

## Report to Decision Maker

**Report to Decision Maker:** Lou Sanson, Director-General, Department of Conservation

**Applicant:** Hawke's Bay Regional Investment Company Limited

**Permission Record Number:** 40030-OTH

**File:** PAC 23 24 02

The purpose of this report is to provide a thorough analysis of the application and its effects within the context of the Freshwater Fisheries Regulations 1983, and to make recommendations to the decision maker.

### 1.0 Summary of proposal

- 1.1 Information about the Applicant:** The Applicant is Hawke's Bay Regional Investment Company Limited ("HBRIC"), which is a Hawke's Bay Regional Council controlled organisation established to own and manage key infrastructure assets and investments within the region. For the purposes of the Local Government Act 2002, HBRIC is classified as a council-controlled trading organisation.
- 1.2 HBRIC took over responsibility for the Ruataniwha Water Storage Scheme ("RWSS") after the feasibility study of the project was completed in late 2012.
- 1.3 Should the RWSS progress further, it is expected that HBRIC will become a partner with other investors in the construction and ownership of the project.
- 1.4 Type of authority sought:** Dispensation and Approval under the Freshwater Fisheries Regulations 1983.
- 1.5 Term sought:** undefined, with a 10 year lapse period.
- 1.6 The Applicant has not requested a specific term for the dispensation/approval, nor is there one set out in the Freshwater Fisheries Regulations 1983 ("FFR 83"). For this reason, no term is defined.
- 1.7 It is noted that the Resource Management Act 1991 ("RMA 91") provides a default lapse period of 5 years for consents, which has been extended to 10 years on the RWSS consents due to the scale and complexity of the project. That being the case, under s125 of the RMA 91, the Applicant must have "given effect" to the consents within 10 years.
- 1.8 Regulation 44(4) of the FFR 83 provides that approvals shall expire 3 years from the date of issue, "if the construction of the dam or diversion structure is not completed". This "lapse" period can be extended at the Director-General's discretion.
- 1.9 It is recommended that this period be extended to 10 years for any approvals granted in this instance, as this aligns with the relevant resource consents.
- 1.10 Timeframe for decision:** The regulations stipulate a timeframe of six months from receiving all required information for the Director-General's decision. The Department of Conservation ("DOC", "the Department") considers that the timeframe of 6 months started on

19 February, being the date it received the further information from the Applicant on 19 February.<sup>1</sup> This means a decision is required by 19 August 2015.

- 1.11 Description of the proposed activity:** The Applicant has applied for dispensation from a requirement for fish passage under the FFR 83. In its application letter of 11 November 2014, it is noted that “in collaboration with DOC and the other interested persons, it has been concluded that the proposed Makaroro Dam will not provide sufficient fish passage in order to gain approval from the Director-General, hence a dispensation is sought”.
- 1.12 The Applicant also notified the Department of fish screening requirements as per the conditions of consent for upstream and downstream water intake structures (NSP 13/02.005 (upstream water intake diversion and take) and NSP 13/12.007 (downstream water intake diversion and take) which are fish facilities as per regulation 43 of the FFR 83. Notification of these facilities is given as per regulation 43(2).
- 1.13 The application is considered in the context of the construction, operation and maintenance of the proposed Makaroro Dam (“the dam”), and its associated structures and reservoir, collectively referred to as the RWSS.
- 1.14 The RWSS involves the construction of an 83m high dam to store approximately 90 million cubic metres of water for the irrigation of the Ruataniwha Plains and Papanui Basin Area in the Central Hawke’s Bay Region. The dam is proposed to be located in the upper Makaroro River, and will include part of the Ruahine Forest Park. It is envisaged that this dam will harvest winter and other high flows to provide reservoir supply for between 25,000 and 30,000 hectares of land. A map showing the dam site is attached (refer schedule A to this report).
- 1.15 The reservoir will also supplement flows from the Makaroro River contributing to the wider Tukituki catchment. The RWSS includes a small (6.5MW) hydro-electric power station to be constructed adjacent to the dam.
- 1.16 The dam as described in the application and plans considered by the Board of Inquiry into the Tukituki Catchment Proposal (“BOI”, “the Board”) is for a Concrete Faced Rockfill Dam. The crest of the dam would be 505m long and 8m wide. This will create a surface lake area of 370ha, extending almost 7km upstream of the dam. A concrete lined spillway is to be located on the right hand abutment and unlined auxiliary spillway on the left hand abutment. A concrete intake structure is located within the reservoir and a tunnel (4m in diameter) would run through existing ground beneath the dam. The design of this structure is likened to the Opuha Dam on the Opuha River in South Canterbury.
- 1.17 The Applicant noted upon review of this report that: “Under condition 24 of Schedule One of the resource consents as approved by the Board of Inquiry (refer discussion of Board of Inquiry process below) variations to that design that are not materially greater or different in effects and which meet or exceed the relevant specified engineering design standards can be approved after completion of a certification process. The dam structure and related diversion tunnel, spillway and power station structures must be located within the area shown on Plan 3 in Schedule Four of the RWSS Resource Consent Conditions. This application for dispensation and approval under the freshwater fisheries regulations has been assessed on that basis.”
- 1.18 The Department accepts this insertion.
- 1.19 To mitigate the effects of the dam, (noting the effects of the footprint of the dam and the reservoir on the natural environment are irreversible changes to the natural environment), the Applicant proposed the following:

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<sup>1</sup> We consider that to be the correct start date, rather than the date that the second set of requested information was received, because DOC requested the second set of information well outside the 28 days stipulated for such requests under Regulation 43(3).

- Mitigation and offsetting including removal of barriers to fish migration in surface water bodies in the Tukituki and Heretaunga Plains catchments, riparian planting, spring-fed stream enhancement and priority sub-catchment phosphorus management, collectively referred to as the Integrated Mitigation and Offset Approach (“IMOA”).
  - As part of the IMOA, a trap and transfer regime for native migratory fish, facilitating movement for species both above and below the dam structure.
- 1.20 The Applicant submits that the IMOA offered will be more effective than an alternative fish facility option (such as an engineered fish pass or canal).
- 1.21 The IMOA was considered by the BOI during the Environmental Protection Authority (“EPA”) resource consent process, and approved by the Board in June 2014.
- 1.22 Board of Inquiry Process:** This application is for dispensation and approval under the FFR 83; however, the Applicant relies on the BOI process and decisions to support this application. For this reason, it is appropriate to provide background as to the BOI process.
- 1.23 The Tukituki Catchment Proposal was referred to the BOI by the Minister for the Environment and the Minister of Conservation on 5 June 2013. This proposal considered a proposed plan change (PC6),<sup>2</sup> 17 resource consent applications relating to the RWSS, and a Notice of Requirement.
- 1.24 PC6 considered the management of the wider catchment in terms of water quantity and quality, and so is not relevant to the question of fish passage past a dam. The Notice of Requirement is likewise not relevant to the question of fish passage, as it relates to the distribution of water through the RWSS.
- 1.25 For the purposes of this report, five of the resource consent applications (and the conditions imposed on them relating to fish passage) are relevant. The five consents relevant to this application enable the Applicant to build and operate the RWSS, i.e. the dam and irrigation system.
- 1.26 The Department made a “neutral” submission to the BOI<sup>3</sup>. It did not submit on any substantive matter (for example, effects on fish passage); nor did it present evidence. The submission noted that: “...in addition to any approval under the RMA the applicant still needs to either obtain an approval or a dispensation under [the FFR 83]”.
- 1.27 Appeals on a limited aspect of the BOI decision relating to the plan change were allowed in the High Court. The BOI has reconsidered this discrete aspect and issued a draft decision (dated 28 April 2015). This decision does not affect any parts of the RWSS conditions that relate to fish passage. A final report in relation to matters referred back to the Board by the High Court, dated 25 June 2015, has now been issued.
- 1.28 Other Approvals required by the Applicant:** To provide wider context to this application, it is noted that the application for dispensation and approval under the FFR 83 is one of a number of approvals sought by the Applicant as part of the RWSS. The Applicant is also working through a land exchange application with the Department, and is likely to require a concession for access over Public Conservation Land as the inundated land will affect access to an area of Crown Forest Land.
- 1.29 In addition, Section 26ZM of the Conservation Act 1987 (“CA 87”) provides that no person shall transfer live aquatic life except in accordance with the section. This section requires prior approval from the Minister of Fisheries for the movement of live aquatic life between sites where species already exist; and the prior approval of the Minister of Conservation for the transfer to any water managed / administered under the CA 87.

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<sup>2</sup> Hawke’s Bay Regional Resource Management Plan.

<sup>3</sup> “Submissions for the Director-General of Conservation” 6.12.13.

1.30 We have alerted the Applicant to the potential requirement for further approval in terms of section 26ZM(3). This is because a small portion of the proposed reservoir site is Public Conservation Land. As noted above, at para [1.28], the Applicant has sought to exchange this land for other land. If this application succeeds there will be no need for approval under section 26ZM(3) from the Minister of Conservation. In any case, no approval has been sought at this stage.

**1.31 Decisions to be made:** The application letter (11 November 2014) sought “dispensation from a requirement as to fish passage”. The letter also gave notice of the fish screening measures at the upper and lower water intakes. Upon review of the application and the FFR 83, the Department has formed the view, communicated to the Applicant, that the application in fact requires the following decisions:

- Whether to require that the upstream water intake structure include a fish facility (fish screen), and if so, what conditions to specify. This decision will also be expressed as whether the Director-General approves the fish facility proposed by HBRIC.
- Whether to require that the downstream water intake structure include a fish facility (fish screen), and if so, what conditions to specify. This decision will also be expressed as whether the Director-General approves the fish facility proposed by HBRIC.
- Whether to require that the dam include a fish facility in the form of a “trap and transfer” system and if so, what conditions to specify. (We consider that the “trap and transfer” system is a “fish facility” - within the definition in the Regulations.) This decision will also be expressed as whether the Director-General approves the fish facility proposed by HBRIC.
- Whether to require that the dam include a further fish facility (and if so, what conditions to specify), or, put another way, whether to grant a dispensation from any further requirement for a fish facility.

## **2.0 Information available for consideration**

### **2.1 Information received:**

#### 2.1.1 From Applicant:

The Applicant submitted their application and supporting information on 11 November 2014, which can be seen at the following links:

- Letter accompanying application: <dme://docdm-1514451/>;
- Application: <dme://docdm-1514450/>;
- Aquatic Ecology Assessment, Cawthron Institute (May 2013): <dme://docdm-1515801/>;
- Integrated Mitigation and Offset Approach Report, HBRIC (May 2013): <dme://docdm-1515815/>;
- Schedule Six to the approved RWSS resource consent conditions (IMOA Projects): <dme://docdm-1515817/>;
- Project Description, Tonkin & Taylor (May 2013): <dme://docdm-1515859/>;
- Environmental Flow Optimisation, Aquanet (May 2013): <dme://docdm-1515814/>;
- Expert Conferencing Joint Witness Statement to the Board of Inquiry – RWSS Effects on Aquatic Ecology (28 October 2013): <dme://docdm-1515816/>; and
- Statement of Rebuttal Evidence of Roger Graeme Young: <dme://docdm-1515818/>.

#### 2.1.2 From Iwi:

The Applicant notes that as part of the Tukituki Catchment Proposal, comprehensive community engagement was undertaken prior to lodging the resource consent applications for the project. The Applicant worked closely with the Mana Whenua Working Party on the development of the IMOA.

The District Office recognised the degree of consultation that has been undertaken by the Applicant on the wider RWSS project.

The Department also undertook consultation in accordance with its section 4 obligations.

The consultation undertaken by the Applicant as well as by the Department is further discussed at section 4.0 to this report.

#### 2.1.3 From DOC staff (including Partnerships, technical):

Comments from District Office: the Napier District Office were invited to comment on the application, and their response can be seen in full at <dme://docdm-1515870/>.

These comments note that fish passage is impractical given the specifications of the proposed structure. The Conservation Services Manager notes that mitigation measures regarding fish facilities had been discussed at length prior to the submission of the application. The District Office supported the trap and transfer option for eels but not for other species, and instead suggested barrier removal options.

Comments from Freshwater Technical Advisor: the Freshwater Technical Advisor was asked to review the application, noting any deficiency in information requiring further clarification from the Applicant. The comments can be seen in full at the following link: <dme://docdm-1526624/>.

This assessment was undertaken with particular reference to an assessment of the aquatic ecology effects of dam construction, completed by The Cawthron Institute (“the Cawthron Report”, refer <dme://docdm-1515801/> for full copy).

#### 2.1.4 Other Sources:

We have also referred to the Final Report and Decisions of the Board of Inquiry into the Tukituki Catchment Proposal, including the resource consent conditions.

Fish and Game (Eastern and Hawke’s Bay Regions) were invited to comment as per the requirements of Conservation General Policy. This is further set out at section 6.0 to this report.

#### 2.1.5 Further Information:

As per regulation 43(3) of the FFR 83, the Department determined that the information was inadequate, and made a further information request on 8 December 2014. This request can be read in full as follows, <dme://docdm-1529035/>.

HBRIC’s response was received on 19 February 2015, and can be seen at the following links:

- Covering letter: <dme://docdm-1560906/>; and
- Further Information: <dme://docdm-1560907/>.

The Freshwater Technical Advisor was asked to review the information received and provide comments as to whether the information provided was sufficient, as well as whether the information aligned with the Board of Inquiry report. This can be seen at the following link: <dme://docdm-1568104/>.

Subsequent to the review of all of the information received, the Department required clarification of the alternatives considered by the Applicant in regards to fish passage. The Department’s information request can be read in full at the following link: [Letter to HBRIC 08.06.15](#).

The Applicant’s response can be seen at [Further Information from HBRIC 18.06.15](#).

The Freshwater Technical Advisor reviewed this information and his comments are incorporated in this report.

This further information is discussed and analysed at section 3.0 of this report.

### **3.0 Analysis of proposal (Freshwater Fisheries Regulations 1983)**

#### **3.1 Relevant statutory provisions**

##### 3.2 Conservation Act

3.2.1 Section 6(ab) of the CA 87 provides that a function of the Department is to preserve so far as practicable all indigenous freshwater fisheries and protect recreational freshwater fisheries and freshwater fish habitats.

“Preservation” is defined in s 2 of the Act, in relation to a resource, as “the maintenance, so far as is practicable, of its intrinsic values”.

“Protection” is defined, in relation to a resource, as “its maintenance, so far as is practicable, in its current state; but includes—

- (a) its restoration to some former state; and
- (b) its augmentation, enhancement, or expansion”.

3.2.2 The “preservation” function therefore applies only to *indigenous* fisheries, and the “protection” function includes *non indigenous* recreational fisheries (including trout.)

##### 3.3 Freshwater Fisheries Regulations 1983

3.3.1 The current application is made under the FFR 83.

3.3.2 The relevant regulations are set out as follows (with emphasis given in bold to the words indicating the decisions required by the Director-General):

#### **“43 Dams and diversion structures**

(1) **The Director-General may require** that any dam or diversion structure proposed to be built include a fish facility: provided that this requirement shall not apply to any dam or diversion structure subject to a water right issued under the provisions of the Water and Soil Conservation Act 1967 prior to 1 January 1984.

(2) Any person proposing to build such a dam or diversion structure shall notify the Director-General and forward a submission seeking the Director-General’s approval or dispensation from the requirements of these regulations, shall supply to the Director-General such information as is reasonably required by the Director-General to assist him in deciding his requirements (including plans and specifications of the proposed structure and any proposed fish facility).

#### **44 Requirement for a fish facility**

(1) **If, in the opinion of the Director-General, a fish facility is required or dispensation from such a requirement is acceptable, the Director-General shall** as soon as practical but in no case longer than 6 months if a fish facility is required from the date of receiving all information required, or 3 months where a fish facility is not required from the date of receiving all information required, **forward his written requirement or dispensation to whomsoever made the submission.**

(2) **Where in the opinion of the Director-General a fish facility is required he shall specify what is required to enable fish to pass or stop the passage of fish, and while not limiting this general requirement may specify—**

- (a) the type, general dimensions, and general design of any fish pass to be utilised:
- (b) the type, general dimensions, general design, and placement of any fish screen utilised.

- (3) Subject to the [Resource Management Act 1991](#) and any determination under that Act, **the Director-General may specify—**
- (a) the type and placement of any water intake to be utilised where fish screens are not required;
  - (b) the flow of water through any fish pass and the periods of the day and year when the pass must be operational;
  - (c) the volume, velocity, and placement of additional water to attract migrating fish to any fish pass;
  - (d) the type and scope of any remedial works in connection with any fish screen or fish pass to enable fish to approach the structure or to be returned to the normal course of the water channel;
  - (e) the volume or relative proportion of water that shall remain downstream of any dam or diversion structure and the period of day or year that such water flows shall be provided.
- (4) Every approval given by the Director-General shall expire 3 years from the date of issue if the construction of the dam or diversion structure is not completed, or such longer time as he may allow.
- (5) The manager of every dam or diversion structure in connection with which a fish facility is provided shall at all times keep such fish facility in good and satisfactory repair and order, so that fish may freely pass and return at all times or are prevented from passing as specified under these regulations.”

#### 3.4 Legal Test when considering whether to impose requirements/grant dispensation

- 3.4.1 It is important to note that the focus for the regulations is quite narrow.<sup>4</sup> The fish passage aspects of the regulations relate solely to the effects of the dam on fish passage and the imposition of a requirement for a fish facility and associated “specifications” to enable fish passage. The regulations do not give the Director-General the power to grant or decline permission to build the dam. He is not deciding whether the dam will or will not promote the conservation of freshwater fish. The regulations effectively require the Director-General to take the presence of the dam as a ‘given’ and then consider what requirements should be made for fish passage.
- 3.4.2 Unlike, for example, a concession application under the CA 87, the FFR 83 provide little guidance as to the test to apply when considering applications under the Regulations.
- 3.4.3 The FFR 83 are deemed to be administered under the CA 87. Therefore, the purpose of the CA 87, and the Department’s specific fisheries function (set out above), must guide decisions under the FFR 83. The test to be used in this instance is as follows:

In order to achieve the Department’s purposes and functions of:

- promoting and conserving New Zealand’s natural and historic resources;  
and
- preserving indigenous freshwater fisheries and protecting recreational freshwater fisheries and freshwater fish habitats

should the Director-General require a fish facility, or is it acceptable to grant a dispensation, taking into account the practicalities of installing a fish facility and any offsets and mitigation measures?

- 3.4.4 In making this determination, the Director-General should consider the trap and transfer system proposed by the Applicant and the additional IMOAs offsets and mitigations where these are relevant to the effects on fish passage as a result of the dam.

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<sup>4</sup> *Re Auckland Regional Council* [2002] NZRMA 241 (EC), at para [51].

- 3.4.5 As the FFR 83 are administered by the Department, section 4 of the Conservation Act applies to the application.<sup>5</sup> Therefore in making his decision the Director-General must give effect to the principles of the Treaty, (to the extent that the FFR 83 are not clearly inconsistent with the principles). Please refer to section 4.0 of this report for this analysis.
- 3.4.6 Further, the statutory planning documents are relevant (in this case the Conservation General Policy (“CGP”) and the Hawke’s Bay Conservation Management Strategy (“CMS”). This is because section s17A of the CA 87 provides that the Department is to administer and manage all conservation areas and natural and historic resources in accordance with statements of general policy, conservation management strategies, conservation management plans, and freshwater fisheries management plans. Given the Department’s freshwater fisheries functions (section 6(ab)), and the definition of natural resources (which includes “plants and animals of all kinds”), we consider that the CGP and the CMS are relevant documents, even though the proposed dam site is not public conservation land. Please refer to section 5.0 of this report for analysis of relevant provisions of the CGP and CMS.

### 3.5 Sufficiency of Information

- 3.5.1 The details of further information sought and received are set out in Schedules B – D of this report and in HBRIC’s letter of 18.06.15. Some information was not provided; this is because it is unavailable at this time. Most significantly, the specific, technical details of the trap and transfer system were not provided as they do not exist at this point. The Applicant has advised<sup>6</sup> that the details of the trap and transfer will not be available until the “detailed trap and transfer plan” is developed.<sup>7</sup> (This will not occur within the 6 months timeframe required for the Director-General to make a decision on this application).
- 3.5.2 An option would have been for the Department to recommend to the Director-General that there was insufficient information to make a decision on the trap and transfer aspect of the application. However, the Department considers that there is sufficient information to require what a trap and transfer system should achieve. The lack of detailed information can be dealt with by way of requiring the Applicant to submit final designs for certification.
- 3.5.3 The Director-General reserves the right to determine that the information provided is insufficient to make a decision. This option is presented at section 10.0 of this report.

### 3.6 Effects of Dam

#### 3.7 Effects on Fish Passage

- 3.7.1 The Cawthron Report (referred and linked at para [2.1.1] above) was commissioned by the Applicant to review the values of the Tukituki catchment and the state of the existing environment, and to provide an assessment of effects on aquatic ecology as a result of the scheme as well as identifying mitigation and monitoring options. The Cawthron Report noted that the proposed dam will represent an obstruction to upstream fish migration in the Makaroro River. Unless measures are taken to assist this migration, migratory native fish will be lost from the fish community upstream of the dam. Assessment of the application by the Freshwater Technical Advisor notes there will also be effects downstream as the same species may not be able to reach their preferred habitats as a result of the dam.
- 3.7.2 In the BOI process, the question of fish passage was raised by witnesses for EDS, Ngāti Kahungunu Iwi Incorporated, Fish and Game, Forest and Bird and Hawke’s Bay Environmental Water Group. These concerns can be summarised as follows, as taken from paras [1023] – [1024] of the BOI Report: decline of local fish populations; reservoir forming

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<sup>5</sup> *Ngāi Tahu Maori Trust Board v Director-General of Conservation* [1995] 3 NZLR 553 (CA), p 558. (Although this case referred to the Marine Mammal Protection Regulations 1992 we consider the same principle, i.e. that section 4 of the CA applies, would apply here.)

<sup>6</sup> In the further information provided on 19.2.15, and for example, specifically in response to query 6.5(e) of the Department’s further information request.

<sup>7</sup> HBRIC refers to a “trap and transfer plan”: there is no requirement for this in the resource consent conditions.



poor environment for native fish deprived of their upstream riverine environment; removal or reduction of riverine habitat for riverine specialist species, including eels; movement of trout into previously uninhabited areas; creation of suitable habitat for pest fish; increasing transit time for fish larvae to travel downstream, thereby increasing their chances of starvation or predation; potential death of a significant percentage of downstream migrating larvae when going through or over the dam; and the potential for death of downstream migrating eels. One expert for EDS considered there would be negative effects on trout, while the expert for Forest and Bird, Hawke's Bay Environmental Water Group and Ngāti Kahungunu Iwi Incorporated considered it could result in the movement of trout to previously uninhabited areas.

