earthworks being undertaken to create the ecological habitat;
 - CRC 170660 enabling the discharge of construction phase stormwater and dewatering water to walk to land via sediment retention ponds and soakage pits;
 - CRC 1706582 discharge dust to air from construction activities;
 - CRC 170659 to discharge contaminants to air from the combustion of diesel from a generator during construction.

¹⁵¹ Traffic, noise, vibration, air quality, land contamination, waste management, effects on terrestrial ecology- lizards, effects on archaeological areas, effects on cultural values, water quality effects arising from discharges to air and to water

- 13.294 Linked to the Fish Screen are consents:
- CRC 170653 to remove vegetation from the bed of the Rangitata River for the purposes of constructing a sluice outlet and fish bypass channel;
 - CRC 182537 to disturb the bed of the Rangitata River for the construction of the fish bypass outlet;
 - CRC 1825382 to temporally discharge sediment to the Rangitata River as a result of the construction and maintenance of the fish bypass outlet; and
 - CRC 182539 to extract gravel for the construction and periodic maintenance of the fish bypass outlet.
- 13.295 We agree the broad range of construction effects do need to be carefully managed so as to avoid, remedy or mitigate effects on the environment. To this end the Application includes a construction methodology report dated July 2016. This report is attached as annexure 2 to the AEE. This report outlines the construction activities involved and demonstrates construction effects including how erosion and sediment effects and hazards that may arise during construction can be mitigated. This report also outlines the management and monitoring requirements in order to confirm that the mitigation measures proposed to be implemented during the construction phase for the proposal are effective.
- 13.296 The construction methodology report is supplemented by a construction management plan which is referred to and included in the suite of proposed resource consent conditions. RDRML provided additional details regarding the construction methodology in section 1.5.9 of the Ryder Consulting AEE document particularly on page 17.
- 13.297 RDRML engaged a large number of experts to assess the environmental effects of the full proposal including recommending measures needed to avoid, remedy or mitigate adverse environmental effects that are expected to arise from the construction and also from the operation of the proposal. Overall RDRML has prepared some 17 individual management plans covering all aspects of the proposal.
- 13.298 In addition RDRML provided evidence from Mr Bryan Peters, a chartered professional engineer in the civil and structural practice areas, and Mr Woods, a chartered professional engineer specialising in geotechnical and civil practice areas. Both experts provided detailed briefs of evidence relating to the development of the KSF construction methodology.
- 13.299 Mr Peters' brief of evidence also reviewed a range of documents related to construction. They included the KSF engineering report which in turn included:
- (a) a draft construction management plan;
 - (b) an erosion and sediment control plan;
 - (c) a vibration control plan;
 - (d) a hazardous substances and spilt management plan;

- (e) a land contamination remediation action plan;
 - (f) a waste management plan; and
 - (g) a works in the river management plan.
- 13.300 We considered one of the more significant plans in relation to potential effects was the works in the river management plan (WRMP). Figure one – two in that plan identifies the near river works. They include various pond soak pits, the proposed WWC, various depots, the ecological refuge and the outlet works from the KSF feed into the downstream gully to return excess and scale water back to the river.
- 13.301 The works in the river management plan also deals with works within the gully that will require temporary storage of plant within a small depot. Refuelling of plant will be carried out by mobile tanker that will return to the main construction site and depots when not in use it would not remain in the river works area.
- 13.302 The purpose of the plan is to ensure that appropriate measures including erosion and sediment control guidelines are implemented by RDRML such that all actual or potential riverbed effects arising from the construction and any recurrent maintenance activities are minimised. The plan extends through the construction phase and immediate site rehabilitation and does not apply to the operational phase of the project.
- 13.303 The WRMP was informed by a range of experts covering landscape visual and natural character issues, hydrology, groundwater and terrestrial and aquatic ecology. We considered the coverage of the plan was comprehensive. We concluded that, when combined with conditions, the plan was an appropriate method to appropriately deal with effects on the environment from river works.
- 13.304 Mr Peters advised that Mr Morgan was responsible for evidence relating to the construction methodology for the various additional facilities that are associated with but do not form part of the KSF. Mr Peters confirmed that he had reviewed the evidence of Mr Morgan in support of the broad approach he was advancing. He was of the opinion that Mr Morgan’s proposed methodology for the canal modifications, the Fish Screen and the WWC are consistent with the construction methodology that he set out in his evidence.
- 13.305 In particular, in relation to construction activities, Mr Morgan noted the canal modifications are an extension of the works associated with the construction of the KSF. Therefore, the CMP will be implemented for the works associated with the canal modifications. The plan describes how the contractor will manage both the day-to-day work activities and the effects of the construction activities.
- 13.306 Mr Morgan confirmed that he worked with MWH on the CMP providing inputs related to the canal modifications, Fish Screen and WWC. The CMP, he said, follows industry standard practice for construction and the implementation of these plans will address potential effects of construction to an acceptable degree.
- 13.307 Mr Morgan noted the key erosion and sediment control principles as described in section five to section eight of the Klondyke Storage Pond -

Erosion and Sediment Control Plan 3 (ESCP) and the ESCP requirements of the applicable CRC resource consent conditions will apply as follows:

- (a) To control run-on water;
- (b) To separate clean from dirty water;
- (c) To protect the land surface from erosion;
- (d) To prevent sediment from leaving the site.

- 13.308 Mr Morgan further noted that the key issue for protecting the land from erosion is ensuring the re-vegetation and seeding of permanent slopes is completed as soon as possible following their formation.
- 13.309 Mr Peters noted in the development of the construction methodology report several other specialist consultants have prepared separate reports addressing mitigation of construction effects relating to the specific specialist areas, for example Mr Nigel Hegley in relation to noise, Ms Prue Harwood in relation to air quality, Mr Andrew Metherell in relation to traffic and parking, and Mr Peter Callander and Dr Ryder in relation to ground water quantity and water quality, Mr Clough in relation to historic heritage and archaeology.
- 13.310 We record we received briefs of evidence from all these specialists and they appeared before us. We had questions of them in relation to the specialist areas in particular relating to effects intended to be provided for by management plans.
- 13.311 There are a number of elements of the proposal that may impact on water quality, none more so than the construction activities. Both Mr Woods and Mr Peters within their evidence explained the construction methodology had been specifically designed so that discharges are controlled and managed to appropriate levels and interactions with the river environment are minimised. Examples they gave included the extensive use of erosion and sediment control devices to ensure that exposed areas are controlled and adverse off-site effects such as loss of sediment are minimised.
- 13.312 In addition we received expert evidence from Dr Ryder and Mr Callander to the effect that in their opinion if these management plans are implemented then the adverse effects on water quality, both surface and groundwater are able to be appropriately managed.
- 13.313 Mr Callander's principle conclusions were that, in his opinion, there are appropriate proposed controls during the construction period for the entire proposal so as to control excavation and refuelling activities and stormwater run-off to avoid potential adverse groundwater effects.
- 13.314 In relation to drinking water, it was Mr Callander's opinion that there are no drinking water bores or community supply bores in close proximity to the site that could be at risk from water quality impacts as a result of the construction activities. This is especially the case he said given the large depth to groundwater in this area of the plain and the likely localised groundwater flow gradient towards the Rangitata River.
- 13.315 Turning to operational effects, the main issue of concern Mr Callander identified related to prevention of recharge by rainfall and potentially offsetting leakage or seepage from the KSF. In Mr Callander's opinion,

given the proposed reservoir will be lined with a low permeability liner, while some leakage of water may occur, this would lead to a very small scale positive effect on the underlying groundwater resource and for users of that groundwater.

- 13.316 The joint witness statement with Mr De Silva recorded agreement with Mr Callander's assessment of the effects of water storage on groundwater levels and the effects of the earthworks required to construct the reservoir and associated structures on groundwater quality can be adequately avoided, remedied or mitigated by the CMP.
- 13.317 In relation to the discharge activities, Dr Ryder concluded that in his opinion, following reasonable mixing, the discharge associated with construction activities, maintenance activities and also the first return are able to comply with the standards of the WCO, the LWRP and section 107 of the RMA. This ensures that the water quality standard is maintained.
- 13.318 Mr Peters explained the proposed construction methodology had been developed in consultation with the RDRML project team and two large New Zealand construction firms with experience on large civil earth work projects.
- 13.319 Mr Peters then detailed the construction activities associated with the KSF - the outlet works from the KSF feed into the downstream gully to return excess and scour water back to the river and the WWC recreation area. He provided details on lining of the KSF, details of depots and fuel storage areas, vegetation stripping and stockpiling of soils. He also provided details on concrete works occurring to build structures such as emergency spillways shoots gate structures and stilling basins.
- 13.320 As mentioned, construction of the KSF is likely to be undertaken over a period of three to five years. Mr Peters provided a proposed construction program in his evidence. He provided details of construction plant and construction quantities likely to be engaged by the project.
- 13.321 As to possible pond staging, Mr Peters referred to Mr Woods' evidence in which he advised a possible development scenario would see an initial immediate pond size of 20 to 30 Mm³ constructed with the full pond been constructed in later years as demand increases.
- 13.322 We note here that the Application assumes that any proposal to construct a smaller pond will progressively extend to the full capacity pond of 53 Mm³ will not cause environmental effects to be greater than those associated with construction of the larger storage facility in one stage.
- 13.323 Once operational, the level of activity on the site will significantly reduce. There are no buildings or offices proposed for the application site rather RDRML will continue to deploy its staff from its existing workshops, offices and depots placed throughout mid Canterbury.
- 13.324 The WWC will operate continuously through the peak irrigation season from one November to 30 April each year. Outside of this period the WWC will be operated for scheduled events only. While operating RDRML will maintain the parking area, toilets and changing areas in a clean tidy state.

- 13.325 RDRML proposes to maintain the pedestrian car park at the end of the realigned Shepherds Bush Road so that it is usable all year round. There will be no facilities constructed or operated at this car park.
- 13.326 Both CRC and ADC engaged specialists to review parts of the construction management plans relevant to the specialty. The views in relation to those management plans including their opinions relating to construction effects were included as annexures to the relevant Section 42A Reports.
- 13.327 Some but not all of those specialist report writers appeared before us. In some instances, for example traffic and parking matters, there were no issues between the RDRML experts and the ADC experts. In many instances we had available joint witness statements or records of caucusing which helpfully recorded agreement on issues.
- 13.328 In relation to the various discharge consents Ms Ford within her Section 42A Report after recording and assessing the various erosion and sediment control measures included into the various management plans was satisfied implementation of those plans would avoid effects on the environment.
- 13.329 In particular the measures would allow for sediment to filter out from run-off water before being discharged. The measures to remove fine soil particles were, according to Ms Ford, effective. The proposed disposal system should result in no direct discharge of sediment laden water to the Rangitata River.
- 13.330 Run-off water is to be only returned indirectly from the groundwater system and settlement pond after primary settling and secondary filtration for soakage pits. She was satisfied that the proposed erosion and sediment control measures will adequately mitigate the potential adverse effects from mobilisation of contaminants during earthworks and the potential for these contaminants to be discharge to surface water and groundwater.
- 13.331 Turning to the gully race and drop structure Ms Ford noted that the in River Works plan provides that sediment from the works for the gully race and drop structure will be managed for sediment control and for the potential for contaminants to enter the watercourse. Containment procedures, treatment of sediment laden run on water to remove contaminants being discharged to ground, minimising open excavation revegetation, use of silt fencing or hay bales to provide improved sediment containment and removal, are all part of the in WRMP.
- 13.332 As to the discharges of stormwater and dewatering water, Ms Ford was of the view that because the discharge of construction phase stormwater in dewatering will be to land there is unlikely to be any potential adverse effects on surface water quality. Because there will be no direct discharges of untreated water to the Rangitata River during the construction phase and because erosion and sediment control measures will be in place discharges will not have environmental effects. We agree with that assessment.
- 13.333 The discharge of other contaminants, for example fuel concrete contaminants and the like to surface waters will be avoided through provision for bunded storage areas, and appropriate positioning of

vehicle access roads and storage areas for these materials. We agree with this assessment and approach.

