



Otago Regional Council

Section 42A Staff Recommending Report

Change of Consent Conditions Application RM18.004
Pioneer Energy Limited

The recommendation in the staff report represents the opinion of the writers and it is not binding on the Hearing Commissioners. The report is evidence and will be considered along with any other evidence that the Hearing Commissioners will hear.

Natasha Pritchard
Principal Consents Planner

14 June 2022

Executive Summary of Recommendation

Pioneer Energy Limited (**the Applicant**) has applied to change the conditions of two resource consents (Water Permit 2001.475 and Water Permit 2001.476.V3). They currently hold these permits for the management of Lake Onslow (**the Lake**) as part of the Teviot Hydro-electricity Scheme. The key change seeks to increase the draw down rate of the Lake over any seven-day period from a maximum of 0.2 metres to 0.4 metres. The change is to provide for greater operational flexibility, especially at lower lake levels.

The application is a discretionary activity under section 127 of the Resource Management Act 1991. It was processed on a limited notified basis to four parties. Two submissions were received. These were from Teviot Angling Club Incorporated (**TAC**) and Otago Fish and Game Council (**Fish and Game**).

The key issues associated with this Application relate to understanding the potential effects this change could have on the Lake and interconnected environments including the resultant effects on the recreational activity of angling. This includes both trout production as well as angler access, angler safety and the overall angler experience.

After assessing the actual and potential effects of the Application, considering submissions, and considering all of the matters in section 104 of the Resource Management Act 1991, the recommendation of the consent officer is to **grant** subject to the recommended conditions of consent.

2. Report Author

Please note that this report contains the recommendations of the Consent Planner and represents the opinion of the author. It is not a decision on the Application, nor is it Council policy.

Natasha Pritchard

My full name is Natasha Maree Pritchard. I am Principal Consents Planner employed by Otago Regional Council (**the Council**). I am based in Alexandra. I have been employed by the Council since May 2008 and have held roles as a Consents Officer, Senior Consents Officer and since 2020 as a Principal Consents Planner.

I hold the qualifications of Bachelor of Applied Science (Honours) in Natural Resource Management from Massey University in Palmerston North. I am an Associate Member of the New Zealand Planning Institute.

I am a certified decision maker under the Ministry for the Environment 'Making Good Decisions' programme.

I have been involved with the Application since it was lodged and received in early 2018. A site visit was attempted in July 2021 but was unable to be completed due to poor road conditions. A second site visit was undertaken with a representative for the Applicant, Otago Fish and Game Council and Teviot Angling Club members, and Dr Kay Booth (Council amenity expert) on 4 April 2022.

Code of Conduct

While this is a Council hearing, I acknowledge that I have read and agree to comply with the Environment Court Code of Conduct for Expert Witnesses (Consolidated Practice Note 2014). This evidence is within my area of expertise, except where I state that I am relying on the evidence or information provided by other parties. I have not intentionally omitted to consider material facts known to me that might alter or detract from the opinions I express in this evidence.

Natasha Pritchard



OTAGO REGIONAL COUNCIL SECTION 42A REPORT

ID Ref:	A1607043
Application No(s):	RM18.004 for Water Permit 2001.475 and Water Permit 2001.476.V3
Prepared For:	Hearing Commissioner
Prepared By:	Natasha Pritchard, Principal Consents Officer
Date:	14 June 2022
Subject:	Section 42A Recommending Report – Change of consent conditions Application for Pioneer Energy Limited, Lake Onslow, Central Otago

1. Purpose

This report has been prepared under Section 42A of the Resource Management Act 1991 (**RMA**) to assist in the hearing of the application for a change of consent conditions made by Pioneer Energy Limited. Section 42A enables local authorities to require the preparation of a report on an application for resource consent and allows the Consent Authority to consider the report at any hearing. The purpose of the report is to assist the Hearing Panel in making a decision on the application.

The report assesses the Application in accordance with Sections 104 and 104B of the RMA and makes a recommendation as to whether the Application should be granted, and a recommendation on appropriate conditions.

This report contains the recommendations of the Consent Planner and is not a decision on the Application. The recommendations of the report are not binding on the Hearing Commissioner. The report is evidence and will be considered along with any other evidence that the Hearing Commissioner will hear.

2. Summary of the Application

2.1 Overview

Applicant: Pioneer Energy Limited

Applicant's agent: LandPro – Will Nicholson

Site address or location: Lake Onslow, Central Otago

Legal descriptions of the site (Lake Onslow bed): Various, currently owned by Pioneer Energy Limited, Central Electric Limited (previous company name for Pioneer Energy Limited), Crown Land, Department of Conservation (marginal strip) and unknown management.