- 3.7.3 The BOI considered evidence from both the Applicant and those in opposition, and determined that the effects arising from the dam would be more significant closer to the dam site, whereas the effects downstream of the Waipawa and Tukituki confluences would be much less significant. All of the experts who presented at this hearing agreed that without any mitigation the dam will block upstream movement of all fish and reduce downstream movement.<sup>8</sup> Five of the eight experts who commented on this point agreed that the proposed trap and transfer regime is the best mitigation option. All the experts agreed there was considerable uncertainty about the efficacy of the trap and transfer.
- 3.7.4 The Board's commentary in regards to the trap and transfer regime predominantly focuses on the evidence of Dr Roger Young (who prepared the Cawthron report, with others, on behalf of the Applicant) and Dr Mike Joy (representing Forest and Bird, Hawke's Bay Environmental Water Group and Ngāti Kahungunu Iwi Incorporated). These two experts are quoted at para [1028] of the BOI Report as follows: "Dr Joy thought that the trap and transfer method might only produce a 50% efficacy in successfully getting fish past the dam (either up or down). Dr Young rated the prospects of maintaining the full range of native fish species currently found upstream of the dam as low to medium." The Cawthron Report provides that a higher level of effectiveness is expected for the strongest migrants (e.g. longfin eels) (p 173).
- 3.7.5 Based on this advice the Board noted that the blocking of fish passage by the dam was a serious adverse effect which could not be fully mitigated by the trap and transfer process alone. The Board also considered Dr Joy's evidence that "68% of New Zealand's native fish are currently listed as threatened, and loss of habitat and water quality impacts are a major cause of their heightened threat status" (refer para [1029] BOI Report).
- 3.7.6 The Board also considered the effects of the reservoir. The creation of the reservoir will result in the loss of approximately 7km of riverine habitat. The Board accepted that some of the fish species currently found in the habitat will be able to use the reservoir. Others, such as torrent fish, bluegill bully, redfin bully, Cran's bully, and dwarf galaxias are unlikely to survive in the reservoir and will be lost. The Cawthron Report states that a trout population of between 1000-2000 adult fish is likely to develop in the reservoir and support a full season fishery. The Board accepted evidence that it is likely that some of the juvenile trout would successfully pass downstream and make a substantial contribution to the fishery in the Waipawa and Tukituki Rivers.
- 3.8 Effects on native fish populations
- 3.8.1 The Cawthron Report noted that New Zealand has a relatively small native fish population, made up of only 38 species. This is partly due to geographic isolation, but also due to geological history. Of the 38 species, 18 are diadromous (meaning that they migrate between the sea and freshwater to complete their lifecycle), making access between the water types essential. The other 20 species are non-migratory, but often need to travel reasonable distances within freshwater systems.
- 3.8.2 The distribution of native fish in the Tukituki catchment was reviewed through existing presence/absence data, spatial database predictions and field sampling (for specifics, refer to pg 44 of the Cawthron Report).

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<sup>8</sup> Expert Conferencing Joint Witness Statement to the Board of Inquiry – RWSS Effects on Aquatic Ecology, dated 8.10.13.

### 3.8.3 The species present in the Tukituki catchment are set out in the following table:

Table 10. Fish species recorded in the Tukituki catchment between 1965 and 2011 and their national threat classification (Allibone *et al.* 2010). Data were derived from the New Zealand Freshwater Fish Database (NIWA) and from 2011 field sampling by Cawthron. \* = these species are often found in brackish and estuarine habitats. u / s = upstream.

Common name	Scientific name	Threat classification	Migratory	Number of entries in NZFFD		
				Tukituki catchment	u / s Waipawa / Tukituki confluence	Makaroro catchment
Longfin eel	<i>Anguilla dieffenbachii</i>	Declining	Y	83	40	19
Rainbow trout	<i>Onchorhynchus mykiss</i>	Introduced and naturalised	Y	66	31	25
Dwarf Galaxias	<i>Galaxias divergens</i>	Declining	N	62	37	24
Torrentfish	<i>Cheimarrichthys fosteri</i>	Declining	Y	59	35	22
Common smelt	<i>Retropinna retropinna</i>	Not threatened	Y	36	11	5
Cran's bully	<i>Gobiomorphus basalis</i>	Not threatened	N	31	15	4
Common bully	<i>Gobiomorphus cotidianus</i>	Not threatened	Y	26	5	2
Shortfin eel	<i>Anguilla australis</i>	Not threatened	Y	22	9	3
Inanga	<i>Galaxias maculatus</i>	Declining	Y	14	-	-
Bluegill bully	<i>Gobiomorphus hubbsi</i>	Declining	Y	10	4	3
Brown trout	<i>Salmo trutta</i>	Introduced and naturalised	Y	8	7	1
Redfin bully	<i>Gobiomorphus huttoni</i>	Declining	Y	6	2	2
Goldfish	<i>Carassius auratus</i>	Introduced and naturalised	N	5	-	-
Upland bully	<i>Gobiomorphus breviceps</i>	Not threatened	N	4	2	-
Koaro	<i>Galaxias brevipinnis</i>	Declining	Y	2	2	-
Yelloweye mullet	<i>Aldrichetta forsteri</i>	Not threatened	Y*	2	-	-
Lamprey	<i>Geotria australis</i>	Declining	Y	2	-	-
Giant bully	<i>Gobiomorphus gobioides</i>	Not threatened	Y	2	-	-
Grey mullet	<i>Mugil cephalus</i>	Not threatened	Y*	2	-	-
Black flounder	<i>Rhombosolea retiaria</i>	Not threatened	Y*	2	-	-
Koura	<i>Paranephrops planifrons</i>	Not threatened	N	41	18	4
Total number of species recorded (incl. koura)				21	14	12

3.8.4 This table, as taken from page 47 of the Cawthron Report, notes a relatively high diversity of native fish in the Tukituki catchment, but it is also noted in the Report that this would be similar to other catchments draining to the East Coast of the North Island. It is further noted that of the 18 species identified in the catchment, 8 are considered to be declining according to the latest threat classification.

3.8.5 In terms of populations above the dam, 10 species are identified, 9 of which are native, as per the table below. Of the 9 native species, 7 are diadromous and require free migratory access to and from the sea past the dam. The Cawthron Report notes that it is unlikely that these 7 species would develop self-sustaining populations above the dam and therefore would be lost over time without mitigation measures. Of the 9 species, it is believed that dwarf galaxias and Cran's bully would likely maintain a self-supporting population upstream of the dam.

3.8.6 The table below, prepared by the Department, provides further information on these species and the effects on populations in the event no mitigation of the effects of the dam was undertaken.

Common name	Scientific Name	Migratory	Threat status?	Effect of dam without mitigation?
Longfin eel	<i>Anguilla dieffenbachii</i>	Y	Declining	Upstream of the dam the population would age as there would be no recruitment from new migrants. Eventually this is likely to lead to a loss of longfin eels from upstream of the dam.
Torrentfish	<i>Cheimarrichthys fosteri</i>	Y	Declining	The torrentfish population upstream of the dam would be lost as they are unable to establish landlocked populations.
Dwarf galaxias	<i>Galaxias</i>	N	Declining	Dwarf galaxias are non-migratory and would

	diverfens			therefore not be directly affected by the loss of fish passage. However, indirectly, the likely increase in populations of rainbow trout and Koaro would increase predation on Dwarf galaxias.
Koaro	Galaxias brevipinnis	Y	Declining	Koaro are migratory but have established land locked populations. If this was to occur in the present case it is expected that predation from rainbow trout would be high.
Cran's bully	Gobiomorphus basalis	N	Not threatened	Non-migratory so fish passage is not a large issue. However, the population will still be fragmented by the dam. There's a possibility of increased predation rates by rainbow trout.
Common bully	Gobiomorphus cotidianus	Y	Not threatened	Common bullies can establish landlocked populations so it is possible that a population will become established upstream of the dam. However, it is likely to be affected by increased rates of predation by rainbow trout.
Bluegill bully	Gobiomorphus hubbsi	Y	Declining	The Bluegill bully population upstream of the dam would be lost as they are unable to establish landlocked populations.
Redfin bully	Gobiomorphus huttoni	Y	Declining	The Redfin bully population upstream of the dam are likely be lost as they are unable to establish landlocked populations.
Rainbow trout	Onchorhynchus mykiss	Y	Introduced and naturalised	It is highly likely that a rainbow trout population would establish in the impoundment. This would result in an increase in the proportion of juvenile fish and overall fish numbers resulting in an increase in their predation on other species present upstream of the dam.
Common smelt	Retropinna retropinna	Y	Not threatened	Populations of Smelt have established in landlocked lakes so it is possible that a similar population will establish upstream of the dam. It is highly likely that any such population would suffer from increased rates of predation from rainbow trout.

### 3.9 Effects on trout population and angler opportunities

3.9.1 Both brown and rainbow trout are present in the Tukituki catchment.

3.9.2 Rainbow trout are the dominant trout species and are widespread with an adult population in the Waipawa and Tukituki Rivers and spawning and juvenile populations in the upper Makaroro. While there is little evidence as to migration patterns of rainbow trout most of the mainstream river and headwater tributaries of the Tukituki catchment are thought to provide suitable spawning habitat for rainbow trout.

3.9.3 The proposed dam will prevent the migration of rainbow trout from the adult habitat in the Waipawa and Tukituki Rivers to spawning and juvenile rearing sites in the upper Makaroro. This has the potential to reduce spawning activity in the Makaroro which could impact on juvenile trout recruitment for the Tukituki fishery downstream.

3.9.4 The Cawthron Report (refer para [3.3.4.2] at page 71) states that a self-supporting rainbow trout population is likely to establish in the reservoir. Migration through the turbines is possible, with a predicted success rate of 75-90%, therefore, in the Applicant's opinion, mitigating the effect of the dam.

3.9.5 The Department considers that a self sustaining rainbow trout population will establish upstream of the dam wall altering the current population's size structure and the angling opportunities of the rainbow trout population. This new self-sustaining population of rainbow trout associated with the impoundment will reduce the median trout size while providing year-round angling opportunities. Downstream of the dam, the alterations in the flow and sediment

regime will reduce the suitability of the environment for spawning making this area more reliant on migration of rainbow trout from the newly established population associated with the impoundment. These migration pathways are likely to occur by either the spillway or by passing through the turbines.

- 3.9.6 Brown trout are reported to be largely confined to the mid-reaches of the Tukituki and Waipawa Rivers and various tributaries. They are also known to focus spawning efforts in lowland spring creek tributaries. For these reasons, the Department does not consider that the dam will affect fish passage of brown trout to any significant degree.
- 3.9.7 The population of trout in the catchment has resulted in the Tukituki being regarded as the most popular angling river in the Hawke's Bay region.
- 3.9.8 The Hawke's Bay Fish and Game Council provided their views on effects on trout (and other fish). Please refer to section 6.0 of this report for their comments and the Department's analysis of the comments.

### 3.10 **Fish Passage Options Considered**

- 3.11 The Applicant has noted that other methods of fish passage were considered earlier in the RWSS development process and through the BOI process. Instead of the alternatives considered, the Applicant has presented a trap and transfer system and IMOAs to mitigate or offset the effects on fish passage. They consider these measures will be more effective than any alternative fish facility option, (page 3 of application dated 11 November 2014). The application included the following table, taken from page 167 of the Cawthron Report, analysing options for fish passage.

Mitigation options	Upstream and downstream passage	Construction and operational feasibility	Cultural acceptability M,M,K,K 1 poor, 5 good	Effectiveness	Cost
Do nothing	No	High	1,2,2,1 6/20	Zero	NIL
Off-set mitigation elsewhere in the catchment	No	Medium-High	1,2,2,1 6/20	Low	Medium
Engineered fish pass up dam face	No, upstream only	Medium	1,2,2,1 6/20	Low	Medium-high initial cost. Low operational cost
Trap and transfer programme – upstream passage only	No, upstream only	Low-Medium	1,2,2,1 6/20	Low-Medium	Medium-low initial cost, but ongoing cost.
Trap and transfer programme – upstream and downstream	Yes	Low-Medium	1,3,3,1 8/20	Low-Medium	Medium-High low initial cost, but larger ongoing cost.
By-pass canal to head of reservoir	Unlikely	Low	1,3,3,3 10/20	Low	Very high

<sup>3</sup> Note the rankings are comparable within each criterion only, i.e. they are not comparable between columns. For the cultural acceptability score, M,M,K,K refers to individual scores for the mauri, mahinga kai, kaiakitanga and ki uta ki tai components of the overall score. Table taken from Cawthron report, May 2013, page 167.

- 3.12 The criteria presented can be briefly explained as follows (as taken from pages 165-166 of the Cawthron Report):
- Upstream and downstream passage: whether the mitigation option directly mitigates for obstruction to both upstream and downstream passage.
  - Construction and operational feasibility: the feasibility of implementing the mitigation measure given the physical characteristics of the site, uncertainty with being able to locate, attract and/or catch migrating fish in sufficient numbers, and the difficulty of maintaining ongoing passage as a long-term mitigation measure.
  - Cultural acceptability: the acceptability of the mitigation option for local iwi. This section was determined by one of the members of the Mana Whenua Working Party using a cultural health indicators framework to determine the acceptability of each option in terms of mauri, mahinga kai, kaitiakitanga and ki uta ki tai concepts. Scores of between 1 – 5 were given for each aspect.
  - Effectiveness: the likelihood of successfully meeting the management objective. For the purposes of this evaluation exercise, it is noted that the broad management objective is “maintaining the existing fish community composition upstream of the dam (i.e. providing mitigation for all of the potentially relevant fish species occurring upstream of the proposed dam site)” (refer page 166 Cawthron report).
  - Cost: a qualitative assessment of the long-term design, construction and operational costs associated with each mitigation option.

3.13 Further analysis of the options considered was set out in the Cawthron Report and is summarised as follows:

3.13.1 Do nothing

This is clearly the lowest cost option, however provides no mitigation of any adverse effects identified, therefore was not further considered by the Applicant.

3.13.2 Off-site mitigation

Restoration and enhancement of fish habitat elsewhere in the catchment or region could offset the impacts on migratory fish above the dam. Five projects were identified to act as mitigation<sup>9</sup> (see para [3.38] and Schedule E below for further details):

- a. “restoration and enhancement of habitat around the reservoir and in the catchment upstream of the dam;
- b. enhancement of a halo of riparian zone around the Waipawa and Makaroro rivers;
- c. threatened species habitat enhancement projects both in the affected area and throughout Hawke’s Bay;
- d. enhancement and mitigation of phosphorus loading in spring-fed and priority streams on the Ruataniwha Plains;
- e. restoration of the Old Waipawa River bed / Papanui Stream.”

3.13.3 Engineered fish pass up the dam face

A fish pass is basically described as an “artificial channel that provides access past an obstruction for fish using their own propulsion”. The main advantages of this kind of structure are that fish can use it when they want to, it can potentially cater for multiple species, and it has relatively low operating costs (as compared to the ongoing costs of trap and transfer operations). The initial cost of construction can be relatively high depending of the target species and the required gradient to allow fish passage can result in very long passes, particularly as dam height increases.

Upstream fish passage efficacy tends to be in direct proportion to the size of the dam; at 83m, any fish pass is likely to only work for the strongest climbing migrant species, such as eels and koaro. The time required to negotiate a pass increases with its length, and fish are exposed to elevated water temperature, predation risk, and the risk of desiccation while in the pass and will expend high levels of energy while undertaking it.

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<sup>9</sup> A sixth project, Project F, was introduced to the IMO A at a later date, and, as such, was not analysed by the Cawthron report. Project F includes the removal of barriers to fish passage in the lower Tukituki catchment.

It was also noted that the peak time for migration is summer and autumn where the water level behind the dam is expected to fluctuate over a broad range. Further mechanisms would be required to transfer the fish from the top of the dam to the reservoir on the other side. While fish locks (based on the idea of canal locks) could be used, the same problems as with a fish pass canal are likely to be encountered. The Department queried whether there were any mechanisms that could mitigate these risks, such as pumping water to the top of the dam, or introducing a sluice to conduct fish to the reservoir water level. The Applicant has confirmed that the height of the Makaroro Dam as well as the degree of fluctuation in water levels makes these potential solutions impractical and unlikely to be successful.

Fish passes require the movement of fish over the crest of the dam or alternatively through a tunnel. It is possible to pump water to the top of the dam to flow down a pass, as well as incorporating a sluice to transfer fish to reservoir level. The Applicant notes that the proposed Lee Dam in the Tasman District has incorporated these design features. This is considered possible due to the lesser height and fluctuations in river levels at this site, however HBRIC notes that the 50m height of the Lee Dam still presents difficulty.

The Cawthron Report at page 168 notes that fish passes have been designed and implemented for fish such as eels and other strong swimming species with some success at the Patea Dam. Noting this success, the Department queried why this approach was not also implemented for the Makaroro Dam. The Applicant referred to learnings from the Patea Dam where both a fish pass (comprising a 300m long PVC pipe) and trap and transfer were implemented. In this instance, due to the comparative success of the trap and transfer system as opposed to fish pass, as well as the fact a trap and transfer regime targets a wider range of species, fish passage at the Patea Dam is now focused on an active trap and transfer system.

#### 3.13.4 Trap and transfer (both upstream and downstream)

This was determined by the Applicant to be the most feasible and effective way of managing the effect of blocked fish passage as a result of the height of the dam. This process involves the trapping of fish using attraction flow, guiding fish into a holding box for later (manual or automatic) transfer upstream. The Applicant notes that this approach has been successfully implemented for young eels (elvers) at several dams throughout New Zealand, for example, Karapiro Dam, Patea Dam, Matahina Dam, and Manapouri Lake Control.

One advantage of this method is that it requires relatively low energy expenditure on the part of the fish. There is also the opportunity for species other than eels to be transferred if they are trapped at the capture points of the dam. The likelihood of this occurring could be enhanced through the design of the trap entrance conditions (for instance by changing the slope and substrate on the entrance ramp, or experimenting with a submerged orifice trap entrance, as set out at p 170 of the Cawthron Report).

The success of this process can be enhanced through the determination of the release point. Ideally, fish should be transferred from the river below the dam and released to a river upstream of the dam. A flow helps orientate fish. This helps prevent fish getting lost and can also reduce the risk of predation.

This trap and transfer method can delay migration if transfer is not undertaken promptly and also increase a risk of predation while fish are held in the trap awaiting transfer. The longer fish are held in the trap, the more they are likely to suffer distress, and potentially predation from other fish in the trap. The handling and transfer of fish can also cause stress, injury and potentially mortality. As a result of this risk, any trap and transfer process should be in place, monitored and maintained on almost a continuous basis.

Downstream transfer of koaro is expected to occur through the release of larvae, whether through flow augmentation releases or spilling. On the basis that survival rates for larval fish through the dam structure is high, it is not proposed that a downstream transfer of koaro be entertained. Eels will require downstream transfer of some form, as they tend to migrate downstream as mature (and often large) adults.

While the trap and transfer programme is likely to have lower set up costs than a fish pass, it will require ongoing operation and maintenance for the life of the dam as the effects of the dam on fish passage are ongoing.

Eel migration tends to occur in the Autumn as large adults migrate downstream. Since water would have been drawn from the reservoir over the summer period, the water level is likely to be below the spillway during this migration period. The only way out of the reservoir is then through the outtake pipe and through turbines. Due to the difficulties of downstream migration through the dam, it is suggested that a downstream trap and transfer regime is also implemented to assist fish passage.

The Cawthron Report notes that this option is only evaluated as having low-medium effectiveness; however this is still more than the low effectiveness of the other options considered, ie an engineered fish pass or canal. The Cawthron Report also notes that the effectiveness of this scheme is only low-medium if the goal is to maintain a full range of fish species currently found upstream of the dam. A higher level of effectiveness is expected for the stronger migrants, eg longfin eels. Effectiveness however is less likely for other species.

### 3.13.5 By-pass canal to head of reservoir

This was discussed very early in the development process as the Department enquired as to the possibility of incorporating a by-pass canal from the base of the dam right up to the head of the reservoir, effectively creating a very long fish pass of approximately 5km. This option was discussed further but it was dismissed due to the low practical feasibility.

When queried as to why the feasibility of this option was so low, the Applicant confirmed that the entrenched nature of the gorge was the reason. As stated on page 2 of the further information letter of 18 June, “cutting a low gradient canal in this terrain was not considered to be physically feasible.” The Freshwater Technical Advisor confirmed that fish passes cannot be overly steep, otherwise the flow is too much for the fish.

As an alternative, it was suggested at the BOI hearing by three experts for Ngāti Kahungunu Iwi Incorporated and Te Taiwhenua o Heretaunga that a 7km culvert constructed under the reservoir lake through the dam to the existing river bed could be ‘day lighted’ and designed to allow fish passage. The Applicant noted that this option was briefly discussed at the Freshwater Ecology Expert conference. While acknowledging this suggestion, the Applicant notes that the remaining 5 witnesses (representing the Hawke’s Bay Regional Council/the Applicant, Fish & Game and the Environmental Defence Society) disagreed. The reason it was not considered further was due to the technical challenge of maintaining a free water flow given the water level fluctuations and sediment flows, as well as expected issues in attracting fish to the structure.

3.14 Of the options considered, the Applicant has put a trap and transfer system forward as the best alternative for fish passage, albeit recognising that additional mitigation and offsets are also required.

### 3.15 The Department’s analysis of other fish pass options and recommendation as to whether the Director-General should require such a facility

3.15.1 As noted immediately above, the Applicant (and their consultant, the Cawthron Institute) considered other options for fish passage, against the test of maintaining the full range of species above the dam and concluded that the best option was a trap and transfer system.

3.15.2 In the Expert Conferencing Joint Witness Statement<sup>10</sup> five of the eight experts who gave evidence on this matter believed that the proposed trap and transfer was the “best available mitigation option” (refer para [4]).

3.15.3 The experts who agreed with this statement can be listed as follows:

- Dr Mike Joy, Senior Lecturer Freshwater Ecology, Massey University, for Forest and Bird and Ngāti Kahungunu Iwi Incorporated;

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<sup>10</sup> RWSS effects on Aquatic Ecology, 28 October 2013.

- Kate McArthur, Freshwater Ecologist, Catalyst Group, for EDS;
- Dr Russell Death, Associate Professor Freshwater Ecology, Massey University, for Fish and Game;
- Dr Roger Young, Freshwater Ecologist, Cawthron Institute, for Hawke's Bay Regional Council and Hawke's Bay Regional Investment Company Limited; and
- Dr Oliver Ausseil, Freshwater Scientist, Aquanet Consulting Limited, for Hawke's Bay Regional Council and Hawke's Bay Regional Investment Company Limited.