- 13.334 Ms Ford further notes the land remediation plan (LRP) will appropriately address those parts of the KSF which may have historically been used in association with fertiliser/chemical storage for farm operations or shipyards and other facilities such as sheep dips. We consider this approach is appropriate
- 13.335 Essentially there was a high level of agreement between the relevant experts in relation to identification of construction effects as well as agreement that the manner in which those effects were proposed to be avoided remedied or mitigated within the specialist management plans were appropriate.
- 13.336 Turning to the conditions, in particular the certification process provided for the management plans, we consider the certification requirements are appropriate. In particular the certification process for the management plans effectively requires certification that the management plan is generally in accord with the draft management plans submitted with the application and/or provided in evidence. The certification process will also require determining whether or not the management plan in question has been prepared in accordance with the relevant conditions of consent.
- 13.337 In addition certification will involve a consideration of whether or not the respective management plan meets the objectives or standards prescribed by the relevant conditions of consent. We acknowledge some of the management plans are still in development or contain less certainty in some areas compared to the other management plans. However given the nature of this proposal and its development stage, in our view what RDRML has presented is adequate. This is especially so when the management plans are read in conjunction with the conditions.

Findings on the adequacy of management plans to deal with effects on the environment.

- 13.338 In detail we are satisfied that the evidence demonstrated construction effects such as traffic, noise, dust and air quality, vibration, land contamination and waste management, ground and surface water quality and discharge effects were appropriately provided for within the specialist management plans.
- 13.339 The evidence received from the RDRML experts and the Section 42A Report experts along with the draft management plans we are able to make an informed assessment of the effects of the proposal and how the management plans would respond by way of avoiding remedying or mitigating those effects.
- 13.340 We were also comfortable that the management plans recognised and provided a degree of flexibility in the instance additional information on effects or mitigation options arose at a later date.
- 13.341 Overall we consider that the management plans had been well developed though we acknowledge they were not fully formulated management plans. Overall we consider that the purpose of the various management plans enabled the submitters to understand the ways in

which RDRML intends to comply with specific controls, or parameters provided either by the plans themselves, or by other conditions of consent.

- 13.342 Overall we are satisfied that the various management plans can operate in a way which will meet and serve the purpose of the RMA.

Relevant Planning Framework Consideration

- 13.343 Ms Ford and Mr Greaves undertook a comprehensive assessment of the planning framework in relation to the construction activities and related discharges. There was a high level of agreement between them both as evidenced by the joint witness statement prepared by all of the planners who appeared.
- 13.344 Ms Ford in considering the NPSFM noted that while the focus of the NPS is on the water abstraction part of the proposal considered that the discharges associated with the proposal would nevertheless comply with water quality Policy A3(a).
- 13.345 In her Section 42A Report Ms Ford closely considered the CRPS and in relation to the objectives and policies relevant to the construction activities identified compliance with the relevant objectives and policies. We agree.
- 13.346 Turning to the LWRP, Ms Ford again undertook an assessment of the relevant provisions of that plan in her Section 42A Report. Overall she considered the proposal was consistent with that framework however at the time of writing her report she had concerns in relation to the now discontinued sluice discharge and the 10 cumec take, which is not relevant to this part of our decision. We note Mr Greaves agreed with that assessment of the relevant provisions under the LWRP.
- 13.347 We agree and consider the construction elements of the proposal including the various discharges having particular regard to the proposed management plans are consistent with the LWRP.

Other relevant issues

Relevant issue one - effects of earthworks on terrestrial ecology/loss of lizard habitat

- 13.348 RDRML, within its AEE¹⁵², provided an analysis of the terrestrial ecology of the KSF. Located on the KSF site in common with the surrounding farmland are piles of stones that contain lizard habitat.
- 13.349 We understood from evidence received, that when the farms were being established the stones were collected and the piles were then utilised by the lizards. RDRML proposes to relocate the lizards on the KSF site to a constructed six hectare ecological refuge located on the lower terrace. This refuge is proposed to be comprised of one hectare of lizard habitat, two hectares of native planting and three hectare of constructed wetland. The purpose of the refuge is to mitigate adverse on-site ecology effects, and to enhance local ecological values.

¹⁵² Annexure 2 Klondyke storage proposal terrestrial ecology assessment of effects July 2016, Klondyke storage proposal lizard management plan draft March 2017, ecological refuge planting and management plan March 2017

- 13.350 The lizard habitat will be developed from removal of 150 stones located within the proposed construction footprint, surrounding farm land and rocky parts of a gully on the site.
- 13.351 Lizards from the existing stone piles will be relocated in a staged approach to the relocated of stone piles, establishment of plant, and translocation of lizards so that suitable habitat is available for lizards as they are relocated to new habitat.¹⁵³
- 13.352 Dr Sanders, a qualified professional ecologist who was engaged by RDRML and who has been involved with the proposal since 2012, provided a brief of evidence considering the actual and potential effects of the KSF on vegetation, birds and lizards. He considered all elements of the proposal, namely the canal modifications, the replacement Fish Screen and bypass, the construction and operation of the KSF, the creation of the six hectare ecological refuge adjacent to the Rangitata River and the 10 cumec take.
- 13.353 He undertook site investigations between 2012 and 2017 including surveys of vegetation, birds and lizards. In working with other experts he made recommendations as to how RDRML could avoid, remedy and mitigate adverse effects on terrestrial ecology. He was involved in consultation during the course of processing of the resource consent and along with other technical experts and project engineers Mr Sanders developed the concept plan of the six hectare ecological refuge located between the KSF and the Rangitata River.
- 13.354 Turning to effects, it was Mr Sanders' view that the proposal will result in the loss of 286 hectares of existing pasture/cropland and seven hectares of exotic shelterbelts, which will be replaced by 245 hectares of open water, 41 hectares of grass embankment, 4.8 hectares of native vegetation, and two hectares of constructed wetland. The native vegetation would comprise seven *Oligosoma aff. polychroma* Clade 4, previously known as common skink. Eight *Woodworthia* 'Southern Alps', one of four taxa in the taxonomically-indeterminate *Woodworthia* complex, six 3.0 hectares of plantings within the proposed ecological refuge, and 1.8 hectares of plantings along the Ealing Montalto and Montalto Roads.
- 13.355 Dr Sanders was of the opinion that the loss of existing farmland as a result of the construction of the reservoir will be of little ecological consequence with regard to vegetation at the site because this comprises almost entirely exotic pasture and trees, with only a few scattered individual native plants.
- 13.356 In any case, he said a total of 4.8 hectares of native vegetation will be planted, representing a substantial increase in local biodiversity. Similarly, it was his view that the conversion of farmland to a reservoir will have little consequence for birds. Birds will, he said, benefit from the improved habitat provided by the proposed ecological refuge and landscape plantings, and to some extent by the reservoir itself. The constructed wetland will benefit birds by providing additional and alternative habitat for water birds, including braided river birds.
- 13.357 In his opinion relocation of stone piles and lizards will inevitably result in a loss of some lizards because not all lizards will be able to be captured and re-located. However, in the long term, the refuge will he

¹⁵³ Mr Sanders, summary of evidence and supplementary comments of dated 26 April 2018

said result in overall net benefits for lizards in the form of an increase in the area and quality of physical stone pile habitat set within three hectare of native plantings that will provide further lizard habitat.

- 13.358 Given the known distribution of fish in the proposed ecological site and their habitat requirements, species most likely to colonise the wetland area of the proposed ecological refuge are the longfin eel and upland bully, both will require access to the Rangitata River or recruitment. Other native fish potentially present in this section of the catchment (e.g., bluegill bully, and torrent-fish), prefer fast flowing water and so the habitat is unlikely to be suitable for them.¹⁵⁴
- 13.359 The constructed wetlands should be capable of supporting diverse benthic invertebrate communities dominated by taxa that prefer slow or still-water environments with macrophytes including taxa known to flood-plain springs and ground water.¹⁵⁵ Habitat will be ideal for fresh water crayfish (koura) and should be encouraged to colonise the wetlands.
- 13.360 In the context of the RMA, the proposal, including the mitigation and enhancement measures described above, will, in Dr Sanders' opinion, have less than minor adverse effects on terrestrial ecology. Indeed, he was confident that it will have a net positive effect on local biodiversity as a result of the establishment and ongoing management of the ecological refuge.
- 13.361 Dr Sanders discussed submissions regarding terrestrial ecology and all birds. Dr Sanders referred to the Fish and Game submission agreeing that bird scaring devices alone may not be sufficient to deter waterfowl from the KSF surface particularly during the opening two weeks of the game bird hunting season. He recommended amendments to conditions to address this issue. Those recommendations are included in the conditions set.
- 13.362 Dr Sanders spent some time addressing the Forest and Bird submission. The key point that emerged was whether or not predator control and or monitoring as sought by Forest and Bird of the proposed ecological refuge would be of value.
- 13.363 It was Dr Sanders' view predator control was not necessary. It was his view that the refuge as proposed would be a benefit to native biodiversity with or without predator control. In his opinion the increased area of native terrestrial and wetland vegetation will directly benefit native biodiversity in and of itself. He was confident that the vegetation and wetland and stone habitat will support native fauna including invertebrates, lizards and birds. He gave us examples¹⁵⁶ of similar refuges elsewhere that had been successful without predator control.
- 13.364 Turning to monitoring again in reference to the Forest and Bird submission he referred to the draft proposed conditions of consent and the draft lizard management plan (LMP) which will be required by the wild life act authority for lizard relocation. He noted that monitoring of plantings is proposed in the draft conditions and is provided for in the

¹⁵⁴ Ryder Consulting Terrestrial ecology assessment of effects, July 2016

¹⁵⁵ Ryder Consulting Terrestrial ecology assessment of effects, July 2016

¹⁵⁶ Ruataniwhi Wetland in the Mackenzie Basin

ecological refuge planting and management plan and is standard practice.

- 13.365 Dr Sanders then discussed Mr Frank's submission noting that he agreed with almost all of Mr Frank's points with regards to lizards. Dr Sanders did however observe that his own assessment and proposed mitigation conditions contained within the LMP were almost entirely consistent with Mr Frank's comments and suggestions.
- 13.366 Dr Grove, on behalf of CRC assessed the AEE reports we have already identified. In short Dr Grove was of the view that the potential adverse effects on terrestrial ecology as a result of the earth works undertaken for the full proposal would be offset provided the native planting, wetland construction and other activities such as environmental weed control as described in the Ecological Refuge and Planting Management Plan (ERPMP). Overall he considered such an outcome would result in a net increase in both extent and quality of native vegetation and wetland habitats.
- 13.367 In terms of lizards he was of the view, provided the LMP is successfully implemented the likely result would be no net loss of lizard values.
- 13.368 Dr Grove agrees with Mr Sanders that the conversion of farmland to water aquatic habitat will be of little ecological consequence to indigenous birds, agreeing that the reservoir, and constructed wetland habitats will benefit birds by providing additional and alternative roosting and/or foraging and/or breeding habitat for indigenous birds.
- 13.369 Dr Grove recommended that the ERPMP be amended to include a predator control program to help ensure a net benefit for lizards and would also benefit native birds using the refuge. However for the reasons already advanced by Dr Sanders we agree that a predator control program is not required.
- 13.370 Dr Grove also recommended some alterations to the conditions in relation to translocating the lizards and creating and maintaining the proposed ecological refuge. We understood these were adopted by RDRML.
- 13.371 Overall it was Dr Grove's assessment that given the mitigation measures proposed by RDRML he considered that any adverse effects of the earthworks of the entire proposal on terrestrial ecological values are likely to be minor.

Findings on effects of earthworks on terrestrial habitat including lizard habitat

- 13.372 We agree with Mr Sanders and Dr Grove that, taking into account the LMP in particular, the effects on terrestrial ecology including the loss of lizard habitat, can be appropriately determined as being no more than minor.