Map reference (mid-point) of Lake Onslow dam: NZTM2000 E1333973 N4950253¹

Consents sought: s127 of the RMA change of consent conditions for Water Permit 2001.475 (damming) and Water Permit 2001.476.V3 (take)

Purpose: To enable greater operational flexibility in use of water within the Lake.

Information requested: Yes, see '*Application documents*' below

Notification decision: The Application was limited notified to 4 parties: Otago Fish and Game Council, Teviot Angling Club Incorporated, Director General of Conservation and Aukaha on behalf of the rūnaka who have a mana whenua relationship with the site.

No unconditional written approvals were obtained prior to a notification decision.

Submissions: Total submissions received by due date: 2

- in support: 0
- in opposition: 2
- neutral: 0

Number of late submissions: 0

Wishing to be heard: 2

Site visit: A site visit was undertaken on 4 April 2022 with Dr Kay Booth (Council amenity technical expert), Tony Jack (the applicant), Nigel Paragreen and Ian Hadland (Otago Fish and Game Council) and John Preedy and Graeme Rae (Teviot Angling Club). A copy of the site visit notes that have been agreed by the Applicant and submitters as representing an accurate reflection of the site visit are attached as Appendix 4.

Key Issues: It is considered that the key issues with this Application are:

- The baseline for comparing the effects of the proposed change against and whether this is the operating regime that could occur under the current consent conditions, or the current operating regime
- Uncertainty on how the change will affect Lake Onslow and the Teviot River.
- The effects of the change on shore-based and boat-based angling including angler access, angler safety and visual amenity values.
- The effects on trout production due to changes in available lake habitat and changes to macrophyte beds and invertebrate populations.
- The effects to trout and angling during the cicada hatch period (20 January to 20 February).

¹ This is a more accurate NZTM reference than what is currently on the consents. This map reference is for the middle of the dam.

- The proposed adaptive monitoring regime (conditions) not supported by submitters.

2.2 Description of Application

Pioneer Energy Limited (**‘the Applicant’**) currently holds various consents for the operation of the Teviot hydroelectric power generation scheme on the Teviot River in Central Otago. The Applicant is seeking to change the conditions on two of these consents:

- Water Permit 2001.475 to dam the Teviot River with a 17-metre-high gravity dam (Lake Onslow Dam) for the purpose of creating Lake Onslow for hydroelectric power generation and for irrigation for a term expiring on 1 April 2041.
- Water Permit 2001.476.V3 to take and use surface water non-consumptively from Lake Onslow at a maximum rate of 6 cubic metres per second for the purpose of hydroelectric power generation and flow augmentation for a term expiring on 1 April 2041.

Both consents have the following condition imposed (Condition 2 of Water Permit 2001.475 and Condition 3 on Water Permit 2001.476.V3). This condition restricts the rate at which the water level in the Lake can be drawn down:

The rate at which the lake shall be drawn down shall not exceed 0.2 metres over any period of seven days.

The Applicant states that the current rate of draw down restricts the amount of electricity that can be generated from Lake Onslow (**‘the Lake’**), especially when the Lake is at lower levels and there are periods of high demand. The minimum operating level of the Lake is 679.9 metres above sea level (masl), which allows for an operating range of 5.2 metres (m) below the crest of the dam. The Applicant is seeking the following changes to the above condition:

*The rate at which the lake shall be drawn down shall not exceed ~~0.2~~ **0.4**² metres over any period of seven days.*

The Applicant is not proposing to make any other changes to the existing consent conditions, including the rate of take/discharge from the Lake (maximum of 6 m³/s), the minimum operating level of the Lake (679.9 masl) or the existing residual flow to the Teviot River (345 L/s).

2.1 Amendment to the Application

After consultation with interested parties, the Applicant proposed the following amendment (**‘Amendment’**) to their Application on 21 June 2021. The Amendment seeks to include the following conditions on both consents (2001.475 and 2001.476.V3).

Definitions

In these conditions,

- **Year**, or any reference to a specific year, means a calendar year (unless otherwise stated).

² The original variation application was for 0.5 m/7-days. An amendment to the Application on 21 June 2021 formally changed this to 0.4 m/7-days.

- A **trigger year** is a year in which:
 - the minimum lake level over the **year** is 682.5 metres above mean sea level or lower, and
 - the rate of drawdown of the lake level exceeds 200 mm/week for 4 or more calendar weeks.
- A **monitoring year** is a **year** in which monitoring in accordance with the Lake Onslow Monitoring Proposal (LOMP) is required under condition A1.
- A **monitoring round** is two consecutive **monitoring years**, following a **trigger year**.