- 3.15.4 The experts who disagreed with this statement can be listed as follows:
- Marei Apatu for Te Taiwhenua o Heretaunga;
  - Ngāio Tiuka for Ngāti Kahungunu Iwi Incorporated; and
  - Dr Kepa Morgan, from the University of Auckland, for Ngāti Kahungunu Iwi Incorporated.
- 3.15.5 The Department has considered the matter of options (for example, whether the Applicant is correct that an "engineered" fish pass would be ineffective owing to the height of the dam and the level of the reservoir at critical times). In order to better assess the issue, the Department sought further information on the particular question of alternatives, which the Applicant supplied (refer [Further Information - Alternatives](#)). The Department accepts that:
- The height of the Makaroro Dam as well as the degree of fluctuation in water levels makes the potential alternatives impractical and unlikely to be successful.
  - Fish passes cannot be overly steep as the flow will be too much for the fish passage.
  - In the Patea instance the PVC pipe has proved less successful than the trap and transfer.
- 3.15.6 The Department further notes that:
- There does not appear to have been any evidence presented at the BOI to support an alternative option.
  - As noted, five of the eight experts who gave evidence on this matter believed that the proposed trap and transfer was the "best available mitigation option."
  - The BOI accepted this approach.
- 3.15.7 On the basis of the above, and because we recommend that you require a trap and transfer system, the Department recommends that the Director-General not require an alternative fish passage option (for example an engineered fish pass).

### **3.16 Trap and Transfer**

#### **3.16.1 The Proposal**

- 3.16.2 The Applicant proposes a trap and transfer regime for native migratory species, however the focus of this system is predominantly longfinned eels and koaro. Limited information has been provided as to the benefits of this system to other species, as well as specifics of the trap and transfer facility, for example how and where it will be constructed.
- 3.16.3 The Applicant describes the system (as recommended by Cawthron at p 16 of the Applicant's application) in general terms as follows: "An upstream and downstream trap and transfer programme that will enable migratory native fish to access habitat upstream of the proposed dam, and enable mature longfin eels to move downstream and complete their life cycle; and pre and post-construction monitoring of the age-structure of the eel population upstream of the dam to ensure that the trap and transfer programme is enabling successful recruitment".<sup>11</sup>
- 3.16.4 The Applicant then goes on to focus on the upstream trap and transfer system, noting that downstream is largely untried and in previous instances, often unsuccessful. The Department accepts that facilitating downstream fish passage with a downstream trap and transfer program is difficult and largely untested. However, the Department believes that facilitating downstream fish passage is vital to minimise the effects of the dam. Under the proposed Requirement and Specifications for the trap and transfer system (as set out at section 7.0 to

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<sup>11</sup> Application: <dme://docdm-1514450/> at page 16.



this report), the Applicant will be able to evaluate the efficacy of the trap and transfer system, introducing modifications as required.

- 3.16.5 The Department requested further information on the question of fish passage, in particular some of the specifics relating to the form and structure of the facilities, as well as monitoring. This information can be seen in full at Schedule B to this report. In the following paragraphs we summarise (and comment on) the information about the trap and transfer system provided in the application, the Applicant's further information, and the Cawthron report.
- 3.16.6 In some instances we refer the reader to para [3.13.4] of this report, where information about the trap and transfer, and Cawthron's reasons for supporting it, are set out. All other references to the Cawthron Report in the following paragraphs refer to pp 169-172 of the report.
- 3.17 Species to be targeted
- 3.17.1 Although the trap and transfer system appears to be focused on eels and koaro, the Cawthron Report states that trap and transfer operations can also provide passage for other migratory species if they can be successfully trapped at the base of the dam. The report states that "it is likely that the ability of other native fish species to enter a trap and transfer facility could be enhanced by altering the trap entrance conditions (eg changing the slope and substrate on the entrance ramp, or experimenting with a submerged orifice trap entrance)". The Department accepts this information.
- 3.17.2 Dr Joy, at para [1024] of the Board Report notes that the loss of passage could lead to increased "transit time for fish larvae to travel downstream, thereby increasing their chances of starvation or predation [and] potential death of a significant percentage of downstream migrating larvae when going through or over the dam."
- 3.17.3 The Freshwater Technical Advisor has confirmed that larval fish are not active swimmers and that they use natural flow to migrate downstream. He noted that in a low flow environment, such as a reservoir, the duration of downstream passage can be increased, potentially decreasing condition/fitness of larvae past the dam wall, lowering survival rates. The risk of increased predation of larval fish during passage was also raised. The Freshwater Technical Advisor noted that these points had not been further investigated in specific studies, but considers it highly likely that the downstream migration of fish will be affected by the reservoir.
- 3.18 Design and method
- 3.18.1 In response to a request for more specifications about the trap and transfer programme, the Applicant advised in its further information of 19.02.15 that "detailed design of the trap and transfer system will be incorporated into the final design phase of the project with input from the Ruataniwha Biodiversity Advisory Board ("RBAB").<sup>12</sup> The trapping system for the upstream movement of fish is expected to involve an attractant flow leading to a trap box installed beside the river channel (see example on [winner-bill-kerrison-saving-nzs-longfin-eel](#)"). The Freshwater Technical Advisor advises that this is a standard method for trap and transfer systems, but it is largely untested for trapping downstream migrating eels.
- 3.18.2 We note that while the Applicant refers to a "detailed trap and transfer plan", and clearly intends to write one,<sup>13</sup> there is no requirement for such a plan in the resource consent conditions.
- 3.18.3 We also note that the resource consent conditions do not directly require the input of the RBAB into the design of such a plan. What the consent conditions require is that the Consent

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<sup>12</sup> RBAB is established under the resource consent conditions. It has an advisory role. DOC has one member on the Board.

<sup>13</sup> Confirmed in Applicant's further information of 18 June 2015.

Holder (HBRIC) in consultation with the initial RBAB and the consent authorities, develop a Terms of Reference covering various matters. The matters include “guidance” to assist the Consent Holder “with the effective implementation” of various matters, which in turn include the “Proposed Delivery Mechanism” for Project C. That Delivery Mechanism includes implementation of an upstream and downstream trap and transfer programme.<sup>14</sup>

- 3.18.4 While the Applicant notes that the trap and transfer approach is proposed because it has been successfully operated for young eels (elvers) at several hydro dams throughout New Zealand (e.g. Karapiro Dam, Patea Dam, Matahina Dam, Manapouri Lake Control), the Freshwater Technical Advisor questioned the definition of success, noting that success should be assessed by the age distribution in the upstream population of a species.
- 3.18.5 The Applicant notes that the upstream trap and transfer is more likely to be successful for stronger swimming species such as eel and koaro. The Freshwater Technical Advisor notes that this efficacy is not so much due to these migrants being stronger as it is to the ability to lure and trap these species. To account for this, offsite mitigation could benefit some of the species affected by the efficacy, or lack thereof, of the trap and transfer regime, but this is not certain (as discussed further in our consideration of the IMO A at para [3.38] and Schedule E).

### 3.19 Placement

- 3.19.1 The Applicant states in its further information, that the locations will be included in the detailed Trap and Transfer plan developed in consultation with the RBAB. At this point in time, this information is not available.
- 3.19.2 With regard to the location of the traps downstream of the dam, the Applicant states in its further information that “the final placement of the trap should be determined after observations of fish accumulations below the dam during the first migration period after construction, or alternatively placed further downstream where local knowledge indicates migrating fish will be concentrated.”
- 3.19.3 The Freshwater Technical Adviser accepts that this is a valid method of determining where the traps should be located. This information will be collected as part of the pre-dam monitoring the Department recommends that the Applicant be required to carry out.
- 3.19.4 The release point of the fish trapped for upstream passage should be above the reservoir in flowing waters. Fish should be released so that they can access all waterways upstream of the dam and it is noted that this may require multiple release points.

### 3.20 Operation

- 3.20.1 The Cawthron Report notes that a trap facility requires continuing maintenance and operation, but that the system need not operate year round after an initial evaluative period (recommended as “several years long”) as upstream migrations tend to have reasonably strong seasonality. Again, the Applicant states this timeframe detail will be in its detailed trap and transfer plan. The Cawthron Report notes the trap infrastructure has to be in place, be maintained and be monitored “on an almost continuous basis” throughout the season that it is in use to ensure predation while in the trap is minimised.
- 3.20.2 The Applicant acknowledged, in its further information, that the risk of transfer of pest species was to be considered, and noted this would be included in the final trap and transfer system design, to be developed in consultation with RBAB.

### 3.21 Monitoring and other information gathering

- 3.21.1 The Applicant is required by the resource consents to undertake monitoring of the eel population above and below the dam, but not of any other species. Along with its application

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<sup>14</sup> Condition 6 (iii), of Schedule 2 of the General Conditions and Schedule 6, Project C.

for dispensation, the Applicant also submitted the eel monitoring protocol (as required by its RWSS consent conditions) which was finalised in March 2014.

- 3.21.2 An Investigation into the Eel Population of the Upper Makaroro River (Maclean, April 2014) (“the Investigation”) was undertaken as per the Eel Monitoring Protocol. It found that successful recruitment resulting from the trap and transfer programme will be evident if young eels between 150-300mm long are recorded during the electric fishing in tributaries and along the edge of the mainstem of the Makaroro River (refer further information in Schedule B of this report and p 20 of the Investigation).
- 3.21.3 With regard to species other than eels, the further information states that “the presence and relative abundance of other native fish species at the monitoring sites was measured during the pre-construction investigation and we have recommended that a change to the eel monitoring protocol...is made to ensure that this continues” (the Department has not seen a version of the Eel Monitoring Protocol with this amendment).
- 3.21.4 The Department has concerns regarding the sufficiency of this investigation and recommends more detailed study be undertaken to understand the fish community present before construction begins. The Department also considers that the five yearly monitoring required as part of the Eel Monitoring Protocol is not sufficient, and that this frequency of monitoring will not support an accurate annual review of the system as is proposed.<sup>15</sup>

### 3.22 Specific downstream passage issues

#### 3.22.1 *Eels*

- 3.22.2 With regard to eels, which migrate downstream as mature (and often very large) eels, the Cawthron report states that the primary way for them to migrate would be the dam releasing flows over the spillway during autumn flushes when the strongest likelihood of these fish seeking downstream access will occur. This method would ensure eels bypass the turbines. However Cawthron notes that during autumn there may be little water available for this as the reservoir may be too low from summer usage. Cawthron recommends, as a contingency for successive dry years that produce no spilling during autumn, the only feasible option would be to trap migrants and manually transfer them downstream past the dam wall.
- 3.22.3 The report notes that the downstream programme would benefit from review after monitoring over the first few years of operation to determine when / where adult eels seeking downstream passage can be caught and if the numbers of eels involved justifies the effort. The Applicant notes in its further information that based on observed densities (in the Maclean Report, 2014) it is likely that the migratory run of longfin eels from the upper Makaroro River will be in the order of several tens of individuals, rather than hundreds or thousands of eels. It states that there are significant practical difficulties with catching eels while they are migrating. Therefore the Applicant proposes, in its further information, to capture and transfer eels that were visibly undergoing transformation to migratory state, or of a size where migration would be likely prior to actual migration, and moving them downstream below the dam.
- 3.22.4 The Department accepts that facilitating downstream fish passage with a downstream trap and transfer system is difficult and largely untested, however believes that facilitating downstream passage is vital to minimise the effects of the dam. We note that the Applicant suggests that in future the money presently budgeted for this purpose may be moved to other mitigation (if the Council approves this variation to the condition).<sup>16</sup> The Department does not support this approach, at this stage.

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<sup>15</sup> Condition 8, schedule 2 of the RWSS Resource Consents, requiring an annual progress meeting on the progress of the IMO. We note that this is not specific monitoring solely for the trap and transfer system.

<sup>16</sup> The Applicant notes that Mr McLean, in his report “Investigation into the Eel Population of the Upper Makaroro River 2014” states that given the practical difficulties of effectively trapping eels to transfer them downstream, consideration should be given to moving resources budgeted for this to offsite mitigation elsewhere.

### 3.22.5 *Koaro and other larvae*

3.22.6 The Cawthron Report notes that koaro migrate passively as larvae, and considers that they will be carried downstream by water flow, either via flow augmentation releases or spilling, or through the turbines. The Cawthron Report further considers there to be little advantage to downstream trap and transfer of koaro. In terms of koaro larvae that are not carried past the dam, the Cawthron Report notes that the remaining larvae may remain and rear in the reservoir.

3.22.7 The Cawthron Report advises that most other migratory native fish similarly migrate downstream as larvae.

3.22.8 The Department accepts that transfer of larval fish is not practical, and as such does not consider it should be required.

### 3.22.9 *Board of Inquiry*

3.22.10 The Final Report and Decisions of the Board of Inquiry into the Tukituki Catchment Proposal (18 June 2014) required that the Applicant undertake a trap and transfer programme once the dam is operational (refer paragraph [1211] of the Report and Project C of the IMOA).

3.22.11 The resource consents contain very little detail as to the trap and transfer system.

3.22.12 The conditions relevant to the trap and transfer system are as follows:

- WP120371M, condition 19: design and implement a monitoring protocol to investigate and report on the size structure of the eel population in the Makaroro River upstream of the proposed dam in order to determine if the trap and transfer programme is enabling the successful recruitment of young eels to the reservoir above the dam.
- Schedule 2, condition 5: commence the six Integrated Mitigation and Offset Approach Projects (including the trap and transfer programme), including the establishment of a RBAB to oversee the IMOA projects, in terms of the respective Project Description, Proposed Delivery Mechanisms and Performance Targets. One of these projects is Project C “Ruataniwha Threatened Species Enhancement Project” (which includes the trap and transfer system).
- Schedule 2, condition 6: Terms of Reference for the RBAB shall be developed covering matters and functions including:
  - review of the IMOA Annual Report;
  - guidance and prioritisation advice on effective implementation of the IMOA (in Schedule 6);
- Schedule 2, condition 8: Annual Review Meeting is to be held (including with the RBAB) where the IMOA Report shall be reviewed.
- Schedule 2, condition 9: The consent authorities may approve a variation to the Projects (including Project C which includes the trap and transfer programme).
- Schedule C: Ruataniwha Threatened Species Habitat Enhancement Project:
  - Project Description includes “Trap and transfer programme focusing on native fish.”
  - Proposed Delivery Mechanisms include “Implementation of an upstream trap and transfer programme to enable migratory native fish (including eels) to access habitat upstream of the proposed dam and a downstream eel trap and transfer programme.”
  - Performance Targets include “Ensure that the trap and transfer programme is enabling successful recruitment of eels by pre- and post-construction monitoring of the age-structure of the eel population upstream and downstream of the dam.”

### 3.23 Analysis of a Trap and Transfer System

3.23.1 When considering the trap and transfer system the Director-General must make a number of decisions.

3.23.2 First, he must decide whether to “require” a trap and transfer system (regulation 44(1)).

- 3.23.3 Next he must decide whether to specify “what is required to enable fish to pass or stop the passage of fish”, including specifying the type, general dimensions and general design of the system (regulation 44(2)).
- 3.23.4 The Department recommends that the Director-General require that HBRIC implement a trap and transfer system, as this has potential to mitigate the effects of the dam on fish passage, and the Department is not aware of any better alternative.
- 3.23.5 The remainder of this part of the report recommends that the Director-General specify further requirements, which we refer to as “specifications”. The recommended Requirement and Specifications relating to the trap and transfer system are set out in full at section 7.0 of this report.
- 3.23.6 In light of the lack of certainty regarding the particular design and placement of the trap and transfer facility, the Department undertook further analysis of trap and transfer processes generally. The Freshwater Technical Advisor provided the following:

“Recently, Jellyman and Harding (2012) illustrated that the presence of a dam, regard[less] of the existence of a trap and transfer programme, alters upstream fish communities compared to those found downstream of the dam. This strongly suggests that the trap and transfer programmes that have been implemented at other large dams across New Zealand have not been effective in maintaining fish communities above the dam. Specifically, Jellyman and Harding (2012) found that fish communities above dams have lower species richness, a lower percentage of diadromous species and a higher exotic species presence when compared to fish communities below dams. Furthermore, successful downstream passage of eels has not previously been achieved by other trap and transfer programs operating in New Zealand. Dr Richard Allibone presented these and other concerns about the efficacy and risks of trap and transfer in [expert witness testimony](#) in response to similar proposals to mitigate the effects of a dam on the Mohikini River.<sup>17</sup>

.... The overall goal of the trap and transfer program should be to ensure that the presence of the dam does not have significant effects on the structure of the fish community presently found both up and down stream of the proposed dam wall location. This is a broader objective than the one currently proposed of merely trying to maintain the upstream long fin eel population.”

- 3.23.7 Noting that the application and the further information do contain specific information on the design and/or placement of any trap and transfer facility, the Department recommends a number of specifications under regulation 44(2). The specifications relate directly or indirectly to “what is required to enable fish to pass or stop the passage of fish” and to the type, general dimensions and general design of the trap and transfer system.
- 3.23.8 In terms of the legal test, we consider that a trap and transfer system (with the proposed specifications) will help promote and conserve natural resources, and in particular will assist in preserving indigenous freshwater fisheries and protecting recreational fisheries.<sup>18</sup>
- 3.23.9 We consider it is practicable to require a trap and transfer system.
- 3.24 Requirement for a trap and transfer system
- 3.24.1 Currently the Resource Consent conditions establish a “performance target” for the trap and transfer system (in Project C of the IMO, at schedule 6 of the condition set). The target is “ensure that the trap and transfer programme is enabling successful recruitment of eels” (determined by pre- and post-construction monitoring of the age-structure of the eel population upstream and downstream of the dam).

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<sup>17</sup> Statement of Evidence of Richard Mark Allibone, ENV2010-CHC-115, 123,124, and 135

<sup>18</sup> Referring to the test as set out in para [3.4.3] of this report.

- 3.24.2 The Department is concerned that the Applicant's trap and transfer system will be focussed on maintaining the eel population only.
- 3.24.3 As stated earlier in para [3.4.3] to this report, the Department has a function under the CA 87 to "preserve so far as is practicable **all** indigenous freshwater fisheries, and protect recreational fisheries and freshwater fish habitats" [emphasis added]. With a suitable and well-designed trap and transfer system the Freshwater Technical Advisor advises that it should be possible to transfer many different types of indigenous species.
- 3.24.4 As such, the Department recommends that the Requirement and Specifications be for a trap and a transfer system for all indigenous species. We recommend that this be done by listing "Target Fish Species" known to be present at the dam site (or found in the recommended pre-dam monitoring).<sup>19</sup> We recommend that the "Target Fish Species" not include trout. Brown trout are not considered by the Department to require fish passage past the dam, therefore are not considered. Rainbow trout would require passage, but are not classified as either threatened or declining. Evidence presented through the Board, and confirmed by our Freshwater Technical Advisor suggests that a self-sustaining rainbow trout population will develop above the dam. There is also potential for predation by trout upon other species in the trap. We recommend that the focus of the system should be to maximise the benefit to the more endangered indigenous species. Trout may still be transferred through incidental bycatch, but they will not be the focus of the system.
- 3.24.5 Although the performance target in Project C of the IMO A relates only to eels, HBRIC has stated a number of times that the trap and transfer system will also be focussed on other native species. For instance, the Application provides that "The Cawthron report recommended a number of initiatives to mitigate potential adverse effects of the Scheme on aquatic ecology, including...an upstream and downstream trap and transfer programme that will enable migratory **native fish** to access habitat upstream of the proposed dam, and enable mature longfin eels to move downstream and complete their life cycle" (p 16), (emphasis added).
- 3.24.6 We also note that while the Project C performance target relates only to eels, the "Project Description" and "Proposed Delivery Mechanism" (which are also part of Project C) refer to native fish more generally. For example the "Proposed Delivery Mechanism" requires: "Implementation of an upstream trap and transfer programme to enable migratory **native fish** (including eels) to access habitat upstream of the proposed dam and a downstream eel trap and transfer programme" (p 9), [emphasis added].
- 3.24.7 The Cawthron report (p 170) and further information provided by HBRIC (refer Schedule B) both note that "trap and transfer operations can also provide passage for other migratory species if they can be successfully trapped..."
- 3.25 Baseline information monitoring to be undertaken before the dam is in operation (including during construction if possible)
- 3.25.1 To be able to measure whether the requirement to transfer all species is met, baseline information on fish species above the proposed dam, and their migratory patterns, must be robust. This information is also necessary for the design of the system, such as where traps will be positioned.
- 3.25.2 Presently the only specific monitoring that has been undertaken to assess the impact of the dam was completed on 25-27 October and 4 November 2011 (Cawthron report), and 25, 26 and 31 March 2014 (Investigation into the Eel Population of the Upper Makaroro River). The Applicant also provided information from existing sources, the New Zealand Freshwater Fish Database (which contained data from 1965-2009) and a spatial modelling database.

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<sup>19</sup> Defined in the Specifications as follows: "Target Fish Species" means longfin eel, torrentfish, koaro, common bully, bluegill bully, redfin bully, and native smelt, including any other species of native migratory fish found during the pre-dam monitoring specified in Specification 3.1.

- 3.25.3 The Department is advised by its Freshwater Technical Advisor that these data sets (ie the specific information and the existing data) are unlikely to provide a representative view of the current freshwater fish community above the proposed dam site, nor will they provide any information on the current migratory behaviour of the freshwater fish species present.
- 3.25.4 It is desirable that further detailed monitoring of the freshwater fish and eel populations upstream of the dam should be undertaken. The recommended monitoring is set out in section 7.0 of this report.
- 3.25.5 Ideally pre-dam monitoring would occur for at least 12 months prior to construction. However the Department recognises that the Applicant needs to start construction as soon as possible and therefore has recommended that pre-dam monitoring occurs for 12 months before construction, but if construction starts before the 12 month period finishes, we recommend a minimum of 6 months' monitoring.
- 3.25.6 Recent reporting<sup>20</sup> indicates that the RWSS will not be operational and supplying water before the 2019/2020 summer season, indicating that there may be time for this monitoring to be undertaken.

### 3.26 Design and operation of the trap and transfer system

- 3.26.1 The Applicant, while acknowledging that the trap and transfer system is a requirement of project C of the IMO, has not submitted a final trap and transfer system design as part of their application.
- 3.26.3 The Department recommends that the system be designed by an adequately qualified and experienced expert and that the Department has the opportunity to certify any trap and transfer design HBRIC proposes to use. The Department also recommends a number of "criteria" the trap and transfer system must meet, if it is to achieve the Requirement of transferring all target species (see section 7.0 for the Requirement and Specifications).