Relevant issue two - emergency discharge - CRC182541

- 13.373 RDRML advises emergency discharges from the spillway would operate under two scenarios:
- (a) If rain fall fell on the KSF surface when it was at its maximum operating level; and

- (b) If the control system fails to operate correctly and continues to divert water into the dam after it reached the maximum operating level.
- 13.374 In the first scenario we were told the occurrence of these discharge flows would be common and produce very low discharge flows while the second scenario would be infrequent but could produce flows of up to 40 cumecs.
- 13.375 RDRML did not provide a detailed assessment of effects on the riverbed morphology and erosion and water quality in relation to this emergency discharge. The probable reason for this is that RDRML mentioned in opening¹⁵⁷ some doubts as to whether a consent for emergency discharges is required instead of relying upon section 330 of the RMA. However RDRML did apply for consent.
- 13.376 Ms Ford assessed the activity and its likely effects finding that they were generally acceptable. This is because the spillway will include a stilling basin to reduce velocities and the erosion potential of the discharge. In addition the water quality management plan is to ensure that water within the KSF retains a high water quality standard therefore any discharge should be consistent with the water quality within the river.
- 13.377 Ms Ford also noted a ramped discharge procedure proposed gradually increases the flow from the channel to the river. This reduces the potential effects associated with a sudden rush of water travelling down the river channel. There is a link she said with the EAP in relation to the ramped discharge. Finally it was her view that the discharge will not contain any sediment that has accumulated at the bottom of the dam because the discharge will largely be surface water.
- 13.378 In terms of effects on water quality in the river Ms Ford was of the opinion they are likely to be more pronounced should they occur during low flows. In any event she noted that any discharge that may occur will be infrequent and would be of short duration which should minimise any adverse effects.
- 13.379 Ms Ford then considered both clause 11 and 13 of the WCO. She considered scenario one would comply with clause 11 and that scenario two would be unlikely to comply with clause 11. However she considered that the second scenario would be provided for under clause 13(a)(ii) and (iii). Finally she was of the view that such a discharge of carried out as proposed would not compromise the preservation and protection of the rivers outstanding characteristics and features.
- 13.380 In her Section 42A Report Ms Ford also commented on effects on public safety and infrastructure as a consequence of emergency discharges. After referring to the guidelines and the need for an EAP she observed that an EAP should set out procedures to be followed in the instance of an emergency discharge.
- 13.381 Ms Ford noted the EAP provided by RDRML includes processes and procedures to be followed in the event of an emergency discharge. In particular she noted these measures include notification to river users via emergency response agencies and the gradual ramping up of the

¹⁵⁷ Ms Hamm, legal submissions, paragraphs 86 – 90

discharge rate so as to minimise the potential effects associated with a rapid rise in water levels.

- 13.382 In this regard she referred to the submissions by CRC River Engineering manager and CRC harbourmaster Mr Fox. River Engineering raised concerns in their submission about the impacts of an emergency discharge and possible impacts on river control and flood control infrastructure. Mr Fox was concerned about provision of a warning system and signage for river users.
- 13.383 Ultimately both the CRC River Engineering and Harbourmaster were satisfied their concerns were addressed by proposed conditions promoted by RDRML.

Findings on emergency discharge

- 13.384 For the reasons contained in Ms Ford's report we agree that any adverse effects on the Rangitata River of an emergency discharge under either scenario are likely to be minor and are not in contravention of the WCO.
- 13.385 Public safety risks and infrastructure risks posed by a discharge can be provided for by appropriate and robust resource consent conditions including an appropriate EAP.
- 13.386 We agree with Ms Ford's analysis both in terms of effects and with her assessment of the activity against the relevant provisions of the WCO.

14 FISH SCREEN

- 14.1 This section addresses resource consent applications that are relevant to the proposed new fish screen.
- 14.2 Principal issues in relation to the Fish Screen are:
- (a) Fish Screen design criteria;
 - (b) Monitoring and Performance of the Fish Screen;
 - (c) Timing of installation and operation of Fish Screen (i.e. the consent lapsing period); and
 - (d) Effects of the 5 cumec diversion for the fish bypass – including cumulative effects.
- 14.3 Other relevant issues include the following:
- (a) Landscape and amenity effects;
 - (b) Construction and related effects; and
 - (c) Benefits or positive effects.

Introduction

- 14.4 There was general acceptance among all parties that the existing BAFF fish screen is ineffective and that a more effective screen is required (see Existing Environment section above). We acknowledge that there have been complaints made to CRC regarding poor performance of the

existing screen,¹⁵⁸ but note that this is a compliance issue between CRC and the consent holder, and is not of direct relevance to this decision. Our task is to assess effects of the applications before us, taking into account the existing environment (including the existing BAFF screen).

14.5 The first suite of consent applications proposed a permeable rock bund and infiltration gallery to screen fish. In response to submissions received on the first suite of consent applications, RDRML replaced the bund and gallery design with a mechanical rotary fish screen design as part of the second suite of consent applications. There was consensus from all experts at the hearing that the chosen fish screen design will be far more effective at screening both native and introduced fish species than the existing BAFF screen, subject to appropriate installation and maintenance. At the hearing, Mr Webb from Fish & Game stated that comparing the BAFF to the proposed mechanical rotary fish screen was like comparing a mini to a Rolls Royce.

14.6 Relevant consents associated with the proposed new Fish Screen are:

- (a) CRC182536: For a non-consumptive take of up to 5 cumecs of water from the Rangitata River associated with the operation of a fish screen;
- (b) CRC182542: to change conditions of CRC011237 to enable an alternative fish screen design consisting of a Mechanical Rotary Fish Screen;
- (c) CRC182535: to discharge water from the take authorised under CRC182536 and suspended sediment to the river via the fish bypass return;
- (d) CRC182539: to extract gravel for the construction and periodic maintenance of the fish bypass outlet;
- (e) CRC182538: to temporarily discharge sediment to the Rangitata River as a result of the construction and maintenance of the fish bypass outlet;
- (f) CRC182537: to disturb the bed of the Rangitata River for the construction of the fish bypass outlet; and
- (g) CRC182540: to use land for earthworks over an aquifer.

14.7 We consider that CRC182536 (the non-consumptive take of 5 cumecs for the fish bypass) and CRC182542 (the new Fish Screen) are the principal applications under consideration, and they are discussed in detail below. Effects associated with application CRC182535 (discharge water and sediment from the bypass channel) are considered under the fish bypass section below. Effects associated with the remaining related consent applications – c) to g) above – are addressed under the heading of construction effects below.

14.8 The proposed Fish Screen is located on the RDR canal, with a new bypass returning fish back to the river. The total distance from the intake to the bypass discharge point is approximately 1,400 metres.¹⁵⁹ We heard from some submitters that they would prefer the screen to be

¹⁵⁸ Mr Hodgson, Evidence in Chief tabled at the hearing, dated 29 April 2018.

¹⁵⁹ Ryder Environmental Report (2016), Resource consent application assessment of effects, page 23.

located at the point of take from the river, to minimise impacts on fish populations. However, we heard from RDRML that a Fish Screen located at the river intake was not practicable, due to exposure to river debris and because it would require the existing intake openings to be significantly enlarged to meet approach velocity requirements¹⁶⁰. We heard no expert evidence to the contrary, so accept that the proposed new screen is situated in the best practicable location. It is also consistent with the WCO requirement of a fish bypass of no longer than 2,500 m.

- 14.9 The proposed Fish Screen was designed to be in accordance with NIWA Fish Screen Guidelines and Schedule 2 of the LWRP¹⁶¹. Key design considerations of both of these documents relate to the screen mesh being fine enough to exclude fish present in the area; water velocities that sweep fish past the screen, rather than draw them through it; and providing a bypass channel that returns fish quickly back to the river. The NIWA guidelines are more comprehensive than Schedule 2 of the LWRP. However, we note here that although the NIWA guidelines do give best practice guidance, they carry no statutory weight. In contrast, the design features in Schedule 2 of the LWRP are standards and carry with them statutory weight, by virtue of them being attached to a regional plan.
- 14.10 A joint witness statement amongst the aquatic ecology experts¹⁶² indicated the following key points of agreement regarding the proposed Fish Screen design: (a) The proposed use of a 2 mm slot spacing wedge wire screen is appropriate for effective screening of both native fish and introduced trout and salmon; (b) there needs to be certainty in screen seal design and systems to ensure they were well seated and did not leak or fail; (c) the bypass channel needs to include features to prevent fish swimming up the channel from the Rangitata River; (d) a 5 cumec bypass flow is necessary to provide the sufficient velocity past the screens to ensure fish are not drawn into the screens and to facilitate sediment transport along the bypass canal; and (e) a higher fish screen bypass flow was likely to have minor or less than minor ecological effects, at worst, in the 1.3kilometres dewatered section of the Rangitata River between the RDR intake at the proposed location of the Fish Screen bypass return flow.
- 14.11 Key areas of disagreement amongst the experts related to screen performance criteria and monitoring requirements. Another issue of concern raised by numerous submitters related to the consent lapsing period. Impacts of the non-consumptive 5 cumec take were also discussed, but were not a primary issue. We deal with these matters in the following sections. Effects of the proposed Fish Screen on landscape values and construction effects were not contentious matter at the hearing, but we also discuss these matters for completeness, given the size of the structure and its environmental setting.

¹⁶⁰ Mr Morgan, Evidence in Chief, dated 12 April 2018 paragraph 49

¹⁶¹ Mr Morgan, Evidence in Chief, dated 12 April 2018, paragraph 44

¹⁶² Water Quality and Aquatic Ecology Joint Witness Statement, dated 19 March 2018.

Principal Issue 1 - Fish Screen Design Criteria

Approach Velocity

- 14.12 The experts could not agree about meeting the NIWA guideline performance criterion of a maximum approach velocity¹⁶³ of 0.12 m/s. We note that RDRML has proposed consent condition 7(c) for resource consent CRC182542, namely that the Fish Screen shall have an average approach velocity of less than 0.12 m/s¹⁶⁴. In their comments on the proposed conditions, CRC suggested a maximum approach velocity of 2 m/s (although there was no rationale given for that number), and Fish & Game suggested that the approach velocity should not exceed 0.12 m/s for more than 5% of measurement points, with an absolute maximum of 0.13 m/s. RDRML replied that "*RDRML consider it more appropriate that the condition is consistent with the provisions of the recognised Guidelines rather than deviating away from them. As such, no change to clause c. is proposed.*" We note here that the NIWA guidelines recommend a maximum approach velocity of 0.12 m/s, whereas Schedule 2 of the LWRP states that for takes exceeding 10 cumecs (as is the case here), approach water velocity "*is slow enough (generally less than 0.12 m/s) to all fish to escape*".
- 14.13 During his oral presentation at the hearing, Mr Paul Morgan explained that the detailed design will aim to achieve the design criterion of a maximum approach velocity of 0.12 m/s. He said he was confident that the criterion will generally be met, but that it is likely that a small part of the screen will not meet the criterion. He said that the screen design includes a very high "sweep velocity" across the screen to counter the potential for sometimes exceeding the 0.12 m/s approach velocity criterion. To this end, RDRML has proposed condition 7(d) of resource consent CRC182541, requiring a sweep velocity of at least twice the approach velocity, and requiring that the screen is designed with the objective of having an average sweep velocity of four to five times the approach velocity.
- 14.14 The crux of this issue is the tension between the desire to have certainty that the screen will perform to a certain standard and the uncertainty associated with designing and constructing a fish screen of this size, particularly given that detailed design work and modelling is not yet complete. While we are mindful that any new screen must be designed to perform more efficiently than the existing BAFF screen, we are also mindful of the need to avoid imposing particular standards that we have heard may not be met. In deciding the merits of an average velocity standard of 0.12 m/s versus any alternative, we have considered the greater statutory weighting given to Schedule 2 of the LWRP over the NIWA guidelines and also the overall intent of both the LWRP and NIWA guidelines, that is to screen fish.
- 14.15 Approach velocity is only one of a number of design criteria that RDRML has proposed as conditions to consent CRC0182541. Of greater importance is the overall performance criterion in proposed condition six, namely that "*fish are prevented from entering any of the irrigation infrastructure downstream of the screen*". We put greater emphasis on the requirement of condition six, than on simply complying with a requirement to reach a maximum approach velocity of 0.12 m/s. Evidence from Mr Morgen gave us reassurance that the approach

¹⁶³ Where the "approach velocity" is the water velocity measured perpendicular to the screen face.

¹⁶⁴ Proposed Condition 7c of resource consent CRC182542 (Applicant version dated 30 May 2018).

velocities will generally exceed 0.12 m/s (as per requirements of Schedule 2 to the LWRP) and that the high sweep velocity will compensate to some extent for the potential for higher approach velocities.

- 14.16 We heard that the design of the screen is such that it will effectively screen native (smaller mesh) and exotic fish. When questioned Dr Ryder said he did not think native fish would be found in the existing environment of the Fish Screen. In their verbal evidence manawhenua acknowledged the effort RDRML had undertaken to upgrade the existing Fish Screen. Manawhenua did not agree with Dr Ryder's appraisal expressing their concerns on the uncertainty surrounding the performance and monitoring of native fish in particulate whitebait.
- 14.17 In his oral evidence at the hearing, Mr Marty Bonnett said that he thought the current design will be close to achieving the maximum approach velocity criterion of 0.12 m/s. In terms of screen performance, Mr Mark Webb from Fish & Game stated in his oral evidence that he felt the screen could potentially be 100% efficient at screening fish if it is maintained and operated well, and that it would be a very significant improvement on the existing situation with the BAFF screen. Dr Meredith from CRC stated in his oral evidence that he considers the proposed screen to be an excellent structure.
- 14.18 Overall, we consider that the proposed consent condition of an average approach velocity of 0.12 m/s is acceptable. That is on the basis that the screen will be designed to generally exceed 0.12 m/s, to have a sweep velocity four to five times greater than the approach velocity, and that the consent will still have to comply with the requirement of preventing fish from entering the RDR downstream of the screen.