Draft condition A1

The consent holder must monitor Lake Onslow in accordance with the Lake Onslow Monitoring Proposal (**LOMP**) dated May 2021 and prepared by Ross Dungey. Monitoring must be carried out by a suitably qualified aquatic ecologist (except for Condition (c) below). Monitoring must include, but is not necessarily limited to:

- a) One baseline monitoring event in 2022 (unless 2021 is a **trigger year**, in which case 2022 would form part of the first post-baseline **monitoring round**);
- b) A minimum of two **monitoring rounds**, one following each of the first two **trigger years**, with the provisos that:
 - i. If a second **trigger year** occurs in the first **monitoring year** of a **monitoring round**, this will not trigger a new **monitoring round** (with the next **trigger year** after this then triggering the second **monitoring round**).
 - ii. If a **trigger year** occurs in the second **monitoring year** of the first **monitoring round**, this would trigger the second **monitoring round** to begin in the following **year** (in this case there would be four consecutive years of monitoring).
 - iii. In each **monitoring year**, the fieldwork shall be carried out once only between January and March (inclusive), and preferably in February.
- c) Facilitating monitoring of the Lake Onslow trout population as described in the LOMP using anglers to collect samples. This shall take place annually from 2021 until the completion of the second post-baseline **monitoring round**.

Within two months from the completion of the baseline monitoring event and each **monitoring round**, a report prepared by a suitably qualified ecologist detailing the results must be prepared and submitted to the Consent Authority, the Otago Fish and Game Council, DOC and Aukaha.

Draft condition A2

After the second **monitoring round** required under condition A1 is completed, the consent holder must engage a suitably qualified aquatic ecologist to review the monitoring data collected under Condition A1 and any other relevant data available and prepare an Ecological Review Report (ERR). The ERR shall be submitted to the Consent Authority for certification that it adequately addresses the matters required under Condition A1 and achieves the key objective of the ERR, which is to evaluate the extent of any ecological effects associated with the increased drawdown provided for by Condition B1. The consent holder must meet the costs of certification of the ERR by the Consent Authority. The ERR must include, but is not limited to, the following matters:

- a) Describes, discusses and evaluates the monitoring results (baseline and post-baseline) in accordance with the LOMP;
- b) Describes, discusses and evaluates the degree to which the lake has been drawn down at greater than 0.2 m/week between 2021 and the date when the

ERR is prepared and compares this with typical drawdown rates in the previous years when drawdown was limited to no more than 0.2 m/week;
c) Based on (a) and (b), provides and justifies a professional opinion regarding whether any more than minor adverse ecological effects have occurred since the baseline monitoring;
d) If there have been any more than minor adverse ecological effects, provides and justifies a professional opinion as to whether the effect(s) is/are likely to be occurring as a result of the increased rate of drawdown.

*The ERR must be provided to the Consent Authority, the Otago Fish and Game Council, DOC and Aukaha within 60 working days after the second **monitoring round** required under condition A1 is completed.*

Draft condition A3

Should the Otago Fish and Game Council, DOC or Aukaha choose to provide comments on the ERR, the consent holder and/or their ecologist must respond to these comments, provided that such comments are received within 20 working days of the ERR being provided to those parties. The consent holder must respond to all such comments within a further 20 working days (i.e. within 40 working days from the ERR being released), and must provide a copy of both the comments received and the response given to the Consent Authority.

Note: The consent authority may consider any comments offered by Fish and Game, DOC or Aukaha, as well as the consent holder's response to any such comments, when making a decision regarding certification of the ERR under condition A2.

Draft condition B1³

The rate at which the lake shall be drawn down over any period of seven days must not exceed 0.4 metres.

Draft condition B2

*For the period commencing 1 October in the **year** in which the second **monitoring round** required under condition A1 is completed and ending with the expiry of the consent, the rate at which the lake shall be drawn down over any period of seven days must not exceed 0.2 metres unless:*

- a) the ERR prepared under condition A2 is certified in accordance with that condition; and*
- b) the report concludes that no more than minor adverse ecological effects have occurred, or*
- c) if there is such an effect, the report concludes that this effect is not caused by the increased drawdown rate.*

Notes: 1 October was chosen as this allows 3 months for preparation of the ERR under condition A2, one month for affected parties to consider it and comment if they wish, one month for the consent holder to respond to any comments, plus one month for peer

³ Note: this is the same condition as proposed to be varied originally. It was added sequentially into the scheme of new conditions proposed by the Applicant within their Amendment.

review/certification of that report by the Consent Authority and any discussion following on from that.

Draft condition C

The consent holder shall maintain and operate a lake level monitoring site at or near the dam, with lake levels recorded at least hourly to a minimum accuracy of 0.025 metres.

The conditions above were proposed by the Applicant as an Amendment to their Application for the following reasons:

- The Applicant considers that the environmental effects of their proposal are no more than minor and that the assessments that supported their original Application are still relevant (recognising that many of these assessments were lodged in 2018).
- The proposed Amendment introduces an adaptive management approach after consultation with parties (Director General of Conservation, Fish and Game Otago and Aukaha). It establishes a monitoring regime to verify that the ecological effects are as anticipated with a reversion to the current draw down regime if there is evidence to suggest to the contrary.
- The reduction from 0.5 m per seven days to 0.4 m per seven days reflects a compromise to address concerns raised by Otago Fish and Game Council.
- Condition C enables accurate lake level monitoring to ensure that the Consent Holder is complying with the consented maximum draw down rate. This has been included as there is currently no requirement under the existing consents to monitor lake levels.