### 3.27 Monitoring to be undertaken post dam in operation

- 3.27.1 To ensure the trap and transfer system is achieving the Requirement and Specifications, regular monitoring throughout the life of the dam must be undertaken. Monitoring will include the fish populations upstream and downstream from the dam, and also will evaluate the effectiveness of the trap and transfer system. The Department recommends specifying that HBRIC is required to engage a suitably qualified and experienced aquatic ecologist to design and implement a monitoring protocol, to be undertaken once the dam is operational, and that this will be certified by the Department.
- 3.27.2 Currently the resource consent conditions provide for monitoring (of eels)<sup>21</sup> every five years which is not frequent enough to ensure a thorough understanding of whether the requirement is being achieved.

### 3.28 Variation of monitoring protocol and of the design of the trap and transfer system

- 3.28.1 There may be instances where the Department, in its certification capacity, may not be satisfied that the monitoring protocol is operating adequately to ensure the Requirement and Specifications are met. In these instances the Department recommends specifying that it may require amendments to the protocol to better achieve these. The Department contemplates that this may occur a number of times over the life of the approval.

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<sup>20</sup> "Delay in dam's delivery of water" by Simon Hendery, Hawke's Bay Today, May 16 2015.

<sup>21</sup> Although in the further information provided on 19.2.15 HBRIC states that "the presence and relative abundance of other native fish species at the monitoring sites was measured during the pre-construction investigation and we have recommended that a change to the eel monitoring protocol...is made to ensure that this continues".

3.28.2 In addition, monitoring may show that the trap and transfer system is not operating in a way that achieves the Requirement. In this instance, the Department recommends that a suitably qualified expert provide recommendations to the Approval Holder regarding modifications to ensure the system better achieves the Requirement. The Approval Holder would then be able to vary the trap and transfer system based on these recommendations, and the varied system would need to be certified by the Department.

### 3.29 Other Amendments to Director-General's Requirements and Specifications

3.29.1 In addition to the circumstance where the Director-General wishes to require changes to the monitoring programme or certifies modifications to the trap and transfer system, there may be instances where the Director-General and HBRIC agree that changes are desirable. We recommend that the specifications enable this to occur.

### 3.30 External Expert advice

3.30.1 It may be that certification of the proposed trap and transfer system, the system once operational, or the monitoring protocol, will be more robust with the aid of an independent expert in aquatic ecology or design of fish passage systems. In these instances, the Department recommends specifying that the Department may engage such an expert, at HBRIC's cost, who may also recommend alterations to any of the above.

### 3.31 Record keeping and reporting

3.31.1 It is important that all operations regarding the trapping aspect of the programme be recorded, in order to establish whether the Requirement is being met. It will also help improvement of the trapping and transfer system.

3.31.2 The Department would like to receive the raw data from the monitoring and the record keeping on a yearly basis.

### 3.32 Cost Recovery

3.32.1 The Department shall reserve the right to cost recover for further work in certifying and monitoring the trap and transfer system.

## **3.33 Fish Screens**

3.33.1 The Applicant notified the Department of two proposed fish screening measures: one at the upper irrigation intake and one at the lower irrigation intake. The purpose of these measures is to prevent fish entering the irrigation system.

3.33.2 The location of the two intakes is shown on the map at page 233 of the BOI report. The upper irrigation intake is situated on the Waipawa River, diverting flow for use in zones A-D and the lower intake is situated on the northern bank of the Waipawa River, a little under 1km from the confluence with the Tukituki River.

3.33.3 The project description design for the fish intake screens is described at page 149 of the Cawthron report, and involves a rock fill infiltration bund (rather than a more traditional mesh screen) with screening equivalent to 3mm mesh.

### 3.34 Upper Intake

3.34.1 In terms of the upper water intake the Applicant is required by its resource consent conditions to "ensure fish exclusion to a standard consistent with the NIWA Fish Screening Good Practice Guidelines" (HBRC consent WP120373T, condition 5).

3.34.2 The Applicant is required to undertake post-construction monitoring of the efficacy of the rock-fill infiltration bund at the upper irrigation intakes (HBRC consent WP120373T, condition 6).



3.34.3 The Department accepts the NIWA guidelines as representing current best practice in fish screening water intakes into irrigation systems. Therefore we do not recommend any further requirement be imposed in terms of screening fish at the upper intake.

3.34.4 We therefore recommend that the Director-General impose a requirement in identical terms to the Resource Consent conditions. This will mean that the requirement can be enforced, if necessary, through the FFR 83 as well as through the Resource Management Act 1991. We consider that in terms of the legal test this is the best practicable way to prevent freshwater fish entering the irrigation system via the upper intake.

### 3.35 Lower Intake

3.35.1 In terms of the lower water intake the Applicant is required by its resource consent conditions to “ensure adult trout are fully excluded” (refer HBRC consent WP120375T, condition 5).

3.35.2 The Applicant is required to monitor the performance of the structure in excluding adult trout. This is to be assessed and reported within 3 calendar months of exercising the consent, (refer HBRC consent WP120375T, condition 6).

3.35.3 The reason why the lower intake has a different requirement to the upper intake is due to where the intakes finish up. The upper intake goes to irrigation canals, where fish are unlikely to survive. The lower intake finishes in a natural water body, where the fish will likely survive and continue as normal. Screening out trout would likely benefit the native fish populations.

3.35.4 We consider that in terms of the legal test the Resource Consent conditions provide the best practicable way to assist indigenous freshwater fish.

3.35.5 We therefore recommend that the Director-General impose a requirement in identical terms to the Resource Consent conditions.

### 3.36 Turbine Screens

3.36.1 The Cawthron Report notes that the likelihood of fish injury or mortality during turbine passage increases with fish length. Survival rates for small fish or larvae are likely to be high. In the absence of a screen or other physical barrier, large eels which attempt to pass through an outlet and turbine are unlikely to survive.

3.36.2 To address this risk, the Department inquired as to screens over the turbines in the dam structure itself. The Applicant confirmed that while fish screens are used at some hydro dams in New Zealand, there are difficulties in implementing these for the Makaroro Dam.

3.36.3 The Applicant notes that the proposed Makaroro Dam has a (comparatively) wide operational range, and a deep intake. This creates difficulties in maintaining an operational turbine screen.

3.36.4 As stated in the Applicant’s further information letter of 18 June: “The latest design for the intake pipes within the dam includes screens with an aperture of 50 mm allowing a maximum velocity of 3 m/s. These screens are designed for debris screening rather than fish screening and would only be expected to screen large trout and eels... Due to potential high velocities at the screens it is likely that fish will be entrained through the screen into the intake or impinged on the screens.”

3.36.5 The Applicant notes that the proposed screens would likely only screen large eels and trout, further stating as follows:

“The major problem with physical screens is ensuring that the approach velocity is low enough so eels can manoeuvre away from the screen and avoid becoming entrained through the screen into the intake, or impinged on the screen surface. Maintenance of a screen with a sufficiently small aperture size to physically exclude eels would be a major undertaking, especially if the outlet is at considerable depth, as is the case in the proposed RWSS dam design. Clogging of the screen would be difficult to avoid, and this would result in velocity ‘hot spots’ through the screen, increasing the risk of entrainment or impingement.”

3.36.6 While other barrier types such as light, electricity, sound, water jets and bubbles have been trialled in controlled circumstances their efficacy in a natural setting has not been confirmed.

3.36.7 The Department has accepted the information from the Applicant that the screening of turbines against fish passage is not practical. It is further noted that an effective downstream trap and transfer system will reduce the entry of eels to turbines. It is expected that trap and transfer will increase in intensity during periods of peak migration, requiring more intensive management.

### 3.37 Additional Screens

3.37.1 The Cawthron Report notes that fish screens will be required on the individual takes from the Papanui Stream. This is to prevent entrainment in the Zone M secondary distribution system for irrigation.

3.37.2 The Cawthron Report recommends these intakes be designed to “meet good practice guidelines for fish screening” (Jamieson et al, 2007) (page 150).

3.37.3 The Department understands that any additional screens are apparently to be incorporated at a later design stage.

3.37.4 The Applicant has not requested consideration of any additional screens in this application.

### 3.38 Integrated Mitigation and Offsetting Approach (IMOA) (other than the trap and transfer system)

3.38.1 Please refer to Schedule E for a summary of the IMOA, with brief commentary as to their benefits for fish species affected by the dam.

3.38.2 The Board found the IMOA provided for “positive environmental outcomes to offset the unavoidable effects for which there is no feasible mitigation package” (para [1208]). The Department considers that while the benefits for freshwater fish *may* be significant, they are difficult to measure, largely uncertain and take effect over a long time period, if they are successful. For example, some potential benefits depend on landowner approvals that are not yet obtained, and on forms of legal protection that are not specified. Other benefits depend on the removal of barriers to passage; but there is no specific plan identifying which barriers will be removed, when they will be removed, or who will administer the removal project.

3.38.3 The IMOA are relevant so far as they may assist the Director-General in determining whether to impose requirements for fish passage, and whether it is acceptable to grant a dispensation from a further requirement for a fish facility. It remains essential that every reasonable effort be made to minimise the direct (measurable) effects of the dam in the short term. This is especially important in the event the IMOA do not deliver the benefits the Board expects them to.

## **4.0 Application of the principles of the Treaty of Waitangi**

4.1 The FFR 83 do not specify any requirements in regards to consultation, and duties under the Treaty of Waitangi.

4.2 However, as the FFR 83 are administered by the Department, the section 4 CA 87 requirement to give effect to the principles of the Treaty of Waitangi applies.

4.3 The Department considers that the following principles of the Treaty apply generally to its work:

**a. Partnership - mutual good faith and reasonableness**

The Crown and Māori must act towards each other reasonably and in good faith. These mutual duties of reasonableness and good faith describe the nature of the relationship between the Crown and Māori. They are the core of what has been described as the Treaty partnership. This principle is about how the Crown should behave to Māori and Māori to the Crown.

**b. Informed decision-making**

Both the Crown and Māori need to be well informed of the other's interests and views. When exercising the right to govern, Crown decision makers need to be fully informed. For Māori, full information needs to be provided in order to contribute to the decision-making process. This is connected closely to the principles of good faith and active protection. Consultation is a means to achieve informed decision-making.

**c. Active protection**

The Crown must actively protect Māori interests retained under the Treaty as part of the promises made in the Treaty for the right to govern. This includes the promise to protect tino rangatiratanga and taonga. Active protection requires informed decision-making and judgement as to what is reasonable in the circumstances.

**d. Redress and reconciliation**

The Treaty relationship should include processes to address differences of view between the Crown and Māori. The Crown must preserve capacity to provide redress for proven grievances from not upholding the promises made in the Treaty. Māori and the Crown should demonstrate reconciliation as grievances are addressed.

**4.4 How do the principles apply within the context of this decision?**

4.5 Clearly each Treaty partner needs to act respectfully towards the other. The Director-General needs to understand the iwi view and the reasons for it. The iwi should be forthcoming with their view and their reasons for it. The Department should provide information to iwi about the legislation and policy parameters he must work within. Likewise, the Department must be open to and consider the views of iwi.

4.6 It is acknowledged that the Applicant has consulted with iwi throughout the wider RWSS process. This consultation however does not remove the role of the Department in undertaking its own consultation to ensure it has a good understanding of iwi views and the reasons for these views.

**4.7 Consultation undertaken by the Applicant**

4.8 The Applicant notes that they have undertaken comprehensive community engagement throughout the development of the RWSS. As part of this, a Mana Whenua Working Party was established, and this group contributed to the development of the IMOA, as well as taking particular interest in the issue of fish passage.

4.9 The Board Report at paras [194] – [256] and [1143] – [1148] discusses the consultation undertaken by the Applicant. This report is not the forum to question whether the consultation undertaken by the Applicant was adequate, as was largely discussed in the BOI report paragraphs referred to above. Rather it is to identify the cultural issues identified by iwi, and to address these as is practicable within the requirements of the FFR 83.

#### 4.10 Iwi participation in BOI

4.11 In terms of participation in the BOI process, Ngāti Kahungunu Iwi Incorporated, Te Taiwhenua o Tamatea and a number of “Heretaunga parties<sup>22</sup>”, namely Te Taiwhenua o Heretaunga, Ngāti Hawea ki Matahiwi Marae, Operation Patiki (Kohupatiki Marae), Waipatu Marae (Ngāti Hawea, Ngāti Hori), Ruahapia Marae, and Ngāi Te Upokoiri ki Omahu Marae were present and participated.

4.12 Of these, Ngāti Kahungunu Iwi Incorporated and the “Heretaunga parties” did not support the RWSS, while Te Taiwhenua o Tamatea did support the RWSS. We address this further below.

#### 4.13 Consultation undertaken by the Department

4.14 The Department contacted the following iwi on the advice of the Napier District Office (Note, we use the term “iwi” generally, to refer to iwi and hapū, in this section):

- Ngāti Kahungunu Iwi Incorporated – the iwi authority’s rohe includes the dam site, and extends from the Wharerata Ranges in the Wairoa District, extending to Cape Palliser in South Wairarapa. Coastal boundaries are Paritu in the North, through to Turakirae in the South. The rohe is further divided into six taiwhenua (communities), of which Heretaunga and Tamatea are two.
- Te Taiwhenua o Tamatea - For the purposes of the Treaty Settlement process<sup>23</sup> Heretaunga and Tamatea have an agreed area of interest, which includes the dam site, covering an approximate area from Napier township in the North, and south to Cape Turnagain, coming inland towards the Ruahine Range.
- Te Taiwhenua o Heretaunga – Discussed above, but as the two groups have had different positions through the Board of Inquiry process, and were contacted separately through the Department’s consultation process, they are referred to separately in this report.
- Ngāi te Upokoiri – This group is a hapū within Heretaunga, and was a party at the BOI<sup>24</sup>.
- Mokai Patea Confederation – This group comprises Ngāti Hauti, Ngāti Whitikaupeka, Ngāti Tamakōpiri and Ngāi Te Ohuake.
- Ngāti Hinemanu - This group is a hapū within Heretaunga.

4.15 The iwi listed above were sent an email containing an introductory letter, as well as copies of the application and further information received. An example of this correspondence can be seen at <dme://docdm-1598425/>.

4.16 In this letter, the Department confirmed that while this application is related to the wider RWSS, it focuses solely on the issue of fish passage. Iwi were advised as to the scope of input requested, namely that it related to the provisions for fish passage only and not the wider positive or negative effects of the dam as a whole.

4.17 With that overriding guidance, input was sought on the following, more specific, matters:

- the effects of the dam on the passage of freshwater fish;
- the mitigation of those effects;
- possible fish facilities that would avoid or mitigate any adverse effects on freshwater fish, including whether the imposition of a requirement for such fish facilities would be appropriate;
- the efficacy of the trap and transfer in providing fish passage above and below the dam;

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<sup>22</sup> The Board’s term (para [624]).

<sup>23</sup> An Agreement in Principle for settlement was signed on 11 June 2014.

<sup>24</sup> As one of the ‘Heretaunga Parties’.

- the adequacy of the Integrated Mitigation and Offset Approach (IMOA) (as discussed in the BOI process) package in mitigating effects on freshwater fish (please note that while the Department can consider the IMOA, we are unable to impose any further conditions in regards to its implementation in this context);
- the design and location of the trap and transfer and the fish screens;
- what species will benefit from the trap and transfer; and
- monitoring and maintenance of the fish facilities over the life of the dam.

4.18 Of those iwi contacted, no response was received from the following groups, despite following up:

- Te Taiwhenua o Tamatea;
- Ngāi te Upokoiri; and
- Ngāti Hinemanu.

#### **4.19 Mokai Patea Confederation**

4.20 A response was received from Richard Steedman on behalf of the Confederated Iwi of Mōkai Pātea. While thanking the Department for checking with the group, it was confirmed that they “do not have any manawhenua on the actual site you describe”.

4.21 No further consideration of this interest has therefore been undertaken.

#### **4.22 Ngāti Kahungunu Iwi Incorporated Feedback**

4.23 The most substantive response was received from Ngāti Kahungunu Iwi Incorporated (“NKII”) (refer [Letter from NKII 28.05.15](#)).

4.24 The submission was supplemented by the expert testimony of Dr Mike Joy (refer [Evidence of Dr Joy](#)), who was engaged by NKII for the BOI process.

4.25 The submission noted that the blocking of fish passage as a result of the proposed dam would have ‘serious adverse effects’, further noting that the application did not attempt to avoid or remedy them, but rather attempt to mitigate them.

4.26 NKII submits that “there is very little evidence that any freshwater species will benefit from the trap and transfer proposal”, (refer Letter from Ngāti Kahungunu Iwi Incorporated (NKII) dated 28.05.15). Referring to Dr Joy’s expert testimony, NKII reiterated his statement that a trap and transfer might only produce 50% efficacy in successfully moving fish past the dam. Based on this testimony that the prospects of maintaining a full spectrum of native fish currently found upstream of the dam were low to medium, NKII stated that “expert testimony provides very little confidence that the ‘effects can be mitigated’”, (refer Letter from Ngāti Kahungunu Iwi Incorporated (NKII) dated 28.05.15.)

4.27 NKII refer to the Board’s comments in respect of the size of the dam, reiterating the Board’s comments that the higher the dam, the increased adverse effects it will have on freshwater ecology and native fish species. The Department accepts that the height of the dam will influence the effects on native migratory species, and also notes evidence that due to the height, the fish facility alternatives become increasingly difficult and limited. However, this process does not allow the Director-General any control over the size of the dam.

4.28 NKII have expressed concern over the efficacy of a trap and transfer process, again relying on Dr Joy’s evidence which states that, based on examples from other dams throughout the country, some species of native fish above the dam may become extinct. The trap and transfer process requires multiple transfers of a single fish, ie both up and downstream, which according to Dr Joy’s evidence, can be quite difficult. There is also no guarantee that multiple captures are practically possible.

4.29 The Department also has concerns about the efficacy of the trap and transfer system, and also accepts that downstream trap and transfer is more difficult. Downstream trap and transfer is largely untested, however the Department believes that it is essential to minimise the effects of

the dam. The Department also believes that a trap and transfer programme needs to be focused on as wide a range of migratory native species as is possible.

- 4.30 At this point in time, the trap and transfer has not been designed and the Department does not have any technical specifications. This has made it impossible to evaluate the efficacy, or otherwise, of the eventual design.
- 4.31 To address this lack of information, and to ensure so far as practicable that the eventual trap and transfer design is the best that it can be, the Department has set a Requirement and Specifications for the eventual design, requiring signoff of the end design. The Requirement and Specifications are set out at section 7.0 of this report.
- 4.32 The risk of exotic species being transferred above the dam, forming self-sustaining populations, is also raised by NKII and through Dr Joy's evidence. They note that the Applicant has not covered this risk in any real detail in their application.
- 4.33 The Department agrees that the Applicant has not adequately addressed the risk of pest fish species in their application.
- 4.34 As noted above, the Department has attempted to address this risk through the development of a Requirement and Specifications. The risk of pest fish spread must be addressed in the final trap and transfer system design. One of the recommended criteria for the trap and transfer system is that pest fish not be transferred.
- 4.35 The use of the IMO A to offset of the effects of the dam has also been raised by NKII. One of the IMO A projects is the removal of other fish obstructions in the wider catchment. NKII note that these obstructions were identified in a report in 2010, and that it is concerned that "these obstructions have only seriously been discussed by Hawke's Bay Regional Council by addressing them as a trade-off or "off-setting" tool." They have also noted a lack of real and meaningful consultation throughout the RWSS.
- 4.36 As discussed at para [3.38] of this report, the Department accepts that the IMO A may provide additional benefits and mitigation to offset the effects of the RWSS. However, these benefits are not guaranteed, and every reasonable effort must be made to address the issue of fish passage, ensuring any fish facility is as effective as it can be.
- 4.37 The Department notes NKII's comment regarding consultation, however this report is not the place to consider the adequacy or otherwise of what the Applicant has undertaken to date. The Department must satisfy itself as to consultation and has undertaken direct consultation with iwi to fulfil its Treaty obligations.
- 4.38 Dr Joy's evidence also considers the nutrient management and TRIM model. While NKII has provided Dr Joy's statement of evidence in support of their submission, we are unable to consider these issues, as they are not relevant to the narrow question of fish passage as addressed in this report.
- 4.39 The Department acknowledges NKII's comment that trap and transfer is not the "best" option, and that the preferred option is for no obstruction at all.
- 4.40 As noted earlier in this report, it is beyond the scope of this report to either approve or decline the dam structure. The question is simply whether to impose requirements for a fish facility within the definition of the FFR 83, and/or whether to provide a dispensation from any or all requirements for such.
- 4.41 The Department forwarded our further information request of 8 June 2015 and the Applicant's reply of 18 June 2015 to NKII for their information and/or comment, however no response was received.

#### **4.42 Te Taiwhenua o Tamatea (“TToT”, “Tamatea”) and Te Taiwhenua o Heretaunga (“TToH”, “Heretaunga”)**

- 4.43 A response was received from Marei Apatu of TToH, inquiring as to whom else was contacted and whether “our Iwi office Ngāti Kahungunu” was contacted. The Department confirmed the iwi was contacted, as well as confirming that Ngāti Kahungunu was contacted. Despite further follow up, no other correspondence was received from this group.
- 4.44 No formal response was received from TToT.
- 4.45 Without a detailed response from either TToH or TToT, the Department has considered the Board Report and Agreement in Principle to determine any interests we need to be aware of.

#### *BOI Report*

- 4.46 As noted above, TToH and TToT were both parties to the BOI process.
- 4.47 Para [635] of the Board report notes the specific areas of kaitiakitanga for each of these groups. “Tamatea contends that it has primary kaitiaki with respect to the headwaters of the Makaroro, Waipawa and Tukituki Rivers” and “Heretaunga asserts primary kaitiakitanga in relation to the lower reaches of the Tukituki River (while also emphasising that it is necessary to take a holistic approach to the river)”.
- 4.48 With regard to native fisheries, the Board Report notes that experts on behalf of TToH provided evidence about the diminishing population of native fish in the lower Tukituki, and relating to the declining quality and size of mahinga kai and taonga, including native fish (refer paragraph [651] Board report).<sup>25</sup> Marei Apatu’s evidence states that “there are no proposals to mitigate the risks to...that wildlife, particularly in the lower Tukituki region, or the effects that the RWSS will have on our cultural practices”.<sup>26</sup>

The Board report does not specify particular reasons why TToT supported the dam proposal. Evidence of Roger Maaka states that “from the outset Tamatea’s representatives took the position that if the scientific analysis clearly demonstrated that the RWSS was seriously detrimental to the Makaroro, the Waipawa, the Tukituki or the other associated waterways, then we would cease to support the scheme. With that proviso, we determined that the RWSS and other associated activities provided an unparalleled set of opportunities for marae; these included the active engagement with local authorities in environmental management and a chance to remedy the low employment among our people.”<sup>27</sup>

#### *Agreement in Principle*

- 4.49 In addition to considering TToH and TToT’s position at the Board of Inquiry hearing, the Department has considered the Heretaunga-Tamatea Agreement in Principle. Please note that this is not a formal Deed of Settlement or legislation, therefore does not have the same formal legal status. However, it is likely to form the basis of such documentation and in the absence of any direct feedback from TToH or TToT, it was considered that this could provide valuable context as to TToT and TToH’s interests in freshwater fish and the expectations on the Department with regard to DOC’s freshwater fisheries functions.
- 4.50 The importance of waterways to Heretaunga and Tamatea are noted at page 9 as follows:

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<sup>25</sup> Although this information was provided in the section of the Board Report relating to native fisheries as a cultural matter to be taken into account when considering the plan change, paragraph [1134] states that many of the Board’s observations in Part 2 (relating to the plan change) about cultural issues are equally applicable to the RWSS.