Fish Screen Exposure Time

- 14.19 In their joint witness statement, the experts did not agree on how long the minimum exposure time should be for fish passing the screen. Mr Webb, Mr Bonnett, and Dr Meredith agreed that the period of exposure time should ideally not exceed 60 seconds. Mr Morgan noted that the sweep velocity and the maximum length of screen to be traversed determine exposure time. For example, with an estimated screen length of 100 metres and a sweep velocity of 1 m/s, exposure time would be calculated at 100 seconds.
- 14.20 At the hearing, Mr Webb reiterated his concern that fish could be exposed to the screen for at least 100 seconds. He further stated that in North America, most screens have a maximum 60 second exposure time. His concern was that fish could be impinged or otherwise harmed during their passage past the screen.
- 14.21 In response to the initial round of conditions circulated by RDRML, South Canterbury Salmon Anglers and Paul Hodgson suggested an exposure time of less than 60 seconds. In their comments on the conditions, Fish & Game stated that whilst they would prefer a maximum 60 second exposure time, they would accept 100 seconds, given the position of the screen, its location, and the quantity of water the screen must encounter. Fish & Game therefore suggested the following condition: *"The sweep velocity past the fish screen elements shall be greater than the approach velocity and sufficient to result in an exposure time not exceeding 100 seconds."*

- 14.22 In their response to submitter and CRC feedback on the draft conditions, RDRML stated that the proposed conditions of CRC182542 require that fish are returned safely to the river. RDRML also stated that the criteria proposed in conditions of CRC182542 regarding the design of the Fish Screen are consistent with the NIWA Guidelines. They further stated that the proposed Fish Screen Management Plan provides a methodology for verifying that the Fish Screen meets the design criteria, which may include the use of live fish and fish traps.
- 14.23 While there was general consensus that a lower exposure time was preferable, no viable alternative to the proposed Fish Screen design was presented at the hearing. Increasing the rate of take for the fish bypass beyond 5 cumecs would increase velocities past the screen and reduce screen exposure time. However, Mr Greenaway stated that any ecological benefit of an increased take for the fish bypass would be achieved at a loss of amenity for kayakers and rafters in the affected section of the Rangitata River¹⁶⁵. Mr Greenaway reiterated this point at the hearing, stating that he had worked with RDRML to ensure the bypass take had minimal effects on recreational values in the river.
- 14.24 Having considered the evidence before us, we do not consider it is necessary to impose a maximum exposure time limit as part of CRC182542. That is because the primary concern is around impacts on fish screening efficiency and fish health, and conditions have been proposed that require that fish are returned safely to the river. In addition, we do not consider it good practice to impose a standard that is unlikely to be met.

Principal Issue 2 - Fish Screen Monitoring

- 14.25 Experts disagreed on the type of monitoring required to confirm screen performance. In their joint witness statement, Dr Meredith, Dr Ryder, and Mr Bonnett agreed that fish screening efficiency performance criteria (e.g., screening of 100% of fish) was unnecessary, on the basis that the other design criteria (e.g., screen mesh size of 2 millimetres) would be sufficient¹⁶⁶. In the same joint witness statement, Mr Webb agreed that percentage performance targets were unnecessary, but he felt that verification using fish monitoring was still necessary.
- 14.26 In his oral evidence at the hearing, Dr Meredith reiterated that he did not see value in having a percentage screening efficiency performance standard. However, in response to questions from the commissioners, he acknowledged that there was value to monitoring fish going down the bypass channel, to provide reassurance that the screen is working. Similarly, during questioning Dr Ryder also stated that he was "not opposed" to fish monitoring, but considered the data would be somewhat qualitative, due to the difficulties in monitoring in such a location. We heard from Mr Bonnett at the hearing that using fish monitoring to assess screening efficiency would be relatively straightforward, provided the screen design and installation makes provision for access and fish trapping equipment.
- 14.27 We agree that some form of fish monitoring in relation to the new screen is warranted, given the poor performance of the existing screen and given the magnitude of concerns raised by submitters. We also

¹⁶⁵ Mr Greenaway Evidence in Chief, paragraph 79.

¹⁶⁶ Paragraph 7 (c) of the Joint Witness Statement for water quality and aquatic ecology, dated 19 March 2018.

agree that fish monitoring should not have a percentage exclusion criterion, but rather that the fish monitoring data, along with any velocity measurements and detailed screen design drawings, and maintenance schedules, are used to inform overall screening performance. RDRML has proposed condition 9Ac, which requires that the Fish Screen Management Plan includes "*Methods and a programme for demonstrating via design features and downstream trapping within the bypass the overall effectiveness of the screen...*"¹⁶⁷ We consider that this proposed condition, along with other proposed monitoring conditions, adequately provides for the need to monitor fish screening efficiency in relation to the proposed new screen.

Principal Issue 3- Consent Lapsing Period

- 14.28 A major area of disagreement was in relation to the lapsing period of resource consent CRC182542, which relates to the new Fish Screen. The key concern from submitters was that the screen is built as soon as possible, to prevent further loss of fish from the Rangitata River into the RDR scheme. For example, in their submission on consent CRC182541, both the South Rangitata Huts Association and the South Canterbury Salmon Anglers Association requested that an effective screen be built "immediately". Fish & Game requested the new screen be installed within 18 months, and the Rangitata North Hut Holders' Association requested it be completed within two years¹⁶⁸.
- 14.29 In response to submissions, RDRML reduced the lapse period from five to three years, and then further reduced it during the hearing to 30 months¹⁶⁹. We heard from Mr Curry at the hearing that shortening the lapse period further may be impractical, given the logistics associated with detailed design and construction of a screen of the size and type proposed.
- 14.30 Overall, we consider that the proposed lapsing period of 30 months is a reasonable compromise between the submitters' desire to have an effective screen built as soon as possible and the practicality of achieving that goal.

Principal Issue 4 - Effects of the 5 cumec Fish Bypass Diversion

- 14.31 Some submitters expressed concerns that the five cumec fish bypass flow could have adverse effects on the Rangitata River¹⁷⁰. However, fisheries experts agreed that the five cumec Fish Screen bypass flow was likely to have minor or less than minor ecological effects in the 1.4 kilometres section of the Rangitata River between the RDR intake and the location of the Fish Screen bypass return flow, when taking into account the existing environment and also cumulative effects associated with the proposed ten cumec water take. The primary basis for this view was that the benefits to all fisheries of the Rangitata River by having an effective functioning fish screen and fish bypass were more advantageous than a slightly lower river flow in that section of the river¹⁷¹. We also heard from Mr Greenaway that any impacts on

¹⁶⁷ Proposed Condition 9Ac of resource consent CRC182542 (Applicant version dated 30 May 2018).

¹⁶⁸ Response to Applicant consent conditions, dated XXXXX.

¹⁶⁹ Proposed Condition 6 of resource consent CRC182542 (Applicant version dated 30 May 2018).

¹⁷⁰ For example, submissions from: South Canterbury Salmon Anglers Association and the New Zealand Federation of Freshwater Anglers and Future Rivers.

¹⁷¹ Paragraph 6(j) of the Joint Witness Statement for water quality and aquatic ecology, dated 19 March 2018.

recreational flows would be very small, and that the size of the bypass take had already been minimised to take into account recreational values.¹⁷²

- 14.32 We note that the proposed consent conditions include a variable rate of take for the bypass flow ranging from three cumecs when Rangitata River flow is 132.6 cumecs at Klondyke, through to a maximum rate of 5 cumecs when river flow exceeds 142.6 cumecs at Klondyke¹⁷³. This variable rate of take has been proposed to mitigate effects of the non-consumptive take as river flows drop.
- 14.33 Consent application CRC182535 concerns the discharge of the bypass flow back to the Rangitata River. It was clear from evidence presented at the hearing that the water discharged under this consent is simply Rangitata River water¹⁷⁴. Although concern had been raised regarding this consent application in the submission of Fish & Game, Mr Webb (for Fish & Game) clarified at the hearing that he had no longer had any concerns with it. Given its source from the Rangitata River and the lack of any other impacts on its water quality during its passage along the bypass channel, we consider that there will be no adverse effects associated with the bypass discharge into the Rangitata River.
- 14.34 Overall, we are satisfied that effects of the non-consumptive take for the fish bypass will be less than minor. This conclusion is based on the opinion of fisheries and recreation experts summarised above, supported with the proposed consent conditions regarding a variable rate of take depending on river flows.

Other Relevant Issues

Relevant issue 1 - Landscape and Amenity Effects

- 14.35 Concerns regarding visual impacts of the proposed new Fish Screen were raised by the Commissioners during the hearing, given the size of the structure and the screen's location being within a geoconservation area listed in the ADP. In response, Mr Brown stated that he evaluated visual impacts in the context of existing gravel embankments that are variable in height, with vegetative cover. He concluded that anyone travelling along the Rangitata River would struggle to see much of the Fish Screen above the existing gravel mounds and vegetation. He further noted that in terms of its context within the existing landscape, people would also have just gone past existing control gates and would be travelling through a modified rural landscape.
- 14.36 Mr Brown also considered effects on possible views from Little Mount Peel and concluded that at over six kilometres away, it would be difficult to discern and separate the screen from the surrounding landforms. This was a view shared by Ms Pfluger in her oral evidence.
- 14.37 Regarding impacts on the geoconservation area, Mr Callander (groundwater and geology expert for RDRML) concluded that the low elevation of the Fish Screen and bypass would not impact on the elevated terraces of the Rangitata River (the key features of the geoconservation area)¹⁷⁵. We are inclined to agree with this

¹⁷² Mr Greenaway, paragraph 11 of Supplementary Evidence, dated 24 April 2018.

¹⁷³ Proposed Condition 2 of resource consent CRC182536 (Applicant version dated 30 May 2018).

¹⁷⁴ Oral submissions from Dr Ryder and Mr Morgan.

¹⁷⁵ Mr Callander, Evidence in Chief, paragraph 7.8, dated 28 March 2018.

assessment, based on our own observations made during our site visit and the lack of any evidence to the contrary.

Relevant Issue 2 - Construction and Related Effects

- 14.38 As detailed above, various consents have been sought in association with constructing the Fish Screen and bypass channel. The majority of potential issues associated with construction of the fish screen and bypass are captured within the CMP for the broader development proposal. Construction effects were not a major area of contention for the Fish Screen and bypass, but they are discussed briefly here for completeness.
- 14.39 Construction-related activities for the entire site are addressed via the CMP, which is a requirement of the various land use and discharge consents sought for this proposal. The CMP will require the inclusion of mitigation measures to: stage construction where possible to minimise disturbance; minimise sediment erosion and runoff; and avoid impacts on dust and noise.
- 14.40 The CMP is to include various sub-plans. Of particular relevance to the Fish Screen and bypass are the ESCP and the WRMP. The minimum contents of these plans have been proposed as consent conditions and they include reference to the likes of sediment and erosion control measures and removing machinery from the riverbed prior to any predicted flood events.
- 14.41 Regarding ecological effects, Dr Sanders concluded that the RDR canal modifications and construction of a new Fish Screen and by-pass will have no adverse ecological effects because of the very low ecological value of the existing vegetation at these locations, and the proposed re-instatement of them to a condition similar to the present.¹⁷⁶ This was not a matter of contention. Dr Grove agreed that modifications to the RDR associated with the new Fish Screen and construction of the new fish bypass will have no adverse effects on indigenous terrestrial vegetation.¹⁷⁷
- 14.42 We conclude that construction effects associated with the Fish Screen and bypass will be minor or less than minor, given the raft of mitigation measures proposed as conditions of consent.

Benefits or Positive Effects

- 14.43 There was general agreement between RDRML and submitters that the proposed new Fish Screen should be an improvement on the existing BAFF screen.
- 14.44 In response to a question from the Commissioners, Dr Ryder said that the Fish Screen would have a large net ecological benefit, over and above any minor effect of the additional 10 cumec take. Dr Ryder pointed out that not only does the current BAFF screen poorly screen fish from the RDR, but it also currently only operates during the period of salmon migration. The proposed new screen will operate year-round and should be highly effective compared to the BAFF screen. The new screen would therefore be a significant benefit for all species, including both native species and salmon.

¹⁷⁶ Dr Sanders EIC Paragraph 75.

¹⁷⁷ Dr Grove S42A Report Page 145.