<sup>26</sup> Evidence of Marei Apatu, 8 October 2013, paragraph [28].

<sup>27</sup> Evidence of Roger Maaka, 8 October 2013, paragraph [24].

“5.6 The Heretaunga-Tamatea area of interest boasts significant waterways including the Ngaruroro, Porangahau, Tutaekuri, Tukituki and Waipawa rivers and the Whatumā (Hatuma) and Purimu lakes.

5.7 The hapū of Heretaunga-Tamatea define themselves through these waterways. These waterways, which they consider taonga, lie at the heart of the spiritual and physical wellbeing and the identity and culture of Heretaunga-Tamatea. The hapū of Heretaunga-Tamatea have responsibilities to protect these waterways.”

4.51 The Agreement in Principle confirms that a protocol with the Department will be established (refer paragraph [5.23]). It is noted that this Protocol is in its early stage, however it is likely to form a substantive basis for the Protocol to be agreed.

4.52 Of particular relevance in this instance are paragraphs [5.25.7] and [5.25.8], as follows:

“The protocol will provide for the Department of Conservation to –

5.25.7 work with Heretaunga-Tamatea in the conservation, management and research of freshwater fisheries and their habitats through the mechanisms outlined in the protocol; and

5.25.8 recognise the cultural, historical and traditional association of Heretaunga-Tamatea with indigenous flora and fauna in the Protocol Area.”

4.53 This Protocol further reinforces the relationship of Heretaunga and Tamatea to the land, as follows from page 68:

“1.2 Heretaunga-Tamatea has cultural, spiritual, traditional and historic associations with the land, waters and indigenous flora and fauna within the Protocol Area, and accept a responsibility as kaitiaki in accordance with their tikanga Māori to preserve, protect, and manage those natural and historic resources.”

4.54 This recognised interest is to be balanced and managed in conjunction with the Department’s statutory responsibilities under the conservation legislation it administers.

4.55 The Protocol contains a specific section relating to freshwater fish at paragraph [10]. Paragraph [10.1] acknowledges that the Department’s functions “include the preservation, as far as practicable, of all indigenous freshwater fisheries, and the protection of recreational freshwater fisheries and their habitats.”

4.56 The Protocol further recognises the value of freshwater habitats and indigenous freshwater species to Heretaunga and Tamatea at paragraph [10.3].

4.57 Paragraph [10.4] requires the Department to adopt a ‘co-operative approach’ to ‘conservation, management and research of freshwater fisheries and their habitats’, which will include consulting over research and monitoring and indentifying projects relating to fish passage.

4.58 The RWSS is not a project as such, however does represent an opportunity for the Department and iwi to adopt a ‘co-operative approach’ to the issues of fish passage. The Department considers that it has done this to date, in processing this application, by seeking the parties’ views and taking them into account. There will be other opportunities for consultation in the future as the Department considers the specific design of the trap and transfer, and also as it considers the monitoring results.

4.59 In the monitoring/research context we note that the Protocol, at para [4.7], requires the Department to advise the Governance Entity of “the receipt of any research reports relating to matters of interest to Heretaunga-Tamatea within the Protocol Area and provide copies of those...reports”.



- 4.60 It seems likely that Heretaunga-Tamatea will be interested in the monitoring reports for the trap and transfer. The Department has requested regular monitoring and reporting through the Requirement and Specifications set out in section 7.0 of this report and will support the sharing of that information with iwi.
- 4.61 For reasons as set out in the report, the Department has determined that providing a Requirement and Specifications for a trap and transfer system is the most practical way to provide for fish passage in this instance. We consider this is consistent with protecting the interests of TToH and TToH, as identified through the BOI process and Agreement in Principle. We also consider that focussing the trap and transfer on all migratory native freshwater fish is entirely consistent with the emphasis placed in the Agreement in Principle on indigenous species.

#### **4.62 Evaluation of the Principles of the Treaty**

- 4.63 The Department considers that the consultation process undertaken, as well as the development of the Requirement and Specifications in regards to the trap and transfer system give effect to the principles of the Treaty of Waitangi within the scope of the FFR 83.

**a. Partnership - mutual good faith and reasonableness**

The Department has endeavoured to engage with iwi identified as having an interest in this matter. This has included the sharing of information, and providing an avenue for feedback into the process.

**b. Informed decision-making**

The Department has endeavoured to understand the position of iwi in relation to this application. Where information has not been directly submitted, the Department has turned to external resources in an attempt to ensure informed decision making is undertaken. This included requesting further information from the Applicant, and providing such to iwi who have engaged in the process.

**c. Active protection**

The Department acknowledges the view of NKII that their preference would be for no dam to be constructed at all. This question is beyond the scope of this report and the statutory framework of this decision, and as such, the Department can only acknowledge NKII's view. The value of indigenous freshwater fish and waterways is acknowledged, and the Department has attempted to provide a strong Requirement and Specifications to protect iwi interests to the best of its ability, while still providing robust and practical standards the Applicant can achieve.

**d. Redress and reconciliation**

In considering this application, the Department has attempted to address differences of opinion to the best of its ability, taking into account the information it has at hand and the scope of the FFR 83. In drafting this report, the Department has been mindful that the Treaty settlement process is underway, and that relationships, rights and obligations may evolve during this process. Nonetheless we consider our recommendations to be consistent with the current tenor of the Agreement in Principle. The proposed Protocol with the Department envisages a degree of cooperation and information sharing between the parties. In light of this, the Department recommends continued information sharing and consultation as the trap and transfer system is developed and certified, and furthermore once it is implemented.

We note that the Protocol envisages a meeting between the Governance Entity and DOC within 12 months of the settlement date to discuss implementation of the Protocol.<sup>28</sup> That meeting will be the opportunity to discuss with the Governance Entity what involvement they may seek in ongoing monitoring of the fish passage requirements.

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<sup>28</sup> Clause 4.2.

## 5.0 Analysis of Policy Documents

5.1 The test under the FFR 83 does not specifically require an analysis of the relevant policy documents that affect the place or activity. However as noted above at para [3.4.6] the CA 87 (section 17A) requires the Department to administer and manage all conservation areas and natural and historic resources in accordance with statements of general policy and conservation management strategies.

5.2 Section 17A also refers to conservation management plans and freshwater fisheries management plans. The Hawke's Bay Conservation Management Strategy and the Ruahine Forest Park Conservation Management Plan are considered below.

### 5.3 Conservation General Policy (CGP)

5.3.1 We consider the following policies to be potentially relevant, and we provide brief analysis:

- Policy 2(e), page 16: Tangata whenua will be consulted on specific proposals that involve places or resources of spiritual or historical and cultural significance to them; and
- Policy 2(i), page 17: The Department will seek to avoid actions which would be a breach of the Treaty of Waitangi.

The Department consulted iwi to ascertain their views of the Application. Their response is discussed at section 4.0 above. For the reasons set out there the Department considers the recommended decisions to be consistent with the principles of the Treaty of Waitangi.

- Policy 4.1(h), page 22: The Department, the New Zealand Fish and Game Council and regional fish and game councils, in carrying out their respective functions, will liaise with each other on matters of mutual interest.

The Department invited Fish and Game, Eastern and Hawke's Bay Regions to comment on this application. Hawkes Bay Region responded. Their response is set out at section 6.0 of this report.

### 5.4 Hawke's Bay Conservation Management Strategy 1994-2004 (CMS)

5.4.1 The CMS was considered from two points, firstly that of the value of river habitats such as that which will be affected by the RWSS, and second that of threatened species.

5.4.2 In respect of braided river habitats, at section 2.4.7 Threats/Issues, the following is stated:

#### "Braided River Habitats

As indicated in Section 2.4.6.1, the braided river habitats in the Conservancy have important natural values. Threats to these values include, vegetation encroachment (lupins, willows, broom, buddleja and gorse - see Section 3.4.5), recreational use (jet-boating, 4-wheel drive vehicles and trail bikes can disturb wildlife and their habitats), modifications to rivers (such as riverworks, shingle extraction, irrigation schemes and damming), and modification to riparian areas. It is essential that the Department works closely with local authorities and landowners to ensure that areas with important natural values are protected, or the adverse effects of any developments which occur are mitigated."

5.4.3 This section specifically notes damming and modifications to river systems as threats to be addressed. While identified as a threat/risk, there is no specific policy or implementation point attached to this. It does however state that where these risks are identified the Department is to work with other parties to protect natural values, or mitigate adverse effects as identified.

5.4.4 In terms of this application, as noted previously the Department has relatively limited scope to protect catchment-wide values. The Department has worked closely with HBRIC during the development of the dam proposal and will continue to do so.

- 5.4.5 In respect of species protection, the CMS includes a section on “Protected Animals (Other Species) at page 123 section 3.5.3. “Protected animals” in this section include indigenous freshwater fish.
- 5.4.6 The CMS notes that three fish species are identified in the “priority categories for threatened species conservation” in the Conservancy, namely:
- Koaro;
  - Banded Kokopu; and
  - Blue-gilled bully (page 123 and Appendix 2).<sup>29</sup>
- 5.4.7 Of these species, Koaro and Blue-gilled Bully are both migratory species present above the dam and therefore will be affected by the dam.
- 5.4.8 The section includes a relevant objective:
- “(i) to maintain the full diversity of native animal species and communities found in the Conservancy and to enhance populations of the most threatened species where possible”.
- 5.4.9 It also contains a number of relevant implementations at section 3.5.3, page 124, including the following:
- “(i) the Conservancy will ensure protection is provided, in accordance with the relevant Acts and Regulations, for all species of protected animals; ...
- (xiii) whenever practicable fish passage should be provided for where damming...”. (It includes that this will be advocated through the resource consent process under the Resource Management Act 1991 and the fish pass provisions of the Freshwater Fisheries Regulations 1983.)
- 5.4.10 Implementation (i) requires the Department to ensure protection of indigenous freshwater fish in accordance with the relevant Acts and regulations. Under the FFR 83, the Department’s role is relatively narrow, but the Department considers that within the confines of that role, the recommended Requirement and Specifications for a trap and transfer system targeting all indigenous fish species gives effect to this implementation. The requirement for the system to target all species of indigenous fish will also give effect to objective (i) in so far as possible.
- 5.4.11 Implementation (xiii) requires fish passage to be provided for where practicable. The trap and transfer system is intended to achieve this result, and is therefore consistent with this Implementation.
- 5.5 Ruahine Forest Park Conservation Management Plan 1992
- 5.5.1 The Department considered if the matter of fish passage was addressed by the Ruahine Forest Park Management Plan.
- 5.5.2 This application relates solely to the issue of fish passage and the issue of how fish move past the dam itself. While the reservoir footprint does include a small portion of the Ruahine Forest Park, the dam itself is not within the boundaries of the Ruahine Forest Park and the Management Plan does not contain policies relevant to this application. This plan has not been further considered.
- 5.6 In conclusion, the application is not inconsistent with the policy documents considered.

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<sup>29</sup> The Department notes this document was drafted prior to 1994 and the knowledge of fish species present and their threat statuses have been updated.

## **6.0 Consultation with Fish and Game**

6.1 Fish and Game, Eastern and Hawke's Bay Regions, ("F&G") were invited to comment on the application.

### **6.2 Invitation to Comment**

6.3 The invitation to comment can be seen at the following links:

- Email to Fish and Game, dated 8 June 2015: [Letter to Fish & Game 08.06.15](#); and
- Letter to Fish and Game, dated 8 June 2015: [Letter to Fish and Game](#).

6.4 Noting the scope of the decision to be made in this instance, F&G were invited to comment on the following:

- the effects of the dam on the passage of freshwater fish;
- the mitigation of those effects;
- possible fish facilities that would avoid or mitigate any adverse effects on freshwater fish, including whether the imposition of a requirement for such fish facilities would be appropriate;
- the efficacy of the trap and transfer in providing fish passage above and below the dam;
- the adequacy of the Integrated Mitigation and Offset Approach (IMOA) (as discussed in the BOI process) package in mitigating effects on freshwater fish (please note that while the Department can consider the IMOA, we are unable to impose any further conditions in regards to its implementation in this context);
- the design and location of the trap and transfer and the fish screens;
- what species will benefit from the trap and transfer; and
- monitoring and maintenance of the fish facilities over the life of the dam.

6.5 The letter advised that the Department would not be making a decision on the positive or negative effects of the dam as a whole; rather it is a question of what, if any, fish facilities are to be required and how they should operate.

### **6.6 Feedback Received**

6.7 Feedback was received from the Hawke's Bay Region of F&G, and their response can be seen in full at: [Feedback from Fish and Game](#).

6.8 The main concern of F&G is that the dam will block 'essential elements of both brown and rainbow trout life cycles'. F&G have also recognised that downstream passage is essential to adult long and shortfin eels. Recognising these effects F&G have stated "the overall impact on the trout population and angler opportunity, and on eel populations, from the proposed dam will be substantial and has not been adequately addressed by the proposed mitigation options presented".

6.9 The issue of angler opportunity is a predominant theme throughout the F&G feedback.

6.10 As noted previously in this report, the Department may only consider the requirement for a fish facility as a result of the dam.

6.11 The migration requirements of trout species, as well as the ability of those species to establish sustainable populations above the dam have been considered by both the Board and the Department. F&G have submitted that the inability to migrate will produce a "stunted population of undesirable rainbow trout above the dam and a depleted population below the dam. The impact of interrupted migration by the dam combined with turbine mortality for fish that pass will cause a reduction in the downstream population of trout."

6.12 The Department accepts that the dam will reduce ability of trout to migrate, however does not believe this impact to be severe.

- 6.13 Referring to para [3.8] above, the Department confirms its support of the Board findings that migration of immature trout through turbines has a predicted success rate of 75-90% (as opposed to the figure of below 50% cited by F & G). The trap and transfer system should also ensure some transfer of trout populations above and below the dam, even though trout are not a target species.
- 6.14 In spite of the obstruction presented by the dam, the Department expects that populations of trout in the dam, while affected, will continue to supply adequate populations for anglers.
- 6.15 The Department accepts the Cawthron Report's advice in para [3.8.4] above that it is likely that a self-sustaining population of rainbow trout will establish upstream of the dam. Migration of rainbow trout, most likely through the spillway or through passing through the turbines will ensure downstream populations continue.
- 6.16 The Board report at para [1031] also accepts this position, stating as follows:  
"According to the Cawthron report, a trout population of between 1000-2000 adult fish is likely to develop in the reservoir and support a full season fishery. Compared with the status quo, juvenile trout production from these adult trout would be enhanced and it is likely that some of these juvenile trout would successfully pass downstream and make a substantial contribution to the fishery in the Waipawa and Tukituki Rivers. This evidence was not seriously challenged and the Board accepts it."
- 6.17 While the Department acknowledges the comments made by F&G in their letter of 19 June, it further notes the concluding comment in para [1031] of the Board Report that the evidence regarding effects on trout populations "was not seriously challenged." The Department notes F&G's presence at the BOI process.
- 6.18 In regards to the trap and transfer regime, F&G have noted that "trap and transfer of upstream migrants will not capture all potential adult migrants and is stressful for fish that are transferred further reducing the potential for successful spawning above the dam". The Department recognises that trap and transfer regime can cause stress to the fish and through the Requirement and Specifications set out at section 7.0 to this report has attempted to address this risk. One of the criteria for the trap and transfer system is that it minimises stress.
- 6.19 The trophy value of the fish present above the dam has been queried by F&G who have submitted that the impediment to fish passage will result in a lack of large, quality fish for anglers. The Department accepts that this may be the result: we anticipate an increase in the number of individuals but a decrease in the average size of each individual.
- 6.20 F&G have submitted that downstream passage should be a requirement upon the Applicant, noting that it "is the only practical means of reducing the impact of the dam on the lifecycle of both native fish and trout." They have further noted that successful downstream passage has been installed on agricultural/hydro dams higher than the proposed structure and with similar pool level variability in the United States.
- 6.21 The Department requested further information in regards to this alternative form of downstream passage. This request and information in response can be seen at [Alternatives Clarification](#). The fish facility referred to is a "variable height surface collection facility." The Department understands this is a mechanised form of trap and transfer using attractant flows on a larger scale to assist the passage of fish past a dam. F&G recommended this type of surface facility be used to avoid high turbine and screen related mortality on lamprey, eels and trout.
- 6.22 F&G observe that using the spillway for downstream passage is not acceptable unless a "purpose built pool level sluiceway or bypass is installed that allows for spill of at least 30% of the river flow for fish attraction."
- 6.23 The variable height surface collection facility option has not been presented through either the application, nor was it raised through extensive review of alternative fish passage options through the BOI process. The Department is satisfied that in these circumstances downstream

passage is best achieved through a trap and transfer system, and has not considered this alternative further.

- 6.24 The Department agrees that given the size and height of the dam, downstream trap and transfer is essential to the overall mitigation of the effect of the dam. While some of the proposed mitigation measures as set out in the IMOA may provide some benefits, these are uncertain and will require time to become effective. The Department believes that downstream trap and transfer is essential and has set out a requirement for such.
- 6.25 As noted previously in this report, no final design or specifications have been submitted for the trap and transfer system, however the Department retains a certifying role in the eventual design.
- 6.26 F&G have raised concern that the dam “will block essential elements of both brown and rainbow trout life cycles.”
- 6.27 Due to the expectation that a self-sustaining rainbow trout population will establish above the dam, and that larval trout are expected to access the lower reaches of the catchment by moving through the spillway and turbines, the Department has focused the requirements of the trap and transfer on supporting native migratory species of fish. This is not to say that trout will not be transferred, just that it is not the main focus of the fish facility.
- 6.28 It is also noted that rainbow trout populations for the purposes of angler enjoyment and recreation can be introduced to the catchment through fish stocking.
- 6.29 The Department has confirmed the advice of the Board Report, that brown trout are predominantly found at the lower reaches of the Tukituki catchment. While the dam itself may have effects on water quality and sedimentation which may affect brown trout populations, the wider effects of the dam are not considered within this report. The Department acknowledges F&G’s concern regarding this population, but does not believe that passage of this species is affected by the dam.
- 6.30 F&G have made a number of monitoring recommendations. The Department acknowledges these recommendations and recommends that both pre and post dam monitoring be required. The Department has stipulated what the pre-dam monitoring should entail, and stipulated a minimum of 12 months (or 6 months if dam construction is due to commence). While a longer period such as the 36 months recommended by F&G would be desirable, we do not consider it reasonable to delay the construction of the dam for such a period. The details of what monitoring is required post dam will be set out in the protocol to be certified by the Department in due course.
- 6.31 F&G have also submitted that year round operation of the trap and transfer system is the most effective way to ensure success due to seasonal fluctuations in migration. The Department has recommended 36 months continuous (i.e. year round) operation of the trap and transfer post dam construction. The periods of operation after that 36 months will be set out in the trap and transfer design, and this can be varied if the system is failing to meet the requirement to transfer all species.
- 6.32 The risk of pest fish populating the reservoir has been raised by F&G.
- 6.33 The Department agrees that this is a risk and notes that it has not been adequately addressed by the Applicant in this application. This is to be addressed through the design of the trap and transfer system, as set out at section 7.0 of this report.

<b>7.0 Proposed Requirement and Specifications for a trap and transfer system</b>
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- 7.1 We now recommend an overall Requirement and set of Specifications for the trap and transfer system.

## **Requirement and Specifications for a Trap and Transfer System**

### **1. Definitions**

“Approval” means the Director-General’s Requirement and Specifications for fish passage.

“Approval Holder” means the person lawfully operating the RWSS.

“Department” means the person acting under the delegated authority of the Director-General.

“Pest fish” means Koi carp, rudd, Gambusia and Brown bullhead catfish.

“Makaroro Dam” means the physical dam structure to be located on the Makaroro River as part of the Ruataniwha Water Storage Scheme.

“Target Fish Species” means longfin eel, torrentfish, koaro, common bully, bluegill bully, redfin bully, and native smelt, including any other species of native migratory fish found during the pre-dam monitoring specified in Specification 3.1.

“Requirement” is the requirement set out in clause 2.1

“Specifications” is every other specification set out in section three of this section, section 7.0

### **2. Requirement**

- 2.1 The Approval Holder will design and operate an effective upstream and downstream trap and transfer system for all Target Fish Species.

### **3. Specifications**

#### **3.1 Baseline information monitoring to be undertaken before the dam is constructed**

- 3.1.1 Baseline Monitoring must be undertaken by the Approval Holder. Information collected must include, but is not limited to:

- i. Confirmation of the migratory native fish species present or absent in the Tukituki River catchment in the vicinity of the proposed Makaroro Dam site and upstream of that proposed site.
- ii. Length frequency data and minimum density estimates for target migratory native fish present in the vicinity of the proposed Makaroro Dam site and upstream of that proposed site.
- iii. Area fished (length and width).
- iv. General location details and GPS co-ordinates of areas monitored.
- v. Photographs and brief habitat description of areas monitored.

- 3.1.2 Baseline Monitoring must be undertaken at reaches representative of the environment upstream of the proposed Makaroro Dam, taking into account the listed Target Fish Species, to ensure the Department can determine whether the Requirement can be met.

- 3.1.3 Baseline Monitoring must be undertaken in accordance with the Joy et al (2013) protocol.

- 3.1.4 The Approval Holder must start the baseline monitoring within 2 months of receiving this Approval.

- 3.1.5 Baseline monitoring in this clause shall be undertaken monthly for a 12 month period. If construction which precludes monitoring begins before the end of the 12 month period, the Approval Holder must carry out at least 6 months of monitoring before this stage of construction starts.

- 3.1.6 The Approval Holder must log any information received through this monitoring into the NIWA freshwater fish database at periods no longer than 6 monthly.

3.2 Design and operation of the trap and transfer system

- 3.2.3 Within 6 months of obtaining the baseline information to be completed under Specification 3.1, the Approval Holder must submit a trap and transfer system (ie the design and the operating parameters) to the Department for approval in a certifier role.
- 3.2.4 The system must be designed by an expert(s) qualified in aquatic ecology and design of fish passage systems, engaged by the Approval Holder.
- 3.2.5 The Department must certify the system if, in the Department's opinion, it will achieve the Requirement by (without limitation) meeting the following criteria:
- i. the trap/s maximise the catch of all of the Target Fish Species. This may entail multiple trap designs, and/or may entail the use of altered slope and substrate of the entrance ramp or a submerged orifice trap entrance.
  - ii. the upstream release points are at locations well above the reservoir which ensure the released fish are encouraged to migrate further up the catchment rather than into the reservoir.
  - iii. pest fish and aquatic pest plant species are identified and not transferred.
  - iv. the system includes an initial evaluative period of 36 months of continuous operation.
  - v. following the evaluative period, the system will operate for sufficient periods of the year and sufficient hours of the day to ensure the Requirement is met;
  - vi. the trap and transfer system will minimise stress and mortality of Target Fish Species.
  - vii. traps are located so as to maximise the capture of species migrating up or down the river at different times of the year (which may entail moving traps during the year); and
  - viii. if measures are undertaken to lure fish to the traps, those measures are the most effective lures for all of the migrating species (which may entail trialling different lures).

- 3.2.4 The Approval Holder must operate the trap and transfer system in accordance with the certified system as modified from time to time under Specification 3.3.

3.3 Monitoring to be undertaken once dam in operation

- 3.3.1 The purpose of monitoring, once the dam is in operation, is to evaluate whether the Requirement is being achieved.
- 3.3.2 The Approval Holder must engage a suitably qualified and experienced freshwater aquatic ecologist to design and implement a monitoring protocol, to be undertaken once the dam is operational. This will be approved by the Department in a certifier role.
- 3.3.3 The monitoring must provide information, for sites above and below the dam, to enable the Approval Holder to demonstrate whether the trap and transfer system is meeting the Requirement.
- 3.3.4 The monitoring protocol must specify what records must be kept of the numbers and species of fish caught in the trap.
- 3.3.5 The monitoring must be carried out in accordance with the monitoring protocol approved by the Department.
- 3.3.6 The Approval Holder must report annually to the Department setting out the data obtained through monitoring carried out in the previous year.



- 3.3.7 The Approval Holder must provide five yearly analysis of the previous five years of reporting data as provided under 3.3.6 and other relevant data used to identify whether the trap and transfer system is meeting the Requirement.
- 3.3.8 In the event monitoring establishes that the trap and transfer system is not meeting the Requirement, the Approval Holder shall commission an independent report by a suitably qualified expert to establish why the Requirement is not being met, and to recommend modifications to the trap and transfer system. Upon receipt of such recommendations the Approval Holder shall present this information to the Department.
- 3.3.9 The Approval Holder will identify any practicable option to implement the recommended changes and submit a varied trap and transfer system to the Department for approval in a certifier role.
- 3.4 Variation of monitoring protocol
- 3.4.1 If the Department is not satisfied that the monitoring protocol is providing adequate information in order to determine whether the trap and transfer system is meeting the Requirement, the Department may require the Approval Holder to vary the protocol to better achieve this.
- 3.5 External Expert advice
- 3.5.1 The Department may engage, at the expense of the Approval Holder, an expert(s) qualified in aquatic ecology and / or design of fish passage systems, who is independent of the Approval Holder and the Department, to review:
- the proposed system (before initial certification);
  - the system once it is operational; and
  - the monitoring protocol;
- and advise whether the system will meet, or is meeting, the Requirement, or, in the case of the monitoring protocol, whether it will meet, or is meeting, the purpose of monitoring. The expert may also recommend changes to the system or protocol.
- 3.6 Amendment to the Requirement and Specifications
- 3.6.1 This Requirement and these Specifications can be amended at any time by agreement in writing between the Department and the Approval Holder.

## **8.0 Applicant's comments on draft report**

- 8.1 The Applicant was invited to comment on this report, more specifically, it was invited to comment as per this instruction:  
“We are looking for comments in regards to factual matters as set out in the report, and to understand whether the overall requirement and specifications (as set out in section 7.0 of the report) are, in your opinion, practicable, or if other methods to avoid, remedy or mitigate the effects of the dam on fish passage.”
- 8.2 The Applicant's response can be seen at the following links:
- Email from Applicant: [Email Reply](#)
  - Letter from Applicant: [Letter Reply](#)
  - Comments on draft report: [Draft Report](#)
  - Letter from Cawthron Institute: [‘Cawthron Letter’](#)
- 8.3 There are three main points made by the Applicant in their letter, which are set out and addressed in turn:
- 8.4 Point 1, submitted by the Applicant

- 8.4.1 The Applicant requested “Some suggested re-wording and additions to Clause 1.16 to clarify the dam type considered by Board of Inquiry, and explains the condition mechanism which allows variations to this application design.”
- 8.4.2 The Department has accepted this wording, and has included the Applicant’s comments as part of paragraph [1.16].
- 8.5 Point 2, submitted by the Applicant
- 8.5.1 The Applicant requested “Some suggested minor amendments to the Specification in Section 7.0 of the Report, primarily to reflect the views of Dr Young and Dr Ausseil regarding the proposed baseline monitoring programme.”
- 8.5.2 Where wording has clarified meaning, such as ‘monitoring’ being amended to read ‘baseline monitoring’, this has been accepted.
- 8.5.3 The Applicant noted different requirements, ie the use of the words ‘is to’, ‘will’, ‘shall’, and ‘must’. For the sake of clarity, the Department has amended the requirements of section 7.0 to ‘must’ requirements.
- 8.5.4 Small amendments were suggested to clause 3.1.2, which have been accepted.
- 8.5.5 The Applicant, on advice from Roger Young and Olivier Ausseil in the Cawthron Letter linked above, requested an amendment to the baseline monitoring clause 3.1.5, effectively reducing the months of monitoring to be undertaken. This was suggested on the basis that cooler temperatures in winter reduce fish activity, therefore limiting the value of monitoring during this time. The Applicant requested an amendment to clause 3.1.5, so that it would read as follows:
- 8.5.6 “Baseline Monitoring in this clause shall be undertaken within a 12 month period between the months of November to April prior to construction commencing. If construction which precludes monitoring begins before the end of the 12 month period, the Approval Holder must carry out at least 6 months of monitoring before this stage of construction starts.”
- 8.5.7 The Department sought advice from a Freshwater Technical Advisor in this respect.
- 8.5.8 The Department accepts that fish are less active in winter, however notes they are not completely absent. This monitoring is required to inform the trap and transfer design. Different fish species exhibit different behaviours and life histories meaning that it is inappropriate for monitoring not to occur at least monthly during winter. If the Applicant wishes to carry out monitoring more often than monthly over summer, the Department would support this.
- 8.5.9 Cawthron considers the other requirements are ‘good sense’ (refer page 1, Cawthron Letter), further stating at page 2:
- 8.5.10 “The criteria for the trap and transfer system listed in clause 3.2.3 of the proposed Requirements and Specifications seem sensible and largely align with the thinking of the team that conceived the trap and transfer programme.”
- 8.5.11 In regards to the lack of information currently available on the trap and transfer system, the Cawthron Letter states:
- 8.5.12 “We recognise that there is currently limited information on the design and operating parameters of the trap and transfer system. This is intentional so that the detailed design can be informed by data collected in the monitoring programme, knowledge from local representatives on the Ruataniwha Biodiversity Advisory Board (RBAB), and from observations of fish accumulations below the dam during the first migration period after construction (to identify the best trap location).”

- 8.5.13 The Department notes these comments, and believes that the Requirement and Specifications will support the development of a comprehensive trap and transfer System.
- 8.5.14 The Specifications did require some specificity as to the location of the trap and release locations, which is commented on in the Cawthron Letter as follows:
- 8.5.15 “The draft report recommends that the design and operating parameters of the trap and transfer system shall be submitted to DOC for certification within 6 months of obtaining baseline information required in Clause 3.1 of the proposed Requirements and Specifications. Detailed design and operating parameters of the trap and transfer system will be able to be supplied at that stage, but we won’t be able to confirm the exact location where trapping is best conducted, which will be guided by subsequent fish observations during the first migration period after construction.”
- 8.5.16 The Department acknowledges this and notes that the certification requirements of specification 3.2.3 have enough flexibility to allow for identification of trap locations following construction of the dam.
- 8.5.17 The Applicant also proposed a small amendment, to the introductory words of this clause, which has been accepted.

8.6 Point 3, submitted by the Applicant

8.6.1 The Applicant requested: “Some minor typographical and formatting suggestions.”

8.6.2 Accepted as relevant.

8.7 Other Comments submitted by the Applicant

8.7.1 In addition to the above 3 main points, the Applicant referred to the Department’s concern, as noted at paragraph [3.22.4] of this report, that funds could be moved between IMOAs projects, potentially moving resource from the trap and transfer project. The Applicant stated:

“[The] Department does not (at this stage) support Condition 9 of Schedule Two of the RWSS resource consent conditions which provides a mechanism for shifting money between the different IMOAs projects if the Consent Authorities agree.

While this view is understood and respected, this mechanism is in the resource consent conditions. We think it is relevant that under Condition 8 of Schedule Two, any such alteration to the IMOAs project expenditure defined in the conditions would need to be based on a recommendation from the Ruataniwha Biodiversity Advisory Board (which will include a representative of the Department, along with other environmental groups and the Kaitiaki Runanga).”

8.7.2 While acknowledging this, the Department’s concern remains. We further note that even if alterations to the IMOAs package occur, this does not affect the Applicant’s fish passage obligations.

## **9.0 Summary and Conclusions**

- 9.1 The Applicant has submitted their application, including a number of supporting documents. Included in this was the Integrated Mitigation and Offset Approach, originally designed and submitted as part of the wider BOI process for the RWSS.
- 9.2 For the reasons set out in this report, the Department considers that the facilities put forward by the Applicant (the two fish screens and the trap and transfer system), with the recommended Requirement and Specifications, meet the legal test for the Director-General’s approval under the FFR 83.

- 9.3 The Director-General is required to make decisions as follows:
- Whether to require that the upstream water intake structure include a fish facility (fish screen), and if so, what conditions to specify. This decision will also be expressed as whether the Director-General approves the fish facility proposed by HBRIC.
  - Whether to require that the downstream water intake structure include a fish facility (fish screen), and if so, what conditions to specify. This decision will also be expressed as whether the Director-General approves the fish facility proposed by HBRIC.
  - Whether to require that the dam include a fish facility in the form of a “trap and transfer” system and if so, what conditions to specify. (We consider that the “trap and transfer” system is a “fish facility” as it comes within the definition in the Regulations.) This decision will also be expressed as whether the Director-General approves the fish facility proposed by HBRIC.
  - Whether to require that the dam include a further fish facility (and if so, what conditions to specify), or, put another way, whether to grant a dispensation from any further requirement for a fish facility.
- 9.4 The legal test for these decisions is:  
In order to achieve the Department’s purposes and functions of:
- promoting and conserving New Zealand’s natural and historic resources; and
  - preserving indigenous freshwater fisheries and protecting recreational freshwater fisheries and freshwater fish habitats
- should the Director-General require a fish facility, or is it acceptable to grant a dispensation, taking into account the practicalities of installing a fish facility and any offsets and mitigation measures?
- 9.5 The Makaroro Dam will block all upstream migratory fish passage and significantly affect downstream migratory fish passage. Based on information submitted by the Applicant, this will affect 7 native migratory fish species, of which only 2 may form self sustaining populations above the dam. Of the 7 native migratory fish species affected by the dam, 5 are classified as ‘declining’.
- 9.6 The migration of rainbow trout will also be affected by the dam, however a self-sustaining population is highly likely to form behind the dam wall.
- 9.7 The Department has a mandate to preserve indigenous freshwater fisheries, and protect recreational freshwater fisheries. Due to the likelihood of a self-sustaining rainbow trout population forming behind the dam, the Department has chosen to focus the question of adequate fish passage on native migratory species.
- 9.8 The Department believes the best fish passage option in these circumstances is a trap and transfer system focussing on native migratory fish.
- 9.9 The Department notes that there is a lack of technical information to support the trap and transfer system at this point in time. To bridge this gap, the Department has developed a Requirement and Specifications (as set out in section 7.0 of this report) which the design must meet in order to be certified by the Department.
- 9.10 The Department considers that there is adequate information, in respect of each decision required, to support informed decision making. In the event the Director-General believes that there is insufficient information in respect of any or all of the required decisions, he may defer his decision until this information is received.

- 9.11 While acknowledging the role of the IMOA, the Department reiterates that the benefits of this wider package are difficult to measure, uncertain and often reliant on, as yet unsecured, third party consent and support. Because of this, it is essential that the trap and transfer system operate at the highest level of efficacy, allowing for monitoring and modification as required.
- 9.12 The Requirement and Specifications for operation of the trap and transfer system will achieve this.
- 9.13 The Application requested consideration of a fish screen at the upstream water intake structure. The Department recommends that you require a fish screen in identical terms to the Resource Consent conditions determined through the BOI process.
- 9.14 The Application requested consideration of a fish screen at the downstream water intake structure. The Department recommends that you require a fish screen in identical terms to the Resource Consent conditions determined through the BOI process
- 9.15 Consultation with iwi raised a number of concerns. Those relating to technical aspects of the fish facilities such as ongoing monitoring have been addressed through the Requirement and Specifications. Comments outside of this scope are acknowledged.
- 9.16 Consultation with Fish and Game raised similar concerns as to the efficacy of the system, as well as ongoing monitoring and modification. The Department believes that a number of these concerns can be addressed through the Requirement and Specifications. F&G are largely concerned about effects on trout (although they refer to effects on native fish also). The Department recommends that the focus of the trap and transfer system be on native fish, though it will not exclude trout.
- 9.17 The Department considers that the trap and transfer system, subject to the Department's proposed Requirement and Specifications, is the best fish passage option available to the Applicant, and recommends that the Applicant be granted a dispensation from any further fish passage requirement.
- 9.18 The decisions now required from the Director-General are set out at section 10.0 of this report.

## **10.0 Decisions to be made by Decision Maker**

Prior to making a decision, we request that the Director-General:

- 1. Note** this application requires decisions as follows:
  - a. Adequacy of information;
  - b. Whether to require that the upstream water intake structure include a fish facility (fish screen), and if so, what conditions to specify;
  - c. Whether to require that the downstream water intake structure include a fish facility (fish screen), and if so, what conditions to specify;
  - d. Whether to require that the dam include a fish facility in the form of a "trap and transfer" system and if so, what conditions to specify.
  - e. Whether to require that the dam include a further fish facility (and if so, what conditions to specify), or, put another way, whether to grant a dispensation from any further requirement for a fish facility; and
  - f. Whether the "lapse" period (set out in Regulation 44(4) of the FFR 83) should be extended to 10 years.
- 2. Note** that this decision is made under the FFR 83, not the concessions provisions of the Conservation Act 1987.
- 3. Note** the term sought is undefined, as the regulations do not contemplate a defined term.
- 4. Note** that the Department recommends that you allow the Applicant a "lapse" period of 10 years, to complete the construction of the dam, before these approvals expire.

5. **Note** that a decision is required by 19 August 2015.
6. **Note** that the Applicant relies on the Board of Inquiry process and decisions to support its application.
7. **Note** that the Director-General can only take the Board of Inquiry process into account insofar as it relates to the issue of fish passage.
8. **Note** that the FFR 83 effectively require the Director-General to take the presence of the dam as a 'given' for the purposes of this application.
9. **Note** the FFR 83 are administered by the Department, therefore the Department's section 4 CA 87 obligations apply.
10. **Note** that the Department undertook consultation with iwi and is satisfied that the process it has followed, and the recommendations it has made, give effect to the principles of the Treaty of Waitangi within the scope of the FFR 83.
11. **Note** that the Conservation General Policy and the Hawke's Bay Conservation Management Strategy are relevant to this decision and the Department considers the process followed, and recommendations made, to be consistent with those documents.
12. **Note** that the Makaroro Dam will obstruct fish passage past the dam.
13. **Note** that without assistance of some sort, upstream passage past the dam will be blocked, and downstream passage significantly reduced.
14. **Note** that the Applicant presented its consideration of possible fish passage options to the Department, and prefers a limited trap and transfer system (focussed largely on eels and koaro) to any alternative form of fish passage.
15. **Note** that the Department accepts the Applicant's submission that a trap and transfer system is the most feasible option to maintain both upstream and downstream fish passage past the Makaroro Dam.
16. **Note** that the Department does not recommend that you require any further or alternative fish facility to enable fish passage past the dam (such as an engineered fish pass).
17. **Note** that the Department recommends that you require a more comprehensive upstream and downstream trap and transfer system than was submitted by the Applicant, to target all migratory native fish species.
18. **Note** the Department has recommended a Requirement and Specifications be imposed to ensure the trap and transfer system is effective, including criteria for final certification of the system.
19. **Note** that the Department undertook consultation with Fish and Game Eastern and Hawke's Bay Regions.
20. **Note** that the Department has considered the feedback received from Fish and Game Hawke's Bay Region.
21. **Note** that the Department does not consider that the passage of brown trout will be affected by the dam to any significant degree.
22. **Note** the Department does not recommend that rainbow trout be a target species for the trap and transfer system, but advises that the system does not exclude rainbow trout.

- 23.** **Note** that the Applicant's proposed fish screen located at the upstream water intake structure is subject to resource consent conditions that the Department considers represent current best practice.
- 24.** **Note** that the Applicant's proposed fish screen located at the downstream water intake structure is subject to resource consent conditions that the Department considers provide the best practicable way to assist native fish.
- 25.** **Note** that the Applicant has reviewed a draft of this report, and has largely indicated support for the contents.
- 26.** **Note** the test for the decisions as follows:

In order to achieve the Department's purposes and functions of:

- promoting and conserving New Zealand's natural and historic resources; and
- preserving indigenous freshwater fisheries and protecting recreational freshwater fisheries and freshwater fish habitats

should the Director-General require a fish facility, or is it acceptable to grant a dispensation, taking into account the practicalities of installing a fish facility and any offsets and mitigation measures?

- 27.** **Note** the Department considers that the recommendations in the following section meet the above test.

Pursuant to Regulations 43(3), 44(1), 44(2), 44(3) and 44(4) of FFR 83 it is recommended that the Director-General make the following decisions:

**Upstream Water intake fish facility (fish screen)**

- 1.** **Deem** the information contained within this report to be adequate for the purposes of this decision

**Agree / Disagree**

**and**

- 2.** **Require** the Applicant to install an upstream water intake fish facility (fish screen), upon the same terms and conditions as the relevant resource consent.

**Agree / Disagree**

**Downstream water intake fish facility (fish screen)**

- 3.** **Deem** the information contained within this report to be adequate for the purposes of this decision

**Agree / Disagree**

**and**

- 4.** **Require** the Applicant to install a downstream water intake fish facility (fish screen), upon the same terms and conditions as the relevant resource consent.

**Agree / Disagree**

### **Trap and transfer system**

5. **Deem** the information contained within this report to be adequate for the purposes of this decision

**Agree / Disagree**

**and**

6. **Require** the Applicant to design and operate an effective upstream and downstream trap and transfer system for all native migratory fish species present in the vicinity of the proposed Makaroro Dam and upstream of the Dam site.

**Agree / Disagree**

**and**

7. **Require** the Applicant to design and operate the trap and transfer system in accordance with the Requirement and Specifications as set out in section 7.0 of this report.

**Agree / Disagree**

### **Further fish facility**

8. **Deem** the information contained within this report to be adequate for the purposes of this decision.

**Agree / Disagree**

**and**

9. **Not Require** any further fish facility at the proposed Makaroro Dam, and grant a dispensation from any such requirement.

**Agree / Disagree**

### **Extension of “lapse” date**

10. **Allow** the “lapse” period for the approvals, under decisions 1-7 above, to be 10 years from the date these approvals are issued.

**Agree / Disagree**

### **Next Steps**

11. **Advise** the Department of your decisions and request that the Department prepare a decision letter and Approval document for you to send to the Applicant.

**Agree / Disagree**

12. **Request** the Department to formulate a strategy for the public release of your decision (given the public interest in the Makaroro Dam).