- 14.45 Fish & Game¹⁷⁸ and other submitters¹⁷⁹ also agreed that the proposed new screen would have a significant, positive effect on fisheries in the Rangitata River, particularly salmon smolt, which are the most at risk with the existing BAFF screen.
- 14.46 It is clear that the proposed new screen will have positive environmental effects, in terms of effectively screening fish from the RDR, compared to the existing environment. Overall, we are satisfied that these positive effects will occur, provided the screening performance criteria and monitoring plans discussed above are adhered to.

Relevant Planning Provisions

WCO

- 14.47 Relevant provisions in the WCO include the following:

"Clause 9 (10): The restrictions in subclauses (3) to (5) [regarding water takes] do not apply in respect of a take of water for the purpose of a fish bypass system and which is discharged back into the Rangitata River within 2500 metres downstream of the point of abstraction."

"Clause 10 (2): No resource consent in relation to an intake site may be granted, or rule included in a regional plan, for the waters specified in Schedule 2 authorising an activity unless that resource consent provides for fish exclusion or a fish bypass system to prevent fish from being lost from the specified waters."

- 14.48 The consent application states that the proposed fish bypass will return fish to the Rangitata River approximately 1,400 metres downstream of the intake location. That is therefore consistent with the WCO requirement of a fish bypass system of less than 2,500 metres. We are also satisfied that Clause 10(2) of the WCO can be met, given the proposed design criteria and monitoring requirements.

LWRP

- 14.49 Schedule 2 of the LWRP includes fish screen standards and guidelines. For takes greater than 10 cumecs (as is the case here), Schedule 2 requires the following:

- (a) *The site is located as close to the river source as possible to minimise exposure of fish to the fish screen structure, and minimises the length of stream affected while providing the best possible conditions for (b) - (f) below;*
- (b) *Water velocity through the screen ("approach velocity") is slow enough (generally <0.12 m/s) to allow fish to escape entrainment (being sucked through or washed over the screen) or impingement (being squashed or rubbed against the screen);*
- (c) *Water velocity across (or past) the screen ("sweep velocity") is greater than the approach velocity (b) and is sufficient to sweep the fish past the intake;*

¹⁷⁸ Mr Webb Oral Evidence.

¹⁷⁹ For example, Oral Submissions from Mr Mortimer, Mr Hodgson, and TRoA.

- (d) *An effective bypass system is provided that is easily accessible to entrained fish, and fish are taken away from the intake and back into the source channel, or into water which provides the fish with unimpeded passage back into the source channel;*
- (e) *Screening material (mesh, profile bars or other) on the screen needs to have a smooth surface and openings that prevent any damage to fish coming into contact with the screening material; and*
- (f) *The intake structure and fish screen are operated to a consistent, appropriate standard with appropriate operation and maintenance procedures, and this operation and maintenance should be regularly checked or monitored. A record should be kept of all the maintenance and monitoring carried out.*

14.50 Schedule 2 further states that for takes exceeding 10 cumecs, the intake will need to be purpose-designed, including consideration of any further design features necessary to prevent fish from entering the intake. Schedule 2 also makes mention of the NIWA fish screening guidelines and states that they can be used to help design and comply with the features in (a) to (f) above.

14.51 We consider that the proposed Fish Screen will comply with the standards within Schedule 2, given the design features of the screen and the proposed monitoring conditions.

Conclusions on effects of the new Fish Screen

14.52 Based on the evidence summarised above, we are satisfied that the proposed new Fish Screen will have less than minor adverse effects. We are also of the opinion that the screen will have positive ecological effects, in terms of improved screening of native and introduced fishes. RDRML has proposed numerous conditions regarding screen design, monitoring, and maintenance, and we consider that they will adequately ensure any adverse effects are less than minor.

14.53 We consider that the residual effects associated with the proposed Fish Screen consents are consistent with the relevant planning provisions of the WCO and LWRP.

14.54 We consider that the lapsing period of 30 months proposed by RDRML is appropriate. A 30 month lapsing period is a reasonable compromise between the desires of submitters for an effective screen to be in place as soon as possible and what RDRML considers a practical timeframe for designing and commissioning the screen, given a project of this size.

14.55 We also record that we are granting consent for the rotary drum Fish Screen on the basis that RDRML has proposed to surrender consent CRC180974 (which authorises a diversion for the existing BAFF) if RDRML proceeds with the Fish Screen. We have discussed this issue in detail earlier at paragraph 4.54 of this decision.

15 OVERALL POSITIVE EFFECTS / BENEFITS OF THE KSF

15.1 Ms Greer states that the proposal has the potential to contribute directly to the economy of the Ashburton District and to the achievement of the targets of the Canterbury Water Management Strategy (CWMS). These included improvement in the reliability of irrigation water supply for

existing irrigators, and increasing the area developed for irrigation in the region, without increasing pressure on the region's freshwater resources¹⁸⁰.

- 15.2 Ms Greer further explains that the proposal also has the potential to increase the reliability of supply to existing RDR irrigators and the efficiency of use of water abstracted from the RDR for irrigation on the basis that farmers will be better able to match water use to agronomic demand if they can be assured of supply at the right time. By reducing uncertainty about the level of pasture production, reliable irrigation will encourage greater efficiency in the allocation of other resources to production.¹⁸¹
- 15.3 The Canterbury region is dependant on irrigation during the dry period when it experiences relatively low rain fall, high temperatures and strong winds. The development of water storage will allow water to be stored at times of peak flow for distribution during the summer months.
- 15.4 Ms Greer notes that the proposed KSF and the additional water take, is sufficient to irrigate the consented area of the RDR scheme (94,486) with 99 percent reliability provides water for other users.
- 15.5 Although it has not been possible to estimate the impacts of the average irrigation restrictions on profitability at the individual farm level an estimate based on MPI farm monitoring data (MPI 2012) suggest that production on the average dairy farm would be between 19 and 35 percent higher if irrigation supply were consistently reliable.
- 15.6 Ms Greer notes potential economic impacts of storage development provides certainty and reliability for future supply and demand, providing the potential total (direct, indirect and induced) additional contribution to the Canterbury region (GDP) of \$116 million.
- 15.7 Ms Greer also notes a direct total contribution to employment in the Ashburton District of approximately 445 farm jobs. Ms Greer used existing land use patterns it being her view that the job number would in fact be higher if there is greater land use intensity, which is likely.
- 15.8 Ms Greer, and Mr Greenaway provide that there will positive recreational and social benefits associated with the proposed white-water course will increase the recreational opportunities available in the district.
- 15.9 Further, positive environmental impacts associated with the additional water from the development will be available for MAR, which has been identified as an avenue to improving Canterbury's freshwater ecosystem health, by reducing nitrate concentrations in groundwater and lowering water temperature in spring fed streams.
- 15.10 We did not hear from submitters on points of disagreement on Ms Greer evidence of the economic benefits the development will bring to the local and regional economies. We agree with Ms Greer's view that these benefits *are expected to be considerably higher than the social and environmental costs and will lead to an increase in the economic wellbeing of the community*¹⁸².

¹⁸⁰ Glen Greer, Evidence in Chief dated 28 March 2018, Conclusion, 41

¹⁸¹ Glen Greer, Statement of Evidence dated 28 March 2018, conclusion 42

¹⁸² Glen Greer, Statement of Evidence dated 28 March 2018

- 15.11 Ms Hamm, in her opening legal submissions, explains that the proposal presents an opportunity to:
- (a) *"Create a water storage facility which will strengthen the security of supply and reliability for existing irrigation schemes serviced by the RDR and buffer them against future regulatory and climatic risks;*
 - (b) *Anchor a significant storage facility in mid-Canterbury which may help deliver integrated storage and water delivery throughout Canterbury by facilitating supply to South Canterbury; and*
 - (c) *Facilitate environmental initiatives..."*
- 15.12 Ms Hamm goes on to say that the proposal will result in net improvements to native biodiversity, lizards and birds (through the establishment of the ecological refuge) and ecological benefits from replacing the existing BAFF.
- 15.13 It is evident to us that the proposal will result in a number of positive (some significant) benefits for RDRML, the community, future generations and the environment.

16 CONSIDERATION OF ALTERNATIVES

- 16.1 Schedule 4 RMA requires RDRML, within its AEE, to consider and describe any possible alternative locations or methods for undertaking the activity if it is likely that the activity will result in any significant adverse effects on the environment.
- 16.2 Mr Boyes within his Section 42A Report dealt with consideration of alternatives. Mr Boyes noted that in the context of the ADC applications, consideration of alternatives is restricted to the dam breach scenario and mitigation of risk.
- 16.3 As already discussed, the probability of a dam breach is low albeit it could result in significant adverse effects on the environment. Avoidance of a dam breach altogether is difficult, and all that RDRML can really do in relation to this is mitigate the risk of the dam breach and implementing a sufficient EAP so as to adequately respond to a breach in the unlikely event that it occurs.
- 16.4 RDRML did consider alternatives development options within its AEE (see section 1.7), including the consideration of alternative locations for the KSF. RDRML concluded that the alternative sites posed more of a risk in the event of a dam breach than the currently proposed site.
- 16.5 RDRML undertook assessments/investigations in relation to the constraints of the land at the site, engineering requirements, operational requirements and cost implications for various water storage options. RDRML considered and evaluated a total of 16 alternatives to determine the most appropriate option. The option proposed by RDRML was determined by experts to be a suitable and environmentally feasible option.
- 16.6 Mr Curry provided evidence in relation to alternative development options, setting out an extensive process that RDRML had undertaken in determining whether the location and proposed KSF development was the most appropriate option. Mr Curry stated that based on the

technical expert advice received by RDRML and the feedback from stakeholders, ADC, CRC and RDRML's consultation efforts, RDRML determined that the proposal as currently before us would best meet RDRML's objectives while also appropriately managing the positive and negative effects on the environment together with the risks associated with the operation of the KSF.

- 16.7 My Curry explained that the location and size of the KSF as proposed best represented an option that was able to achieve the objectives sought by RDRML whilst "...balancing the cost of construction with a good cut to fill balance that, in turn, minimises the number of movements of earthmoving equipment with associated benefits in costs, minimised use of resources such as diesel and minimised generation of dust, noise and vibration."¹⁸³
- 16.8 Mr Curry was further of the view that the proposed Fish Screen, which had also involved substantial research and assessment following the original application, was the best design in the circumstances and for RDRML's requirements.
- 16.9 Based on the above, we consider that RDRML has appropriately and adequately considered alternatives for the purpose of Schedule 4 RMA.

17 SECTION 104 RMA ASSESSMENT

Section 104(1)(a)

- 17.1 Through the course of this decision we have referred too many of the RDRML expert evaluations of potential effects that this proposal may give rise to. In addition we have referred to in carefully considered the mitigation measures in advance to address such effects leaving us in a position to make an overall assessment of the extent or scale of effects on the environment.
- 17.2 In terms of the environmental effects of the 10 cumec take, it is our view that the effects are minor or less. All experts acknowledged that any effects of the take would be small (or minor). The principal evidence provided regarding cumulative effects on ecology and angling related to fine sediment deposition, and monitoring has been proposed to address uncertainties in this area.
- 17.3 We are also satisfied that the potential adverse effects on other recreational values, principally kayaking, rafting, and jet boating, of the 10 cumec take, taking into account the mitigation measures proposed, will be minor or less.
- 17.4 The control of the construction activities is undertaken through a range of specific management plans which are developed as part of a suite of resource consent conditions to guide and control the construction works.
- 17.5 These management plans combined with conditions in our view will ensure the adverse effects on water quality, both surface and groundwater are able to be appropriately managed so that effects are no more than minor.