**Agree / Disagree**



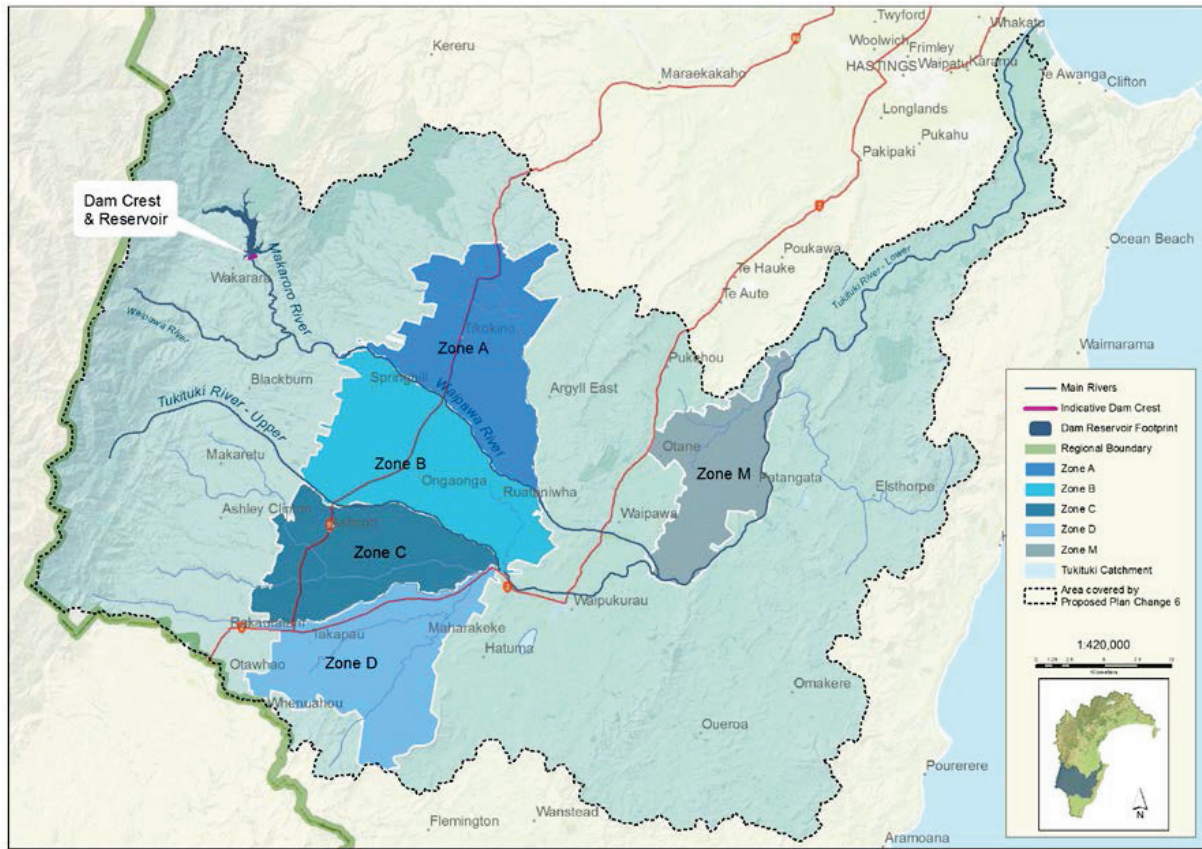
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Lou Sanson  
Director General, Department of Conservation

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Date

**SCHEDULE A – Map**



## SCHEDULE B – Table of Information Requested and Received for Trap & Transfer Regime

Question Asked – Letter of 08/12/14	Response from Applicant – 18/02/15	Science Advisor analysis – 24/02/15
<p>Condition 19 on consent WP120371M requires HBRIC to engage an ecologist to design a monitoring programme for eels to determine whether ‘successful’ recruitment of eels is occurring. Can you advise any further details of this monitoring programme? What will be the test of “successful” recruitment? Will the biological community above and below the dam location be monitored for baseline information prior to the dam construction?</p>	<p>As outlined in Condition 19 of the RWSS Resource Consent WP120371M, <i>“the consent holder is required to consult with Te Taiwhenua o Tamatea, Te Taiwhenua o Heretaunga, Te Taiwhenua o Te Whanganui Ā Orotu, Ngāti Kahungunu Iwi Incorporated, Department of Conservation, and the HBRC freshwater ecology team on a draft of the protocol before it is finalised. The protocol shall be submitted to the HBRC Group Manager Resource Management for certification that it will adequately meet the purpose of the monitoring. The consent holder shall ensure the initial investigation is undertaken prior to any dam construction (including any associated earthworks) commencing with follow-up surveys at five yearly intervals after the completion of first reservoir filling over the duration of the consent.”</i></p> <p>An eel monitoring protocol was finalised with sign off by the HBRC Group Manager Resource Management in March 2014 (attached as Appendix 1.) after consultation with DOC and iwi (see attached meeting notes in Appendix 2). The protocol provides considerable detail on the monitoring programme. The initial pre-construction investigation was conducted in March and early April of 2014 (to ensure completion before a possible construction start in 2014/15 summer) and a report describing the results has been prepared (Maclean 2014) (attached as Appendix 3). Sites were sampled above and below the site of the potential dam.</p> <p>Successful recruitment resulting from the trap and transfer programme will be evident if young eels between 150 and 300 mm long are recorded during electric fishing in tributaries and along the edge of the mainstem of the Makaroro River above the dam (Maclean 2014).</p>	<p>Adequate Information.</p> <p>Other fish species are being added to the 5 yearly monitoring protocol.</p> <p>Monitoring will continue for the life of the consent.</p> <p>Yes, pre-dam community structure both above and below the dam was surveyed in Nov 2014.</p>
<p>The only monitoring that is detailed in the scheme at present will be undertaken on the eel population up and down stream of the dam. Why is further monitoring of other species not proposed? Will monitoring be undertaken for the</p>	<p>The only monitoring required by the granted RWSS Resource Consent conditions relates to eel populations. However, the presence and relative abundance of other native fish species at the monitoring sites was measured during the pre-construction investigation and we have recommended that a change to the eel monitoring protocol (Appendix 1) is made to ensure that this continues.</p> <p>Monitoring is required at 5-yearly intervals over the duration of the consent.</p>	<p>No comment.</p>

<p>life of the RMA consent, for the lifetime of the dam, or for another specified period?</p>	<p>The eel monitoring protocol provides some more details on the information that will be recorded – daily catch per unit effort of juvenile fish transferred over the dam. We expect that further details relating to monitoring of fish species and numbers of individuals transferred will be included in the detailed trap and transfer plan that will be developed in consultation with the RBAB.</p>	
<p>Does the present monitoring regime allow for modification of the monitoring process over the life of the project in the event that the process is inadequate?</p>	<p>As detailed previously, Condition 8 of Schedule Two of the RWSS Resource Consents specifies that the consent holder will convene an annual review meeting to report on progress on the IMOA Programme. Performance targets, monitoring results and any recommendations for altering the focus of any of the IMOA Programme projects to better meet the objectives of the programme will be considered at this annual review meeting.</p> <p>Condition 56a of Schedule One of the RWSS Resource Consents also specifies that the Kaitiaki Rūnanga will be provided with information on the pre and post construction eel monitoring reports and have the opportunity to identify any issues of concern that may arise during the pre- construction, construction, and initial operation phases of the RWSS in order to discuss and recommend any appropriate additional measures outside of the RWSS conditions which may need to be considered by the consent holder to address any issues raised.</p> <p>Both of these consultative and engagement mechanisms provide opportunities to modify the monitoring process in the event that the process is inadequate.</p>	<p>Adequate information.</p> <p>Yes, the monitoring plan can be altered either after a yearly meeting that evaluates the progress made on the mitigation and offsetting projects or by Kaitiaki Rūnanga after they have been provided with pre and post construction monitoring reports.</p>
<p>The application anticipates a trap and transfer strategy that will trap fish both above and below the dam to physically move them and release them, but provides no further detail. a) Please provide specifications of how the trap and transfer system will be set up, including details of any structures to be placed in the water. Why is this particular design proposed?</p>	<p>Response: Detailed design of the trap and transfer system will be incorporated into the final design phase of the project with input from the RBAB (as described in Condition 8 of Schedule Two of the RWSS Resource Consents). The trapping system for the upstream movement of fish is expected to involve an attractant flow leading to a trap box installed beside the river channel (see example on ) <a href="http://garethsworld.com/blog/environment/river-story-winner-bill-kerrison-saving-nzs-longfin-eel">http://garethsworld.com/blog/environment/river-story-winner-bill-kerrison-saving-nzs-longfin-eel</a></p> <p>This approach is proposed because it has been successfully operated for young eels (elvers) at several hydro dams throughout New Zealand (e.g. Karapiro Dam, Patea Dam, Matahina Dam, Manapouri Lake Control). For example, during a trial trap and transfer operation in early 2000 approximately 455 000 elvers were successfully moved over the Patea Dam, while only 27 000 elvers passed through the fish pass over the same six week period (Boubée et al. 2003). An active trap and transfer operation has now replaced the pipe elver pass (Ryder Consulting 2011).</p> <p>Trap and transfer operations can also provide passage</p>	<p>Inadequate information - I don't believe that any additional information has been provided to us in their response.</p> <p>There is no information in the BOI report regarding how the trap and transfer programme will operate.</p> <p>(Report Writer note: there is <i>some</i> information in the report about how the trap and transfer will operate. For example there is a budget of 21, 500</p>

	<p>for other migratory species if they can be successfully trapped. Several other species of native fish are caught as “bycatch” in trap and transfer operations primarily targeting elvers. For example, native fish “bycatch” including koaro, banded kokopu, inanga, koura, smelt, torrentfish, common bully and redfin bully have been recorded at the elver trap at the Patea Dam (Bonnett 2011). Between December 2004 and March 2005, a total of 640 fish other than eels were caught, and between November 2005 and March 2006 a total of 2,513 fish other than eels were caught.</p> <p>The final placement of the trap should be determined after observations of fish accumulations below the dam during the first migration period after construction, or alternatively placed further downstream where local knowledge indicates migrating fish will be concentrated and successfully trapped.</p> <p>Some details relating to the design and operation of the downstream trap and transfer programme are included in the monitoring protocol (attached) and the report on the preconstruction eel population (Maclean 2014). Based on observed eel densities it is likely that the migratory run of longfin eels from the upper Makaroro River will be in the order of several tens of individuals, rather than hundreds or thousands of eels. Practical difficulties with effectively trapping these eels during flood flows and at night when they are most likely to be migrating are significant. Maclean (2014) suggests that consideration should be given to moving resources budgeted for the downstream adult trap and transfer programme to off-site mitigation elsewhere in the catchment/Hawkes Bay and leaving the eels in and above the reservoir for cultural/recreational harvest. This concept was discussed briefly with the mana whenua working group (February 2013) but there was a strong preference for enabling eels from above the dam to access their spawning grounds. As highlighted in the monitoring protocol an alternative to trapping migratory eels during their downstream migration would be to capture and transfer eels that were visibly undergoing transformation to migratory state, or of a size where migration would be likely prior to actual migration, and moving them downstream below the dam. In our opinion this is the most practical and preferred approach.</p>	<p>per annum for the trap and transfer—see Project C in the Final Report and Decisions – Volume 3 (no page number) However there is no information on its design).</p>
<p>b) How does the trap and transfer method ensure that both upstream and downstream migrations of fish and eels are facilitated? How will downstream migrants be</p>	<p>Response: The response to 6.5a above details the approach to the trap and transfer programme. Downstream trap and transfer programmes operate currently on several river systems throughout New Zealand e.g. Waitaki River, Waiau River (Boubee et al. 2008). There are few other options for enhancing downstream migration of adult eels other than releasing flows over the spillway during autumn freshes when the strongest likelihood of these fish seeking downstream access will occur (Boubee et al.</p>	<p>Adequate information.</p> <p>No further information is provided specifically regarding the design of the trap and transfer scheme. There is some</p>

<p>trapped? What are the likely levels of success of this method? Has experience been drawn on from elsewhere in New Zealand?</p>	<p>2001, 2003; Richkus &amp; Dixon 2003). However, many natural autumn high flows will be 'captured' within the reservoir as water levels recover following flow augmentation over the summer and spilling at the appropriate time of year is not likely to occur during dry years. Installation of a bypass pipe might also be effective, but the wide range of reservoir levels makes the design and operation of a bypass pipe impossible (Boubee &amp; Williams 2006). After discussion with DOC and the Mana whenua working party the proposed trap and transfer programme was considered the best option.</p>	<p>discussion of the success of similar schemes at other dam sites and it seems that downstream migration will be difficult to implement. Eels' downstream migration and spillways release do not occur at the same time and trap and transfer programmes implemented at other dams have not had great success in the downstream transport of eels.</p>
<p>c) Fish larvae drift downstream and this migration has also been identified as being likely to be affected by the dam. How will you measure the success or otherwise of the downstream migration of fish larvae after dam construction and their success in passing either over the spillway or through the turbines? Information is lacking as to the fate of downstream migration of larval fish when entering large reservoirs. For drifting larvae, what are the likely travel times through the reservoir, and is mortality likely to be increased? How is this risk addressed? Will the likely currents</p>	<p>Response: Koaro require downstream access after spawning in autumn when their larvae passively migrate downstream during freshes. This is also the case for most other diadromous native fish species (those with a marine stage in their lifecycle), although the timing of their downstream passage varies. It is expected that larvae will migrate along the reservoir with currents and pass downstream over the dam in the spillway flow (if spilling) or become entrained in the flow augmentation releases through the turbines. Alternatively, those koaro larvae that are not carried past the dam may remain and rear in the reservoir, potentially forming a land-locked population. Natural mortality of koaro and other native fish larvae as they move downstream is unknown. However, Coutant &amp; Whitney (2000) report that survival of planktonic fish larvae through the extreme conditions associated with hydro-power turbines is high. On this basis survival is also likely to be high for larval fish passing downstream in the spillway flow. Downstream trap and transfer of larval fish and monitoring of larval fish survival has to our knowledge never been attempted elsewhere and is not planned.</p>	<p>Adequate information.</p> <p>No attempt will be made to trap or measure numbers of larval fish migrating downstream.</p>

<p>in the reservoir direct drifting larvae to the dam exit?</p>		
<p>d) The movements of many of these other species can occur in large runs of small fish (e.g. Koaro) which would make effective trap and transfer difficult and possibly require multiple systems of trap and transfer to be operating simultaneously. How does the trap and transfer programme deal with the large runs?</p>	<p>Response: As mentioned above, downstream trap and transfer of larval fish is not planned. The proposed design of the upstream trap and transfer system will be able to cope with relatively large numbers of small fish, as has been demonstrated elsewhere (Boubée et al. 2003). Intensive trap and transfer efforts will be focussed at times of the year when juvenile fish will be migrating and seeking passage (November to February).</p>	<p>Adequate information.</p> <p>No larval fish downstream trap and transfer.</p> <p>They believe the upstream trap and transfer can deal with a large number and back this up with a reference that I have not read.</p>
<p>e) The Cawthron Report recommends that any trap and transfer system should ensure that robust monitoring information concerning fish species and numbers of individuals transferred each year is undertaken and reported. This is not mentioned in the design of the trap and transfer programme. What monitoring is planned? At what frequency? And over how many years?</p>	<p>Response: The eel monitoring protocol (Appendix 1) provides some more details on the information that will be recorded – daily catch per unit effort of juvenile fish transferred over the dam. We expect that further details relating to monitoring of fish species and numbers of individuals transferred will be included in the detailed trap and transfer plan that will be developed in consultation with the RBAB.</p>	<p>Inadequate information.</p> <p>No concrete information has been provided but there is an expectation that some aspects, which will be determined later, of fish and eel numbers will be recorded during transportation past the dam.</p> <p>The BOI does not provide any specific information regarding what monitoring will be undertaken from the trap and transfer programme other than that it will be undertaken by a “suitably qualified and experienced freshwater aquatic ecologist”, will be focused on eels and consultation will take place with “Te Taiwhenua o</p>

		<p>Tamatea, Te Taiwhenua o Heretaunga, Te Taiwhenua o Te Whanganui Ā Orotu, Ngāti Kahungunu Iwi Incorporated, Department of Conservation, and the HBRC freshwater ecology team on a draft of the protocol before it is finalised.</p>
<p>f) Does the trap and transfer method address the risk of pest fish and aquatic weeds being transferred? If so, how will these risks be addressed? If not, why do you think that these risks are not required to be addressed?</p>	<p>Response: The risk of pest fish and aquatic weeds being transferred needs to be considered for the trap and transfer programme. This aspect will be included in the detailed trap and transfer plan that will be developed in consultation with the RBAB.</p>	<p>Inadequate information.</p> <p>To be considered further at a later date.</p> <p>This issue of the potential transfer of aquatic pest species is not dealt with in the BOI report.</p>
<p>g) The upstream trap and transfer programme needs to use a trapping point located to effectively attract fish into the pass or trap. Where will this point be located?</p>	<p>Response: As mentioned above, the final placement of the trap should be determined after observations of fish accumulations below the dam during the first migration period after construction, or alternatively placed further downstream where local knowledge indicates migrating fish will be concentrated and successfully trapped. This approach is considered to be best practice given that there is still some flexibility with the final dam design and will ensure that the trap is not located in an unsuitable position.</p>	<p>Adequate information.</p> <p>Upstream trap and transfer location will be based either on observed migration patterns in the first year after dam construction or based on local knowledge of eel migration routes.</p>



<p>h) The Cawthron Report recommends that the trap and transfer programme be implemented year round for the first few years of operation in order to ascertain periods of migration for different species. It has been suggested that the trap and transfer programme will only operate a few months of the year. Why?</p>	<p>Response: Fish migrations tend to have reasonably strong seasonality. Consequently, the trap and transfer programme need not operate year round after an initial evaluative period. This evaluation period would need to be several years long in order to account for likely high inter-annual variability in numbers of migrants reaching the dam. We recommend that a seasonal operating regime for the trap and transfer facility is developed following monitoring over the first few years of operation. The monitoring would involve counts of the numbers and species of fish caught in the trap. At that time, optimised seasonally-based operational parameters could be confirmed.</p> <p>The budget for the trap and transfer programme is highlighted in Schedule Six of the RWSS Resource Consents. A figure of \$10,000 has been provided for the trapping system proposed at the toe of the dam to trap native fish for transporting upstream to the reservoir. This is a year one cost requirement. In addition, \$11,500 per year is included to provide for a local person to maintain the system and transfer the fish from Point A to Point B, and a further \$10,000 per year (total annual cost \$21,500) over 35 years is provided for the downstream trap and transfer of native eel species i.e. transferring adult eels from the reservoir downstream of the dam.</p> <p>The budget was developed with advice from Cawthron to equate to approximately two months full time employment for one person per year, but this effort would be spread over a wider period than just two months and ideally carried out cost effectively by field personnel as an additional task to the ongoing pest control activities. Provision has been made to cover the cost of implementation over 35 years.</p>	<p>Adequate information.</p> <p>I believe a valid justification of why the trap and transfer scheme need not operate year-round has been provided. However, suggested dates of operating have still not been provided. This information will be important to determine which "by-catch" species may also be transferred past the dam.</p>
<p>i) The Cawthron Report highlighted concerns regarding the upstream release point of the trapped fish and eels as, if released into the reservoir, they could get "lost" resulting in a high mortality rate. Has this been considered? Where is the upstream release point for transferred species?</p>	<p>Response: The release point for the trapped fish is certainly a consideration. Ideally, fish should be transferred from the river below the dam to the river upstream of the dam. Otherwise, released fish may become 'lost' in the reservoir and/or eaten by predators. This aspect will be included in the detailed trap and transfer plan that will be developed in consultation with the RBAB.</p>	<p>Inadequate information.</p> <p>"Ideally fish would be released upstream of the dam" is their response; clearly, this does not confirm where the release point will be located.</p> <p>There is no information regarding this issue in the BOI report.</p>
<p>j) Where will the downstream traps be located and how will eels and fish larvae be</p>	<p>Response: As mentioned above, the final placement and design of the trap should be determined after observations of fish accumulations below the dam during the first migration period after construction, or alternatively placed further downstream where local</p>	<p>Inadequate information.</p> <p>No additional information</p>

<p>attracted to the traps? The Cawthron Report discusses using a flow method to attract fish; however, there is no mention of how fish and eels will be lured to the trap. How do you plan to address issues such as flow velocity of the attractant water flow?</p>	<p>knowledge indicates migrating fish will be concentrated and successfully trapped. Details relating to these points will be included in the trap and transfer plan that will be developed in consultation with the RBAB.</p>	<p>provided. “Details relating to these points will be included in the trap and transfer plan that will be developed in consultation with the RBAB.”</p> <p>There is no information regarding this issue in the BOI report.</p>
<p>k) The trap and transfer needs to be flexible so that modification can be made if it is proving unsuccessful, as identified by either a change in the fish communities up or downstream of the dam or by trap and transferred fish not being representative of the broader fish community of the area. What flexibility has been built into this system?</p>	<p>Response: As previously discussed, Condition 8 of Schedule Two of the RWSS Resource Consents specifies that the consent holder will convene an annual review meeting to report on progress on the IMO A Programme. Performance targets, monitoring results and any recommendations for altering the focus of any of the IMO A Programme projects to better meet the objectives of the programme will be considered at this annual review meeting.</p> <p>Condition 56a of Schedule One of the RWSS Resource Consents also specifies that the Kaitiaki Rūnanga will be provided with information on the pre and post construction eel monitoring reports and have the opportunity to identify any issues of concern that may arise during the pre- construction, construction, and initial operation phases of the RWSS in order to discuss and recommend any appropriate additional measures outside of the RWSS conditions which may need to be considered by the consent holder to address any issues raised.</p> <p>Both of these mechanisms provide opportunities to modify the trap and transfer process in the event that the process is deemed inadequate.</p>	<p>Adequate information.</p> <p>There will be some flexibility built into the trap and transfer scheme, however, it should be noted that this scheme is targeted at eels and a lack of efficiency in transferring other native species is unlikely to cause a change in the scheme.</p>
<p>l) It should be acknowledged that different strategies may be required to facilitate downstream migration of different species (for example, adult eels vs larval galaxiids; flow conditions and water levels). How has this been addressed?</p>	<p>Response: The downstream trap and transfer programme is focussed entirely on adult eels. As mentioned above, it is expected that larval galaxiids and other juvenile native fish will be able to successfully pass over the spillway or through the turbines. To our knowledge trap and transfer of larval fish has not been attempted elsewhere and downstream trap and transfer of larval fish is not planned.</p>	<p>Adequate information.</p> <p>The trap and transfer programme is entirely targeted at eels.</p> <p>Other natives are expected to gain downstream passage over the spillway. This may cause issues of timing as the spillway may not be</p>

		<p>spilling during periods of migration. Furthermore, there is no mention of how these native fish are to gain upstream passage.</p>
<p>m) The application has not fully explored how the dam might be operated to facilitate movement past the dam in addition to the use of the trap and transfer programme. For example;</p> <p>a. 'Fish friendly' turbines should be installed. How will adult eels be deterred from entering turbines? What design of turbines will be installed to address this issue?</p> <p>b. How can the migration of adult eels be facilitated safely i.e. without having to fall down the 85m of the spillway or pass through the turbines (which is very likely to be fatal)?</p>	<p>Response: An aeration system will be installed above the dam wall and a water quality monitoring programme is required by Condition 16 of HBRC Consent WP120371M. These initiatives will help ensure that no chemical/water quality barrier will affect fish passage in the reservoir.</p> <p>Several types of turbines were considered for the design of the RWSS. The final project description settled on the use of two horizontal axis Francis turbines (Tonkin &amp; Taylor May 2013), which are more fish friendly than traditional Pelton turbines (see <a href="https://powergen.wordpress.com/2008/06/24/fish-friendly-hydro-turbines-move-center-stage-2">https://powergen.wordpress.com/2008/06/24/fish-friendly-hydro-turbines-move-center-stage-2</a>).</p> <p>The final design phase of the project is yet to be undertaken and fish friendly features of turbine choice/design should be considered further in the final design phase.</p> <p>Physical screening is recognised as the most effective and reliable method of excluding fish from water intakes (Boubée &amp; Haro 2003). However, Boubée &amp; Haro (2003) caution that eels are adept at negotiating small spaces and note that screens with bar spacings as small as 20 mm may still allow smaller migrant eels to pass through. The installation of screens to avoid entrainment of eels into the turbines was discussed with the dam design team but this was not considered to be feasible/practical.</p>	<p>Adequate information.</p> <p>New information is that fish friendly turbines will be installed.</p> <p>Adequate information.</p> <p>Fish passage over the spillway is not expected to cause injury as;</p> <ul style="list-style-type: none"> <li>• there are no barriers in the plunge pool;</li> <li>• The drop is 50 m; and</li> <li>• energy is expected to be expelled back to manageable velocities within the Makaroro River.</li> </ul>