¹⁸³ Mr Curry, Statement of Evidence, paragraph 6.26

- 17.6 In relation to the discharge is associated with the construction activities, maintenance activities and the fish return we are also satisfied through the utilisation of these specific management plans following reasonable mixing the discharges are so associated will have no more than minor effects.
- 17.7 In relation to the various discharge and dewatering consents we note that interactions between the proposal and the river have been limited to the emergency discharge channel and the fish bypass return.
- 17.8 However in each case the structures involved have been designed to ensure they do not result in adverse alteration of the natural character of the river nor the flow and function of the river at the points of intersection.
- 17.9 Construction materials have been specifically identified to ensure the structures maintain the existing character of the river environment with the use of rock arm coloured concrete and vegetation to achieve this outcome.
- 17.10 The construction methodology of the discharge points have been specifically designed so that the discharge is a controlled and managed to appropriate levels and interactions with the Rangitata River environment are minimised.
- 17.11 Extensive use of erosion and sediment control devices to ensure that exposed areas are controlled and adverse off-site effects are minimised are in place via conditions.
- 17.12 We have also had the benefit of expert assessment via the Section 42A Reports. In the end it there was consensus between the experts in nearly all instances in terms of potential adverse effects that the proposal may give rise to along with evaluation of the mitigation measures proposed.
- 17.13 With the exception of visual effects of the KSF as identified by Mr Brown being from one particular viewpoint the experts concluded as we do that effects can be avoided remedied or mitigated to the point they are able to be considered to be of a level that is no greater than minor.
- 17.14 Even in respect of Mr Brown's valuation of the visual effects of the KSF from the elevated advantage point of Little Mount Peel it is his assessment that the proposal would result in a moderate level of effect. We agree with both Mr Greaves and Mr Boyes that this means these visual effects are therefore more than minor.
- 17.15 However Mr Brown concludes on the basis of his broader analysis and the limited effects identified it is his opinion that overall the proposal is appropriate in terms of landscape, natural character and amenity effects. We agree and we also note that Mr Boyes acknowledging Mr Brown's finding did not change his overall conclusion which again we agree with that the effects of the land use proposals are acceptable and consent can be approved.
- 17.16 The proposed Fish Screen will have a positive effect on native and introduced sport fisheries of the Rangitata River, by better screening them from the RDR intake than the existing BAFF screen. This was not a matter of dispute amongst experts at the hearing. Improved screening

efficiency will also help support the recreational salmon fishery, by providing safe passage of salmon smolt past the RDR intake. Submitters have provided input into the wording of conditions for fish screen performance and monitoring, and we consider that the final condition set provide sufficient certainty that the screen will perform to an appropriately high standard.

- 17.17 We are satisfied that the effects in relation to the water take, the Fish Screen, the construction activities, road modifications, the various discharge and dewatering consents given they are all subject to specified controls generally expressed in management plans and conditions of consent that the adverse effects associated with the proposal are able to be managed to the extent they are appropriate in the context of the site and its surrounding environment.

Section 104(1)(b) RMA

- 17.18 The relevant statutory planning instruments were thoroughly reviewed by Ms Ford, Mr Boyes and Mr Greaves. Those planning instruments include the WCO. Based on those opinions and our own assessment of the relevant statutory planning instruments and taking into account the assessments and evidence of the technical experts our view is the proposal complies with the WCO and is consistent with the policy direction advanced by the NPSFM, the National Policy Statement for Renewable Electricity Generation 2011 (NPSREG), the LWRP and finally the ADP.
- 17.19 In particular, as the RDR supplies to hydroelectric plants and because the water from the RDR and subsequently that that may be stored in the KSF will be used for electricity generation the use of the water stored in the KSF may increase the reliability and supply of water to the power stations thus increasing power supply. Such an outcome supports the objectives and policies of the NPS for the NPSREG.
- 17.20 Regarding the water take and Fish Screen, we consider they are consistent with the NPSFM, WCO, and LWRP, particularly Objective A1 a) of NPSFM "*protecting the significant natural values of outstanding the requirement to protect the significant values of outstanding freshwater bodies*". That is because effects of the take are considered minor and the proposed Fish Screen will have a beneficial impact on fish and the fisheries they support.
- 17.21 We accept based on the evidence of many of the experts that appeared before us that the overall effects on the environment from the proposal are able to be appropriately managed or mitigated in a manner that we are able to be conclude they are appropriate in terms of the relevant statutory planning instruments.

Section 104(1)(c) RMA

- 17.22 We consider that the CWMS is a relevant other matter. We agree with Mr Greaves analysis that the proposal will provide support for the strategy. He identifies the ecological refuge as one of the ways in which it will do so. We agree because the refuge will in our view assist in restoring the terrestrial aquatic and bird habitats and as a result enhance the overall values of the area.

- 17.23 Ms Ford, Mr Boyes and Mr Greaves identified a range of other relevant plans and statements such as the Te Rūnanga o Ngāi Tahu freshwater policy statement (1999); Te Whakatau Kaupapa - Resource Management Strategy for Canterbury (1990); and Iwi Management Plan of Kati Huirapa for the area Rakaia to Waitaki as all being relevant iwi management plans as they relate to the proposal. We agree with the opinion that the proposal inclusive of conditions is consistent with the direction and outcomes sought by these Iwi Management Plans.

18 SECTION 104D JURISDICTIONAL HURDLES

- 18.1 The preceding sections of this decision set out our key findings in respect of the principal issues in contention. However, before we can proceed any further we must consider whether the RDRML proposal as a non-complying activity is able to meet one of the threshold tests specified in s 104D of the RMA.
- 18.2 In considering the statutory test we have considered the RDRML proposal subject to the proposed conditions.

First gate-way test

- 18.3 We acknowledge Ms Hamm's opening legal submissions relating to the variable approach to the first gateway under section 104D. The issue is whether or not an assessment of effects can and should be approached on an overall basis or whether or not the first gateway test should be approached on an issue or effect-by-effect basis and if any effect is determined to be more than minor then the proposal fails the first gateway.
- 18.4 We favour approaching the first gateway test on an overall basis. So when we approach an overall judgement of effects resulting from the proposal we adopt and rely upon Mr Brown's expert assessment that overall taking into account the existing environment and its modifications the proposal represents an acceptable level of development in the context of the site.
- 18.5 So we conclude when considering the proposal as a whole the effects on the environment are minor and the proposal is able to satisfy the first gateway of section 104D.

Second gate-way test

- 18.6 If we are satisfied that the proposal is not contrary to the objectives and policies of the relevant district, regional, national planning documents and WCO then the second gateway is satisfied and we are allowed in our discretion to grant a resource consent.
- 18.7 In our view overall the proposal is consistent with the objectives and policies of the relevant district and regional council planning documents and in our view the proposal is able to meet the second gateway of section 104D(1)(b).

19 SECTION 105 RMA

- 19.1 As well as the matters identified in section 104(1) section 105 RMA identifies matters requiring consideration in relation to:

- (a) the discharge of contaminants to air from the diesel generators used during construction activities;
- (b) the discharge of dust to air arising from the construction activities; and
- (c) the discharge of water to land following treatment in the stormwater control devices during construction; and
- (d) the discharge of contaminants to water from the construction activities within the Rangitata River; and
- (e) discharge of sediment to water associated with the operation of the Fish Screen.

19.2 Section 105 requires the consideration of alternatives.

19.3 The experts identified potential effects from discharges and expressed views if there were alternative methods that were more appropriate to manage adverse effects on the environment of those discharges. Based on the technical experts evidence we are satisfied that the various management plans advanced are the most appropriate means of addressing effects on the environment of these discharges. The experts in many instances assured us that the construction management plans they were proposing represented industry best practice.

19.4 Accordingly we are of the view the proposal has appropriately and adequately address matters in section 105 RMA.

20 SECTION 107 RMA

20.1 Section 107 places restrictions on the grant of discharge consents. We agree that the discharges associated with the construction activities are all temporary nature notwithstanding the construction period will occur over a three to five year period.

20.2 We are satisfied the draft construction management plans have enabled us to understand and be satisfied that possible adverse effects resulting from the discharge activities have been addressed. In particular we are satisfied the draft plans include appropriate controls, monitoring and maintenance procedures so as to ensure that any adverse effects on the environment are avoided. We are also satisfied that the appropriate management plans can be given effect to via the conditions of consent so that the various discharge activities are able to comply with the requirements of section 107.

20.3 In relation to the emergency discharge we note that section 107(2) enables us to grant a discharge permit even if the proposed activity exceeds one or more of the standards as set out in section 107(1) if exceptional circumstances exist, the discharge is temporary in nature, or the discharge is associated with necessary maintenance work.

20.4 It is open to conclude that the construction activities here proposed will be temporary in nature with no permanent discharge ongoing following the completion of the construction works. So to that extent we accept in the instance that section 107(1) cannot be achieved a pathway is available under subsection (2). In any event we rely on Dr Ryder's assessment that the discharges will not result in adverse effects on the environment so we are satisfied that the construction related discharges

are consistent with section 107(1) and the emergency discharge is consistent with section 107(2).

21 PART 2 RMA

- 21.1 Section 104(1) RMA states that the matters which we have discussed above are subject to the purpose and principles in Part 2 RMA. We discuss below the principles of the RMA in Sections 6 to 8 and return to the overriding sustainable management purpose of the RMA (Section 5) in our overall evaluation of the RDRML proposal.
- 21.2 The principles set out in these sections inform and guide our ultimate decision as to whether or not the RDRML proposal is an appropriate development and one that will promote the sustainable management of natural and physical resources. The exercise is not a mechanistic check-list or a simple score-sheet. Nor do we consider that certain matters somehow trump or override other sections. We must take all these matters into careful consideration.
- 21.3 Following recent decisions primarily from the Supreme Court and High Court there is some doubt as to whether or not the previous broad overall judgement approach is still required absent in the invalidity, incomplete coverage, or uncertainty of meaning within the relevant statutory planning instruments. We have decided to adopt both approaches.
- 21.4 No expert planner appearing before us identified any instances of invalidity, incomplete coverage or uncertainty of meaning in the relevant planning instruments so following these recent court authorities we do not even need to or perhaps we cannot consider Part 2.
- 21.5 Nevertheless there is some doubt on this point particularly when regard is had to recent Environment Court decisions so we will adopt the approach of discussing the proposal in the light of Part 2. We have approached that exercise in the normal way treating the principles contained in sections 6, 7 and 8 as being subordinate to the purpose of the RMA as set out in section 5.

Section 6 matters of national importance

- 21.1 Sections 6 RMA identifies matters of national importance that we must "*recognise and provide for*" when making our decision. There are seven matters of national importance relevant to RDRML's applications. They are 6(a), (b) (c), (d), (e), (f) and (h).
- 21.2 We deal first with section 6(a) RMA which requires us to recognise and provide for the preservation of the natural character of the river and its margins from inappropriate use and development. Mr Greaves, in considering whether or not the proposal was consistent with section 6(a) referred to the expert evidence of Dr Ryder, Mr Mikaere, Dr Sanders, Mr Brown and Mr Veendrick. Mr Greaves considered it significant that all of these experts agreed that the natural character of the Rangitata River and its margins were unlikely to diminish as a result of the RDRML proposal.
- 21.3 Mr Greaves was also of the view that the proposed ecological refuge was relevant to the considerations of section 6(a). Mr Greaves relied on

the evidence of Dr Sanders whose view it was, that the proposed ecological refuge would restore and enhance the terrestrial ecology on the lower river terrace. Mr Greaves understood this to mean that the proposal would improve the level of natural character in that locality. For these reasons Mr Greaves considered the proposal to be consistent with section 6(a) of the RMA. We agree with that conclusion.

- 21.4 We turn now to section 6(b) RMA which requires recognition and provision for the protection of outstanding natural features and landscapes from inappropriate subdivision, use, and development. As previously mentioned in this decision, the site for the proposed KSF is not located within a landscape that is identified as being important and specifically, it is not located within an outstanding landscape or outstanding natural feature. However the proposed KSF is situated adjacent to the Rangitata River which is identified as important and therefore section 6(b) is relevant.
- 21.5 Notwithstanding this, for reasons already outlined in the decision, it is our view that the proposal will not result in any dramatic alterations to the landscape in which it is located, nor will it result in any adverse effects on the natural character and landscape that are more than minor, rather any effects will be minor or less than minor. In any event, we consider any effects can be appropriately avoided, remedied and mitigated through the imposition of conditions of consents and the implementation of management plans.
- 21.6 We also consider section 6(c) RMA to be relevant to the proposal which requires us to provide for the protection of significant vegetation and significant habitats of indigenous fauna. Those areas of ecological significance, are, in the opinion of Dr Ryder and Dr Sanders, the Rangitata River (and its margins) and the lizard habitat. We accept the evidence from these two experts that during construction, there would be some effects on the ecologically significant habitats. However, Dr Ryder and Dr Sanders conclude that adverse effects on habitats of indigenous flora and fauna and the lizard habitat will be temporary and acceptable.
- 21.7 We accept this position and further consider that the establishment of the six hectare ecological refuge (which is to include two hectares of native planting, three hectares of constructed wetland and one hectare of lizard habitat) will assist meeting the requirements of section 6(c). We have already discussed the ecological refuge earlier in this decision, but reiterate here that the ecological refuge, together with the planting management plan and imposed conditions will not only mitigate any adverse ecology effects caused by the proposal but which will, if successfully implemented, progressively enhance local ecological values and biodiversity.
- 21.8 Further, the implementation of the proposed Fish Screen will improve the largely ineffectual fish screen currently in place, increased the level of protection for the significant indigenous species within the RDR, and in particular salmon, diverting them away from the RDR. Consequently, we are of the view that the proposal achieves the requirements of section 6(c).
- 21.9 Section 6(d) RMA requires the maintenance and enhancement of public access to and along the coastal marine area, lakes, and rivers.

- 21.10 We agree with the analysis of Mr Greaves that the proposal accords with the outcome sought by section 6(d) of the RMA. In coming to his conclusion, Mr Greaves refers to the evidence of Mr Greenaway who advised that the proposal, once constructed will formalise and legalise access to the Rangitata River. Further, it will provide parking facilities for those members of the public wishing to access the River. Mr Greenaway makes clear that those seeking to access the River for recreational purposes, such as jet boating, kayaking, rafting users and fishing will not be unacceptably prevented from doing so.
- 21.11 There is a short period of time during construction where, we were advised, access to the Rangitata River will be restricted. We do not think this undermines the requirements of section 6(d) and agree with Mr Greaves that the proposal harmonises with this section.
- 21.12 In regards to section 6(e), we agree with Mr Mikaere's evidence in chief that section 6(e) RMA seeks recognition and provision for "the relationship of Maori and their culture and traditions with their ancestral lands, water, sites, wāhi tapu, and other taonga".
- 21.13 TRoA and TRoNT are the appropriate Maori iwi/rūnanga to engage with concerning the KSF and what cultural values are potentially affected. RDRML sought to engage with TRoA and has undertaken measures to assist in the process of engagement, but engagement in the latter part of the process was unsuccessful in some instances for various reasons. However, we have taken into account the relationship the rūnanga has with the project area and cultural features, including the river itself, and we consider that this relationship is recognised within the suggested consent conditions. We therefore conclude that the consent application, consultation and decision-making process adequately meets the intent of section 6(e) RMA for recognition and provision purposes.
- 21.14 We agree with Mr Greaves' analysis in relation to sections 6(f) of the RMA and consider that the proposal achieves this provision.
- 21.15 Finally, in relation to 6(h) RMA which seeks to recognise and provide for the management of significant risks from natural hazards, we consider for reasons outlined earlier in this decision, that the proposal meets the requirement of this section. The relevant risk in relation to this section is a dam breach due to a seismic event.
- 21.16 As discussed earlier, we are satisfied that any adverse effects in relation to a low probability, but high impact event such as a dam breach can be appropriately avoided, remedied or mitigated through the imposition of conditions and implementation of management plans related to dam design, construction, operation and emergency response.

Section 7 other matters

- 21.17 We now turn to the relevant matters that we are to have particular regard to under Section 7 RMA, including kaitiakitanga,¹⁸⁴ the efficient use of natural resources, the maintenance and enhancement of amenity values and the quality of the environment, the intrinsic value of ecosystems, and the protection of habitat for trout and salmon, among other matters.

¹⁸⁴ Guardianship, stewardship, trustee (<http://www.maoridictionary.co.nz>).

- 21.18 As we understand it, kaitiakitanga in this context will involve ongoing involvement of tangata whenua with the natural and physical resource, which in this case is both the land and the Rangitata River. Kaitiaki involves the ability to exercise guardianship of the natural and physical resources of the area in accordance with tikanga Maori.
- 21.19 We agree with Mr Greaves' conclusions that the proposal accords with section 7(a) and (aa) RMA and agree with the approach taken by him to arrive at that conclusion. In recognition of TRoA kaitiaki responsibilities RDRML have, through the Cultural Impact Assessment (CIA), identified key issues relating to the KSF and associated activities. The proposed consent conditions, as described by Mr Greaves appears to meet the cultural issues associated with the project.
- 21.20 Further, we consider that the proposal gives sufficient regard to the efficient use of natural resources (section 7(b)). We accept, based on RDRML and expert evidence that there is a demonstrated need and economic value associated with the water that is to be taken and stored. Further, we consider that RDRML has had sufficient regard to and presented sufficient evidence to demonstrate that the proposal will result in an efficient use of water (being a natural resource) and that the proposal constitutes a reasonable use of the water.
- 21.21 We are comfortable that the proposal provides for the maintenance and enhancement of amenity values (section 7(c)). We are satisfied that effects on landscape character and amenity for nearby residents can be appropriately mitigated by the relatively isolated location of the KSF, its placement on a river terrace well above and distanced from the Rangitata River, grassed vegetation of the embankments and screening by pine shelterbelts along both Montalto Road and next to the Rangitata River.
- 21.22 In regards to impacts of the proposal on views from Peel Forest, we consider that these effects are not easily mitigated and will be of a moderate level of effect for more elevated advantage points within Peel Forest, especially from Little Mount Peel.
- 21.23 The intrinsic values of ecosystems (section 7(d)) and the maintenance and enhancement of the environment (section 7(f)) will be provided for in this proposal primarily through conditions, management plans, and the creation of the ecological refuge. In that way, we are satisfied that sections 7(c), (d) and (f) are addressed and provided for.
- 21.24 We agree with Mr Greaves' conclusion that the proposal can be constructed and operated in a manner that responds appropriately to the considerations introduced by section 7(g) of the RMA by way of imposed conditions of consent and management plans.
- 21.25 Section 7(h) requires particular regard to be had to the protection of the habitat of trout and salmon. Based on the expert evidence received, we accept the conclusion that the proposed 10 cumec take will not affect fish passage, in particular salmon passage. Further, we are of the view that provided imposed consent conditions and management plans are adhered to, the proposed Fish Screen will have positive environmental effects in terms of effectively screening fish, including salmon, from the RDR. For these reasons, we consider the proposal achieves the requirements of section 7(h).

- 21.26 We accept Mr Greaves' views in relation to sections 7(i) and (j) and conclude the proposal aligns with these two subsections. Overall, we are of the view that the proposal accords with section 7 of the RMA.

Section 8 Treaty of Waitangi

- 21.27 Finally, Section 8 RMA requires that we shall take into account the principles of the Treaty of Waitangi (Te Tiriti o Waitangi). Section 8 recognises the relationship of tangata whenua with natural and physical resources and encourages active participation of, and consultation with, tangata whenua in resource management decision-making.
- 21.28 Maori are considered to be key stakeholders with interests in the Rangitata River catchment. Consultation provides the forum by which partnership principles can be exercised. We understand that a good faith Memorandum of Understanding (MOU) is in place between RDRML and TRoA. We also note that TRoA and TRoNT have been invited to be part of a community liaison group (CLG), along with local councils. We view this CLG and MOU as an active initiative that sets a good foundation for a community cooperative approach to freshwater management. We also heard at the hearing from both RDRML and TRoA that they wished to have an ongoing korero, or conversation, around water management and environmental matters in the Rangitata River catchment.
- 21.29 We are satisfied that the principals of the Treaty of Waitangi have been taken into account. That is because we have heard the concerns raised by TRoA and TRoNT regarding this proposal, and we are satisfied that the proposed conditions and commitment to ongoing involvement adequately addresses these concerns. We therefore consider that the proposal accords with the outcomes sought by section 8.

Section 5 The Purpose of The RMA

- 21.30 The purpose of the RMA is to promote the sustainable management of natural and physical resources. That is, 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 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.
- 21.31 Enabling people and communities to provide for their social, economic and cultural well-being, and for their health and safety is an important element of sustainable management. Utilisation of the 10 cumec flood flow will be based on the expert economic evidence of Ms Greer enable people and communities in Canterbury locally and perhaps nationally to provide for the economic well-being.
- 21.32 Ms Greer and some supporting submitters highlighted the benefits primarily to agriculture and two others that arise from irrigation. In addition Mr Greenaway identified other benefits such as the improved

access to the Rangitata River and the establishment and operation of the WWC which will likely enhance recreational opportunities in and around the location of the KSF. The Fish Screen should enhance the sports fishery within the Rangitata River.

- 21.33 Mr Mikaere addressed cultural well-being in his evidence. His recommendations in that regard had been accepted by RDRML and further developed and represented in conditions of consent. In that way cultural well-being is provided for.
- 21.34 Safety is a critical issue in this proposal connected with the unlikely and unexpected and uncontrolled release of water from the KSF and its modified canals. Many submitters both private individuals and those with infrastructural assets and other civil safety concerns raised matters in submissions seeking reassurance that matters of safety had been addressed and provided for and that matters of risk had been understood.
- 21.35 Mr Fletcher relying on the seismic evidence and Mr Morgan both addressed civil safety issues of the KSF and the canal modifications. They demonstrated through the evidence that the proposal has to date and will continue to be designed in a manner required by the applicable legislation and specialist dam build guidelines. Those guidelines will apply through design build operation and monitoring of the KSF and its modified canals so as to ensure that civil safety is provided for and risk is monitored
- 21.36 In addition RDRML requested its experts develop drafts of the applicable safety management plans such as the EAP, WSCP and the DSMS. The inclusion of these drafts within the AEE accompanying these applications along with their refinement and presentation accompanied by expert evidence has enabled independent expert review of these develop drafts. That independent expert review through caucusing in conversation has enabled further development of these drafts.
- 21.37 This approach led us to be satisfied that we could adequately understand the effects of the proposal on the environment and that the means to avoid, remedy or mitigate those effects, namely the management conditions were appropriate.
- 21.38 Due to the operation of the KSF there is the possibility for controlled releases of water which release may affect users of the Rangitata River and those who have infrastructural assets either within the river or over the river. Again development of the EAP seeks to ensure those affected parties are appropriately notified. For completeness we observe that there is a management plan to guide the use and operation of the WWC.
- 21.39 These factors lead us to the conclusion that the proposal inclusive of these management plans will enable people and communities to provide for their social, economic and cultural well-being and for their health and safety.
- 21.40 Section 5(2)(a) provides that when enabling people and communities to provide for their well-being, health and safety, the potential of natural and physical resources must be sustained to meet the reasonably foreseeable needs of future generations. For reasons we have already advanced we consider the proposal is likely to maintain the values that

are presently supported by the site upon which the KSF will be built and principally the nearby Rangitata River.

- 21.41 We are satisfied that the adverse effects associated with the proposal can be minimised to the point that they are acceptable and that beneficial effects such as those we have already referred to will arise to the point that discrete areas of environmental enhancement will result. For example the proposed ecological refuge, the lizard and wetland habitat within and adjacent to the site will be enhanced as well areas that are proposed for native revegetation. The sports fishery and indigenous ecology of the Rangitata River will not be unacceptably diminished. Indeed it is expected to improve as a consequence of the proposed Fish Screen.
- 21.42 We accept that the construction activity has the potential to affect the amenity levels of those adjacent to the construction works. However we note they are few in number. We also note that there are proposed conditions of consent which we consider are appropriate to address negative visual, landscape, natural character, noise, dust and traffic transportation effects. We note a range of experts and support those conditions.
- 21.43 Based on the evidence received we concluded the recreational use of the site and adjacent areas such as the Rangitata River and Little Mount Peel is not expected to reduce. Indeed the proposal presents some localised enhancements such as more practical and formed and formalised public access to the river and the provision of the WWC.
- 21.44 Irrigators will be able to improve the reliability and storage of water will provide a range of potential uses by others. These include managed aquifer recharge and possibly further irrigation.
- 21.45 The natural character of the Rangitata River and its margins will be preserved and nor will the values associated with the adjacent outstanding landscapes or natural features be affected by either inappropriate subdivision use or development.
- 21.46 Therefore in this way accepting the proposal will modify the environment that modification will not degrade the potential of natural and physical resources it will sustain them so as to enable future generations to meet the reasonably foreseeable needs.
- 21.47 Section 5(2)(b) requires that in achieving the purpose of the RMA, the life supporting capacity of air, water, soil and ecosystems are to be safeguarded.
- 21.48 Based on the evidence we have received and considered it is our view the proposal is unlikely to significantly harm or cause a significant reduction in or loss of the life supporting capacity of the Rangitata River, the groundwater resource, or air quality.
- 21.49 We acknowledge that some adverse effects may register in the ecosystems supported by the Rangitata River but the expert evidence we received as to the thrust that these effects will not be of any significance and importantly will not diminish the life supporting capacity of those ecosystems. As we have all he noted the proposed fish screen will in fact better protect than what currently occurs various fisheries within the Rangitata River.