## SCHEDULE C - Table of Information Requested and Received for Fish Screens

Question Asked – Letter of 08/12/14	Response from Applicant – 18/02/15	Science Advisor analysis – 24/02/15
<p>The specifications of the fish screens to be included in the dam structure are not detailed in the application. Please provide details around the specification of these screens, including addressing the matters set out in Regulation 44(2)(b) and 44(3).</p>	<p>Response: As mentioned above, no screens are planned for the dam structure, hence the application for dispensation from the requirements to provide for fish passage.</p> <p>The screens mentioned in the application relate to the upper and lower irrigation water intakes. The screen at the lower intake is required to ensure that adult trout are excluded (HBRC Consent WP120375T, Condition 5), while the screen at the upper intake shall ensure fish exclusion to a standard consistent with the NIWA Fish Screening Good Practice Guidelines (HBRC Consent WP120373T, Condition 5).</p>	<p>Adequate information .</p> <p>The screen at the lower intake is required to ensure that adult trout are excluded (HBRC Consent WP120375T, Condition 5), while the screen at the upper intake shall ensure fish exclusion to a standard consistent with the NIWA Fish Screening Good Practice Guidelines (HBRC Consent WP120373T, Condition 5).</p>
<p>Regulation 44(5) requires that any dam or diversion structure with a fish facility “shall at all times [be kept]... in good and satisfactory repair and order, so that fish may freely pass and return at all times or [be] prevented from passing as specified under these regulations”. What maintenance plan is in place for the lifetime of the consent to address the maintenance of the trap and transfer apparatus and fish screens?</p>	<p>Response: As mentioned above, Condition 5 of HBRC Consent WP120375T and HBRC Consent WP120373T specify the requirements of the fish screens that are associated with the two irrigation water intake structures. A maintenance programme is obviously required to ensure that these screens are meeting the consent requirements otherwise the consent holder would be in breach. Similarly, the goals of the trap and transfer programme are clearly articulated in Schedule Six of the RWSS Resource Consents and there is an annual review meeting of progress on the IMOA Programme, including monitoring results from the trap and transfer programme.</p>	

## SCHEDULE D - Table of Information Requested and Received for Integrated Mitigation and offset Approach

Question Asked – Letter of 08/12/14	Response from Applicant – 18/02/15	Science Advisor analysis – 24/02/15
<p>The mitigation package presented includes the removal of other freshwater fish barriers in surface water bodies in the Tukituki and Heretaunga Plains catchments. Which species will benefit from this mitigation? Are there any species that will not benefit from this proposal or the trap and transfer method? How will the mitigation project be carried out? What are the steps that will be taken to identify and remove barriers? Who will lead the project, and how will success be measured?</p>	<p>As highlighted in the rebuttal evidence of Dr Young at the Tukituki Catchment proposal hearing, Cameron (2010) identified 88 structures at 82 separate locations on public land that were likely to prevent upstream or downstream fish movement. Most of the barriers that were identified are relatively close to the coast and providing fish passage past these barriers will potentially benefit many native fish species, since native fish diversity is generally highest close to the coast. These species will include longfin eel, shortfin eel, inanga, torrentfish, giant bully, bluegill bully, redfin bully, common bully, lamprey, black flounder and smelt.</p> <p>There are also several key inland barriers (e.g. in the Tukipo catchment) that if addressed could open up additional areas of habitat within the Tukituki Catchment and are relatively close to the footprint of the Scheme. These inland barriers would probably be most beneficial for longfin eel, shortfin eel, torrentfish, bluegill bully, redfin bully, common bully, smelt and perhaps koaro and inanga.</p> <p>All migratory native fish species are expected to benefit from this proposal, although provision of passage past some barriers may only be possible for stronger migrants such as juvenile eels, koaro, torrentfish and redfin bully and less effective for weak migrants like inanga and smelt. However, these weak migrants are rare or absent in the vicinity of the proposed dam so any effects of the dam on migration of these species are expected to be minimal.</p> <p>The Integrated Mitigation and Offset Approach Programme (“IMOA”) is required under Condition 5 of Schedule Two of the RWSS Resource Consents. Details for how the targeted removal of man- made barriers will be carried out are given in Schedule Six of the RWSS Resource Consents – Project F Lower Tukituki Cultural Values Impact and Mitigation and Native Fish Enhancement Project with a purposefully wide scope for where the barrier removal can occur, so as to ensure the offset is as effective as possible on a catchment wide basis. The aim is for</p>	<p>The mitigation package presented includes the removal of other freshwater fish barriers in surface water bodies in the Tukituki and Heretaunga Plains catchments. Which species will benefit from this mitigation?</p> <p>Adequate.</p> <p>All migratory species will benefit to a certain extent.</p> <p>Are there any species that will not benefit from this proposal or the trap and transfer method?</p> <p>Adequate information.</p> <p>All migratory species will benefit, however, weaker swimming migrants will gain the least from the proposed off-site mitigation and the trap and transfer system.</p> <p>How will the mitigation project be carried out?</p> <p>Inadequate information.</p> <p>No additional information has been provided on how the project will be implemented.</p> <p>There is no information regarding this in the BOI report.</p> <p>What are the steps that will be taken to identify and remove barriers?</p> <p>Adequate information.</p>

	<p>the RWSS consent holder to contribute to and work alongside HBRC, HDC, CHBDC, DOC, iwi and hapū as part of the Ruataniwha Biodiversity Advisory Board (“RBAB”) which has DOC representation on it, in their work, rather than to co-ordinate or lead the wider catchment based initiatives where HBRC and DoC have statutory responsibilities.</p> <p>Condition 8 of Schedule Two of the RWSS Resource Consents describes how the consent holder shall convene an Annual Review Meeting to report on progress on the IMO A Programme. The RBAB will be among the parties invited to attend this Annual Review Meeting. Performance targets, monitoring results and any recommendations for altering the focus of any of the IMO A Programme projects to better meet the objectives of the programme will be considered at this Annual Review meeting.</p>	<p>The barriers have already been identified but how they will be removed or mitigated will vary depending on the specific barrier.</p> <p>“The majority of the barriers that have been identified so far are culverts. Fish passage at culverts can be addressed using a variety of methods ranging from fish friendly flood gates, culvert replacement, structural alterations to the culvert, channel engineering to avoid culverts becoming ‘perched’, and providing fish ramps or other arrangements (e.g. mussel ropes) to help fish negotiate their way through existing culverts”. Page 23 of Schedules 5 and 6.</p> <p>Who will lead the project, and how will success be measured?</p> <p>Inadequate information.</p> <p>No further information has been provided about either of these questions.</p> <p>“The aim is for the RWSS consent holder to contribute to and work alongside these agencies and iwi and hapū in their work, rather than to co-ordinate or lead the wider catchment based initiatives where HBRC and DoC have statutory responsibilities.” Page 23 of Schedules 5 and 6.</p> <p>I am unable to find any information regarding how the success of the offsite mitigation will be monitored. I suggest that another monitoring plan that details the effects of the removal of fish passage</p>
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		<p>barriers in the offsite areas is needed.</p> <p>There is no information regarding who will lead the removal of fish barriers project or how its success will be monitored in the BOI report.</p>
<p>The mitigation package is largely reliant on the co-operation of landowners. Has the consent of landowners for this mitigation, and for the land access required to undertake it, been given? If not, how will this be addressed? If access cannot be achieved, what do you plan to implement instead?</p>	<p>This issue was debated at length in the Board of Inquiry hearing around the evidence of Mr Daysh (for HBRIC) and Ms Brown (for EDS). Condition 7 of Schedule Two of the RWSS Resource Consent conditions specifically requires HBRIC to have all of the Third Party land agreements for Project A (Ruataniwha Reservoir Restoration Buffer and Catchment Enhancement Zone Project) in place prior to commencement of dam construction. However despite EDS and other parties arguing this should be universally applied, it is just not feasible or practical for such an extensive and multiyear mitigation offset package. Section 8.2 of the RWSS Freshwater Fisheries Dispensation Application submitted to DOC in November 2014 further details the Board's findings.</p> <p>Specifically, in relation to removal of fish barriers, all the structures that have been identified by HBRC so far are on public land and so issues with land owner consent and access are expected to be minimal. HBRC are also investigating the occurrence of fish passage barriers on private and commercial forestry land and it may be possible to include high priority fish barriers on private land if land owner consent and access can be arranged.</p> <p>In relation to other components of the mitigation package it is acknowledged that landowner agreements are an important component of success and have been listed as key performance targets in Schedule Six of the RWSS Resource Consents. It is not practical/appropriate to have these agreements in place at this stage given the scale and number of agreements that will be required. There are mechanisms described in Condition 23 of Schedule Three of the RWSS Resource Consents that require preparation and implementation of Farm Environmental Management plans for all land owners receiving water from the Scheme. This includes ensuring that surface water bodies, wetlands and their margins are managed to minimise stock damage, and direct and indirect input of nutrients,</p>	<p>The mitigation package is largely reliant on the co-operation of landowners. Has the consent of landowners for this mitigation, and for the land access required to undertake it, been given? If not, how will this be addressed? If access cannot be achieved, what do you plan to implement instead?</p> <p>Inadequate information.</p> <p>No further detail has been provided on this issue in response to our request for further information.</p> <p>Condition 7 of Schedule Two of the RWSS Resource Consent conditions specifically requires HBRIC to have all of the third party land agreements for Project A (Ruataniwha Reservoir Restoration Buffer and Catchment Enhancement Zone Project) in place prior to commencement of dam construction.</p> <p>I think that it is also important to note that all fish barriers are located on public land so facilitating their removal or mitigation should be more straightforward. However, I would like to see the total habitat that will be re-introduced by this strategy and for this to be compared with the loss of habitat incurred by dam construction.</p>

	<p>sediment and microbial pathogens. Implementation of Projects D &amp; E in Schedule Six of the RWSS Resource Consents is expected to align with these Farm Environmental Management plans.</p> <p>We also note that the Tukituki Plan Change (PC6) requires stock exclusion from waterways. Implementation of Projects B, D, E &amp; F may be able to align with these efforts required by the new Plan.</p>	
<p>The mitigation plan notes riparian planting as part of the package. What area of land will benefit from this planting, and what are the set back distances for such? Does the total area of riparian planting to be undertaken match or equate to the habitat loss for species above the dam?</p>	<p>Riparian planting is a key component of the IMO A Programme. in particular Projects A, B, D &amp; E in Schedule Six of the RWSS Resource Consents as summarised below.</p> <ul style="list-style-type: none"> <li>• Project A (Ruatanuiha Reservoir Restoration Buffer and Catchment Enhancement Zone Project ) will involve planting of approximately 46 ha of land and a wetland area of approximately 14 ha in a 20 m buffer surrounding the reservoir and legal protection and restoration of at least an additional 100 ha within the Catchment Enhancement Zone surrounding the reservoir (See Schedule Six of the RWSS Resource Consents).</li> <li>• Project B (Ruatanuiha Riparian Enhancement Zone (River Halo Project))will provide (or cause), after 30 years, 600 ha of protected (and management enhanced) wetland, bush and scrub within the Project B spatial area as a result of fencing, planting, weed/pest control and legal protection.</li> <li>• Project D (Ruatanuiha Plains Spring-fed Stream Enhancement and Priority Sub-Catchment Phosphorus Mitigation Project) will contribute \$50K per year for 10 years to contribute to physical works such as wetland enhancement, riparian planting and waterway fencing in priority subcatchments and spring-fed streams. It is anticipated that this fund will be supplemented by other annual funding provided through Hawke’s Bay Regional Council’s Regional Landcare Scheme and Flood Control Scheme.</li> <li>• Project E (Old Waipawa River Bed and PapanuiStream Restoration Project) will involve fencing and planting of an area of approximately 17 ha (5 m width of planted area on both sides of the Old Waipawa River Bed and the Papanui Stream), planting 1 plant/2 m<sup>2</sup>at a unit cost of \$7 per plant (total of 85,000</li> </ul>	<p>Adequate information.</p> <p>The total area of riparian planting and/or protection (800+ ha) is larger than the expected area of riparian habitat loss for species above the dam (dam footprint 372 ha). However, some 600 ha of this will take 30 years to come into protection.</p>



	<p>plants). An additional fund of \$150,000 (\$30,000 per year for 5 years) has been allocated to create wetland areas associated with the Old Waipawa River Bed and the Papanui Stream where feasible and supported by landowners.</p> <p>The total area of riparian planting and/or protection (800+ ha) is larger than the expected area of riparian habitat loss for species above the dam (dam footprint 372 ha).</p>	
<p>The mitigation strategy to remove barriers / improve barriers around existing barriers, as well as the trap and transfer method discussed below, will favour stronger swimming fish such as eels and koaro and potentially do little to aid less strong swimming species such as dwarf galaxias, torrentfish, common bully and bluegill bully which migrate up and down the river to varying degrees. How do the proposed strategies aid these other species?</p>	<p>The trap and transfer programme and targeted removal of fish barriers will be most effective for strong migrants such as eels, koaro, torrentfish and redfin bully, but potentially less effective for weaker migrants such as inanga. The majority of the fish species found in the vicinity of the proposed dam and available to be trapped and transferred are strong migrants as the dam is a considerable distance inland (110 km) and weak migrants are not present or are naturally rare this far from the coast. A wide range of species, including weak migrants, will be more common at barriers near the coast and barrier removal/alteration will aim to provide passage for the full range of native fish species under most flow conditions. While this may be logistically impossible at some barriers, we are confident that it will be possible in many situations.</p> <p>Dwarf galaxias are a non-migratory species and therefore it is not certain that there is a need to maintain upstream and downstream passage for this species. In fact, in some situations it may be advantageous to dwarf galaxias populations to have a downstream fish passage barrier to protect them from incursions of invasive pest fish.</p>	<p>Adequate information.</p> <p>Basically, the trap and transfer scheme will not greatly help weak swimmers but as the dam is located 110 km inland from the ocean there are few weak swimming fish anyway. The removal of fish passage barriers should help all migratory fish, however, where alternative means of passage needs to be implemented, as barrier removal is not possible, the benefits will be greater for the stronger swimmers.</p>

## SCHEDULE E – Summary of IMO A Projects

Each of the projects which form part of the IMO A were discussed by the Board and can be summarised as follows (the bolded text highlights aspects of the programmes the Department considers may provide positive effects for species whose passage is affected by the dam):

### 1. Project A - The Ruataniwha Reservoir Restoration Buffer and Catchment Enhancement Zone

This project has five primary objectives (as taken directly from para [1188] of the BOI Report):

- “Replanting and natural regeneration management of a buffer around a large portion of the new reservoir with indigenous vegetation – ‘Reservoir Restoration Buffer’;
- Providing for targeted enhancement of and restoration of remaining habitats on private land within the catchment upstream of the dam structure – ‘Catchment Enhancement Zone’;
- Protecting water quality in the reservoir through effective riparian management and sediment control;
- Providing facilities for a variety of recreation types on and around the reservoir; and
- Acknowledging the mana whenua of the Makaroro catchment and the history of the Yeoman Mill site by providing public recreation space and visual displays commemorating the history of the area.”
- Total budget is \$2,549,000.

It is noted by the Board that compared with the area to be inundated by the reservoir, this zone is significantly larger.

Project A will enhance the water quality in the reservoir, and hence will enhance the species of fish that form populations in the reservoir. The Applicant is required by condition 7 of Schedule 2 to obtain all necessary consents of landowners before construction and therefore the benefits are secure. The performance targets for this project list “legal protection and restoration of at least 100 ha within the ‘Catchment Enhancement Zone’ and legal protection and restoration of at least 60 ha of land (14ha wetland and 46ha reservoir riparian area)”,<sup>30</sup> but does not specify what form that legal protection will take or a timeframe in which it will be achieved.

However, the only species the Department expects to receive any benefit from the existence of the reservoir are trout and smelt, which may form self sustaining populations in the reservoir. While Common Bullies can form landlocked populations, the other species found in the catchment do not. Furthermore, it is unclear whether these species would benefit from the reservoir due to likely increased predation due to the trout population increasing. For the other migratory species the reservoir may prove an obstacle to migration. For example, while it is accepted that larval fish may pass through the turbines unharmed, the Department notes that larval fish are not active swimmers, and the increase in transit time through the dam may increase the risk of starvation or predation. Therefore the Freshwater Technical Adviser does not consider that Project A is likely to provide positive effects on the majority of the species whose passage is affected by the dam.

### 2. Project B - The Ruataniwha Riparian Enhancement Zone (River Halo Project)

This package involves four biodiversity enhancement objectives (as taken directly from para [1188] of the BOI Report):

- “Control of willows/lupins and other braided river weeds to maintain and enhance habitat for wading birds (particularly banded dotterel) within the active channel of the Waipawa and Makaroro Rivers, to maintain indigenous vegetation, and to prevent the spread of weeds further downstream.
- **Assisting landowners to enhance and protect existing areas of wetland, bush and scrub within or contiguous with the 1km enhancement zone.**
- **Protection and enhancement of riparian habitats alongside the Makaroro and Waipawa Rivers that are affected by flow fluctuations resulting from the project.**

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<sup>30</sup> Page 3, Ruataniwha Water Storage Scheme – Conditions, Schedule Six Integrated Mitigation and Offset Approach – Projects A – F.

- **Enhancing the water quality of the Makaroro and Waipawa Rivers through the establishment of healthy riparian habitats within the Project area.”**
- Total budget is \$1,740,000.

As with the first project, this zone is extensive when compared with the proposed reservoir.

This project will, if successful, enhance the river habitat on the Waipawa and Makaroro rivers, particular by riparian planting and removal of stock from waterways. This would benefit species (namely, Long finned eels, Short finned eels, Inanga, Torrent fish, Crans bully, Bluegill bully, Redfin Bully, Common bully, Upland bully, Smelt, Rainbow trout and Dwarf Galaxid) in the lower catchments, however there is no specific goal or measurement by which ‘enhanced water quality’ is defined. The Freshwater Technical Advisor notes that while this project will have the positive effect of enhancing water quality, it would be hard to quantify this benefit.

The project is reliant on the consent of landowners, which may or may not be forthcoming. It has a performance target of protecting 600 ha of wetland, bush and scrub but this target only applies after 30 years. (Schedule 6, Project B, Page vii). Also, the degree of “protection” required by the performance target is unspecified (and could, presumably, range from a permanent type of legal protection such as a covenant, to an ephemeral type of protection reliant on the landowner at any given time). Taking into account the above, the Department considers that while significant benefits may eventuate, this is highly uncertain.

### 3. Project C - The Ruataniwha Threatened Species Habitat Enhancement Project

This project is defined as follows (as taken directly from para [1188] of the BOI Report):

- “Targeted assistance programme to foster research, advocacy and habitat protection/enhancement for the bats and their habitats throughout the Hawke’s Bay.
- Predator management programme to enhance the biodiversity values of indigenous forest and riverine areas within Project A and B (around the reservoir and downstream of the dam structure, inclusive of targeting wader bird habitats down to State Highway 50).
- **Trap and transfer programme focusing on native fish.”**
- Total budget is \$3,097,500.

This includes the trap and transfer project – as this is covered in detail in the body of the report, it will not be repeated here.

### 4. Project D – the Ruataniwha Plains Spring-fed Stream Enhancement and Priority Sub-Catchment Phosphorus Mitigation and Central/Southern Hawke’s Bay Wide Native Fish Passage project.

The project objective of this can be set out as follows (as taken directly from para [1188] of the BOI Report):

- **“... protect and enhance water quality and stream habitat in priority sub-catchments and spring-fed streams that drain the lower Ruataniwha Plains (e.g. tributaries of the lower Mangaonuku, Kahahakuri Stream, Black Stream, Maharakeke Stream Tukipo River, and Porangahau Stream etc.). These streams provide good habitat for eels and other native fish species, and some are important locations of spawning and juvenile trout rearing.”**
- The total budget for this is \$500,000.

This project does not specifically benefit any one species, however will allow for improved water quality through the fencing of stream and waterways. The Applicant notes that these streams provide good habitat for a number of species including eels and other native fish species. These sites also provide locations for spawning and rearing of juvenile trout.

This is another project which is reliant on landowner support, which has yet to be formally obtained. While the project allows for enhancement of water quality through the management and reduction of sediment and phosphorus input to the waterways, this does not appear to be quantified, therefore it is hard to determine any measureable benefit to these activities.

5. Project E – the Old Waipawa River Bed and Papanui Stream Restoration Project

As taken from para [1188] of the BOI Report, the project objective is as follows:

- **“to rehabilitate and enhance water quality and stream habitat in the old bed of the Waipawa River and Papanui Stream.”**
- The total budget is \$1,330,000.

This project evolved out of the development of irrigation to Zone M, and the concept to use the old Waipawa River and Papanui Stream as a conduit for the supply of irrigation flows. This project involves implementation of ecological rehabilitation as well as restoration works required to meet Zone M irrigation requirements. This involves riparian planting and potential wetland creation, both of which are also reliant on, as yet un-obtained, landowner consent. This project will benefit water quality and the ecological health of the old Waipawa River Bed and Papanui Stream, although again this is not quantified.

The Freshwater Technical Adviser notes that this project would reduce Phosphorus and sediments loads in the streams by fencing them. This will enhance the overall health of the ecosystem, but it is hard to quantify the exact benefit from this.

6. Project F – Lower Tukituki Cultural Values Impact and Mitigation and Native Fish Enhancement Project

As taken from para [1188] of the BOI Report, the objective of this project is as follows:

- **“to provide a focus for the RWSS to contribute to lower Tukituki cultural values through research, monitoring and reporting during the life of the resources consents.”**
- **It includes provision of on-going funding for removing artificial barriers to native fish passage in four Hawkes Bay river systems, including the Tukituki.**
- The total budget for this is \$885,000. Of that amount, \$20,000 per year is budgeted for barrier removal, making a total of \$700,000.

The Freshwater Technical Advisor notes that this project could benefit the Tutaekuri, Ngaruroro, Karamu and Tukituki River Catchments.

This project is comprised of five parts with the following potentially benefiting fish passage:

- “on-going funding for enhancing native fish passage in the Tutaekuri, Ngaruroro, Karamu, Tukituki river systems.”

While monitoring and reporting also comprise this project, the focus is on cultural values and effects.

This project is not reliant on private landowner consent, (as the barriers are located on public land) which may make implementation more effective. However, there does not appear to be an implementation plan or confirmation as to how funding will be managed or allocated.

The benefit to species is specific to the barrier identified and the method used to mitigate its effect, so a wide range of species could benefit from this work.

The benefits to this project are, as yet, un-quantified.

IMOA – Department’s analysis

The Applicant considers that the IMOA “will be more effective than any alternative fish facility option, including a by-pass canal to the head of the reservoir, or an engineered fish pass up the dam face” (refer page 3 of the application). The Applicant submitted that off-site mitigation will provide “some off-site benefits to at least some of the fish species that will be affected by the dam” (refer page 15 of the application).

The Applicant has further described the IMOA package as the “cornerstone of the RWSS proposal” (refer para [1189] of the BOI Report).

The Board found that project A – F, as outlined above, provide for “positive environmental outcomes to offset the unavoidable effects for which there is no feasible mitigation package” (refer para [1208]).

The Department considers that the IMOA *may* provide significant benefits for the fish species affected by the dam.

In sum, the IMOA projects have the potential to assist a number of native fish species in the long term. However, these benefits are not certain. It remains essential that every effort be made to minimise the direct (measurable) effects of the dam in the short term. This is especially important in the event the IMOA does not provide the measurable benefits it is expected to.