- 21.50 The construction activity for the KSF and its related elements will cause the loss of some terrestrial habitats. However those habitats are not of high value. Also the ecological refuge will provide an offset and we consider ultimately enhance the life supporting capacity of the areas directly affected by the proposal or those adjacent to the proposal. For these reasons then we consider the proposal accordance with section 5(2)(b).
- 21.51 In addition, we consider any effects arising from the proposed 10 cumec take will be minor or less than minor, and that any residual effects can be dealt with by way of conditions of consent. Finally, the proposed new fish screen will have positive environmental effects, associated with the improved screening of native and introduced fish species from the RDR network.
- 21.52 Finally section 5(2)(c) seeks to avoid remedy or mitigate any adverse effects of activities on the environment. We accept this subsection does not require complete avoidance of all adverse effects but rather that adverse effects be avoided remedied or mitigated to the extent that it is appropriate having regard to the circumstances of the case.
- 21.53 In this case we have received evidence from a number of well experienced and independent experts who have addressed the actual and potential adverse effects of the proposal and offered and recommended avoidance, remediation and mitigation measures which RDRML has adopted and expressed either in management plans and conditions of consent to ensure that any adverse effects that do arise will be acceptable. We accept and agree that this accords with the direction set in section 5(2)(c).
- 21.54 For these reasons, we consider that the proposal aligns with section 5 RMA.

22 OVERALL EVALUATION

- 22.1 If an application for a non-complying activity passes through either of the jurisdictional hurdles in s 104D RMA, then we have a discretion as to whether consent should be granted. This requires an overall judgment to achieve the purpose of the RMA and is arrived at by:
- (a) Taking into account all the relevant matters identified under s 104 RMA;
 - (b) Avoiding consideration of any irrelevant matters;
- 22.2 Giving different weight to the matters identified under s 104 RMA — depending on our opinion as to how they are affected by the application of ss 5(2)(a), (b), and (c) RMA and ss 6-8 RMA— to the particular facts of the case, and then in light of the above:
- (a) Allowing for comparison of conflicting considerations, the scale or degree of conflict, and their relative significance or proportion in the final outcome.

Effects on the environment

- 22.3 We have discussed at some length in this decision the actual and potential effects on the environment of allowing the RDRML proposal. For reasons we have already advanced in relation to effects, we

consider that the actual and potential effects of allowing the lesser or reduced developed proposal are as follows.

- 22.4 With regards to the Principal Issues of concern and their associated effects, we conclude that:
- (a) Effects of the proposed 10 cumec take are minor or less than minor. Factors affecting our conclusion include that the proposed take is at high river flows, the small size of effects, and that residual effects can be addressed via conditions, including monitoring.
 - (b) Effects of the proposed fish screen and associated fish bypass will be positive. This was not a matter in contention in the hearing, and conditions have been proposed to ensure the screen performs as predicted.
 - (c) Effects of the proposed water storage dam, including risk management and construction related effects can be appropriately managed by the proposed management plans.
 - (d) Effects associated with all other relevant issues and associated consents were found to be minor or less than minor.

Provisions of the relevant planning framework including the WCO

- 22.5 We have earlier in this decision related our findings to the relevant objectives and policies of the provisions of the relevant framework including the WCO. It is our finding the grant of consent for the RDRML proposal would be consistent with the national policy statements, regional and district plans and the WCO and other relevant planning documents.

Exercise of discretion

- 22.6 On the basis of the evidence before us and for the reasons set out above we consider the purpose of the RMA can best be achieved by granting the resource consents relating to the construction, operation and maintenance of a large water storage facility on the eastern side of the Rangitata River near Klondyke, and an additional 10 cumec take of water from the Rangitata River when the flow in the river exceeds 142.6 cumecs, to replace an existing BAFF fish screen with a new rotary Fish Screen, to establish a six hectare ecological refuge, to undertake roading modifications and a range of other construction activities related to the proposal.
- 22.7 We accept RDRML's evidence that the proposal will have a significant and demonstrable positive effect in terms of sustaining the social and economic well-being of the local regional and national community.
- 22.8 We accept that RDRML has given extensive and robust consideration to assessing the risk of dam breach, including thorough identification of those risks and ensuring those risks are appropriately avoided, remedied and mitigated by insuring investigation, design, construction monitoring operations and maintenance of dam structures meets and is undertaken in accordance with appropriate guidelines. Also in the event of a dam failure we are satisfied RDRML has provided sufficient evidence to understand the effects of such a dam breach along with the

means by which such effects can be appropriately mitigated and remedied.

- 22.9 We accept that the proposal will have some effects on the environment. However in our view, RDRML has demonstrated through its evidence, through both utilisation of management plans and proposed conditions how those effects can be appropriately avoided, remedied or mitigated as far as practicable.
- 22.10 Overall it is our decision the proposal aligns well with, and is broadly consistent with, the relevant objectives and policies of the NPSFM, the NPSREG, the CRPS, the LWRP, the ADC plan and finally and importantly the WCO.

23 LAPSING AND DURATION OF CONSENTS

- 23.1 Ms Hamm in her reply following reference to Environment Court decisions noted the scale and importance of the can link to the need and justification for longer lapse periods.
- 23.2 In this case she said the scale and importance of the project supports a longer lapse. Also she said some of the drivers for the KSF will take a slightly longer period to manifest themselves. Here she was talking of climate change impacts, the increase in minimum flows in the Ashburton River (2033) and the time required for any supply to South Canterbury to eventuate.
- 23.3 Insofar as the CRC consents are concerned Ms Ford pointed to policy 4.74 of the LWRP noting that policy seeks to limit durations to periods not exceeding 15 years except in the case of regionally significant infrastructure. She agreed as we do that the KSF can be classified as regionally significant infrastructure. Taking into account that factor plus the likely lifetime of the KSF dam structures she recommended that all CRC consents be granted for a duration of 35 years. For the reasons both she and Ms Hamm advance we agree.
- 23.4 Turning to lapse dates Ms Ford after referring to policy 4.73 of the LWRP recommended a 15 year lapse date for all of the CRC consents given the scale and significance of this proposal and recognising that the project may need to take place in stages. We agree for those same reasons.
- 23.5 Initially Mr Boyes recommended a 10 year lapse for the ADC land use consents. Ultimately taking into account the scale of the project, the need for detailed design work involved in the subsequent building consent process particularly in relation to the KSF he recommended a 15 year lapse which we agree with for the reasons he advances.
- 23.6 RDRML initially proposed a lapsing period of five years for the new Fish Screen. Feedback from submitters prompted RDRML to reduce the lapsing period from five to three years and then 30 months through the course of the hearing. We agree with the applicant that a 30 month lapse period is appropriate, as it provides certainty that the screen will be built promptly, while also providing sufficient time for a project of its scale to be completed. Condition six CRC182542 provides for the 30 month lapsing period.

24 DECISION

- 24.1 The CRC and ADC received applications from RDRML for a suite of resource consents relating to the publicly notified proposal for resource consents CRC170651-CRC170662 and LUC16C/0067 and LUC17/0122 to construct, use and maintain the Klondyke Storage Facility and associated Fish Screen.
- 24.2 Pursuant to the powers delegated to us by the CRC and ADC and for all of the above reasons and pursuant to sections 104, 104B, 104D, 105, and 107 of the Resource Management Act 1991, we GRANT to Rangitata Diversion Race Management Limited the following consents:

CRC170651 – a land use consent for earthworks on the lower terrace, adjacent to the Rangitata River, to create a six hectare ecological refuge comprising of one hectare of lizard habitat, two hectares of native planting and three hectares of constructed wetland; and earthworks to construct the gully race, drop structure for the white water course and the river outlet channel subject to the conditions set out in Appendix 4 attached to and forming part of this decision.

CRC170652 – a land use consent for earthworks to construct the 53 million cubic metre storage pond; to upgrade part of the Rangitata Diversion Race (RDR) Canal; and to construct a 460 metre long fish bypass channel subject to the conditions set out in Appendix 5 attached to and forming part of this decision.

CRC170653 – a land use consent to disturb, and to remove vegetation from, the bed of the Rangitata River for the purposes of constructing a sluice outlet and fish bypass channel subject to the conditions set out in Appendix 6 attached to and forming part of this decision.

CRC170654 – a water permit to abstract an additional 10 cumecs from the Rangitata River, when the flows exceed 142.6 cumecs (as measured at Klondyke). The additional abstraction will be used to fill the storage pond and to provide supply to the RDR subject to the conditions set out in Appendix 7 attached to and forming part of this decision.

CRC170655 – a water permit to take and use surface water at a rate not exceeding 0.5 cumecs from the Rangitata Diversion Race canals for construction purposes (i.e. dust suppression) subject to the conditions set out in Appendix 8 attached to and forming part of this decision.

CRC170656 – a water permit to take groundwater for dewatering purposes. Dewatering will only be required on the lower terrace where earthworks are being undertaken to create the ecological habitat subject to the conditions set out in Appendix 9 attached to and forming part of this decision.

CRC170657 – a water permit to dam up to 53 million cubic metres of water outside of the riverbed subject to the conditions set out in Appendix 10 attached to and forming part of this decision.

CRC18147 – a water permit to dam water in the modified RDR canal subject to the conditions set out in Appendix 11 attached to and forming part of this decision.

CRC170659 – a discharge permit to discharge contaminants to air from the combustion of diesel from a generator during construction subject to the conditions in Appendix 12 attached to and forming part of this decision.

CRC170660 – a discharge permit to discharge construction- phase stormwater and dewatering water to land via sediment retention ponds and soakage pits, subject to the conditions in Appendix 13 attached to and forming part of this decision.

CRC170662 – a discharge permit to temporarily discharge water and sediment in the Rangitata River as a result of the works to be undertaken under resource consent CRC170653 subject to the conditions set out in Appendix 14 attached to and forming part of this decision.

CRC182535 - to discharge water from the take authorised under CRC182536 and suspended sediment to the river via the fish bypass return subject to the conditions set out in Appendix 15 attached to and forming part of this decision.

CRC182536 - For a non-consumptive take of up to 5 cumecs of water from the Rangitata River associated with the operation of a fish screen subject to the conditions set out in Appendix 16 attached to and forming part of this decision.

CRC182537 - to disturb the bed of the Rangitata River for the construction of the fish bypass outlet subject to the conditions set out in Appendix 17 attached to and forming part of this decision.

CRC182538 - to temporarily discharge sediment to the Rangitata River as a result of the construction and maintenance of the fish bypass outlet subject to the conditions set out in Appendix 18 attached to and forming part of this decision.

CRC182539 - to extract gravel for the construction and periodic maintenance of the fish bypass outlet subject to the conditions set out in Appendix 19 attached to and forming part of this decision.

CRC182540 - to use land for earthworks over an aquifer subject to the conditions set out in Appendix 20 attached to and forming part of this decision.

CRC182541 – the emergency discharge of water to the Rangitata River subject to the conditions set out in Appendix 21 attached to and forming part of this decision.

CRC182542 - to change conditions of CRC011237 to enable an alternative fish screen design consisting of a Mechanical Rotary Fish Screen to be used subject to the conditions set out in Appendix 22 attached to and forming part of this decision.

CRC182631 - to use water under CRC170654 for storage, irrigation and stockwater purposes, and to generate electricity at Montalto and Highbank Power Stations subject to and included in

the conditions set out in Appendix 7 attached to and forming part of this decision.

LUC16/0067: *The construction and operation of a substantial water storage facility of no greater than 53Mm³ capacity, including a new spillway/sluicing channel back to the Rangitata River. The Proposal will result in the localised widening and raising of the canal embankments. The area of the existing RDR affected by the proposed works is, in broad terms, from the Klondyke intake to the proposed water storage facility subject to the conditions set out in Appendix 23 attached to and forming part of this decision.*

LUC17/0122: *To construct and operate a new mechanical rotary fish screen on land that is zoned Rural B. This includes the construction of the fish bypass return on the bed of the Rangitata River and within the 20-metre setback; and the upgrading of a utility structure exceeding the rural zone and geoconservation area earthworks standards subject to the conditions set out in Appendix 23 attached to and forming part of this decision.*

24.3 Pursuant to Section 108 RMA, the grant of consents is subject to the conditions specified above and as set out at Appendices 4 to 23 of this decision, which conditions form part of this decision and consent.

24.4 On the basis that consent has either been withdrawn or is no longer required, we DECLINE the following consents:

CRC170661 – *a discharge permit to discharge water and sediment from the storage pond to the Rangitata River via a sluicing channel / emergency spillway (withdrawn).*

CRC182630 - *to use water for storage (not required)*

CRC170658 – *a discharge permit to discharge dust to air from construction activities (not required)*

DECISION DATED AT CHRISTCHURCH THIS 6TH DAY OF JULY 2018

Signed by:

**Paul Rogers
(Chair)**



**Yvette Couch-
Lewis**



Greg Burrell