2.4 Details of Permits Being Varied

Water Permits 2001.475 (damming) and 2001.476.V3 (take and use) were granted in November 2006 as part of a suite of consents for the Teviot River hydro-electricity and irrigation schemes. All the resource consents associated with the scheme were granted a consent term of 35 years⁴. The permits sought to be varied are at the top of the scheme and relate to the management and operation of Lake Onslow.

2.4.1 Decision on the Original Application

The original decision is not being reconsidered as part of this variation process. The s127 of the RMA process is not an opportunity to reconsider the merits or otherwise of the effects that have been consented. The assessment and decision on this Application is limited to considering the positive and adverse effects of the change. However, the original decision may contain some details that may assist this consideration, including understanding why the conditions were imposed. The following summarises the background to the draw down condition imposed on Water Permits 2001.475 and 2001.476.V3.

The key issues for the decision makers when considering the resource consent applications in 2006, specifically in respect of the damming and taking and use of water from Lake Onslow, were the following⁵:

⁴ The exception being Deemed Permits associated with the scheme. These were processed separately and expired on 1 October 2021. These have been replaced with short duration resource consents.

⁵ Report and Decision of the Otago Regional Council through its Hearing Committee for 2001.475-2001.491 dated 15 November 2006

- Dam safety
- Fish, aquatic ecosystem and fish passage
- Minimum flows and residual flows
- Effects of discharging water
- Effects on public access
- Cultural impacts
- Effects on recreation and amenity values.

The purpose of the conditions on minimum lake level and rate of draw down were “to avoid the potential for adversely affecting littoral zone macroinvertebrates and fish, and any future erosion”⁶. It appears that 0.2 m per 7-days was stated by the Applicant as their maximum draw down rate within their original application for consent⁷. After considering the submissions and effects, the decision makers imposed this limit for the above stated reasons and because it represented status quo. The draw down was a specific issue of the Teviot Angling Club Incorporated submission for the original application who noted that the draw down rate of 0.2 m per seven days “sounded reasonable only if not exceeded”. They sought that this draw down rate was retained between December and April. Their submission provided an example of a potential sudden drop in lake levels resulting in invertebrates, fish and koura being stranded⁸.

Recreation, amenity and cultural issues within the decision focussed on the effects to the Teviot River and there was no specific commentary on the effects on these values as they related to the Lake Onslow.

2.4.2 Other changes to the consents

Water Permit 2001.475 has had no changes since it was issued on 13 December 2006. Water Permit 2001.476.V3 has had 3 variations to it since the consent was issued. These variations have been to correct the legal description (immediately after issue), to change the purpose, to update conditions 4 (residual flow) and 5 (measuring of the take) and to convert the map reference to NZTM format. The final variation was to change condition 5 (the location of the measuring of the take). This variation was granted on 27 August 2021 while this variation was being processed and does not change or affect the processing of this variation.

2.5 Application Documents

The applicant has provided the following documentation with the Application:

- **Application form** and assessment of environmental effects to vary Water Permits 2001.475 and 2001.476.V3 dated 9 January 2018;
- **Lake Onslow lake bed profile and invertebrate survey** prepared by Ross Dungey Consulting Limited dated September 2017;

⁶ Report and Decision of the Otago Regional Council through its Hearing Committee for 2001.475-2001.491 dated 15 November 2006 – para 33

⁷ Section 6.1.1 of Recommending report 2006.202 for Notified Permits prepared by Michelle Conland dated 29 March 2006

⁸ Teviot Angling Club Incorporated submission on resource consent applications 2001.475-2001.483, 2001.485-2001.486, 2001.488-2001.489 dated 15 August 2003.

- **Further information** 31 January 2018: storage graph for Lake Onslow in 1983, calculated natural inflow records from 1986-1996, storage data from 1995-2015, the calculated ramp rate for the average flow (assuming no inflows) and lake level since 1974.
- **Further information** 5 April 2018: supplementary information from Ross Dungey Consulting Limited assessing the potential water quality effects from increased water level fluctuations, sediments and nutrients in Lake Onslow and the Teviot River; and water quantity effects downstream of Lake Onslow on the Teviot River.
- **Further information** 17 August 2018: supplementary information from Ross Dungey Consulting Limited assessing the change to habitat critical to invertebrates and bullies, description of macrophyte communities and an assessment of effects of the change on macrophyte communities.
- **Amendment** to Application dated 21 June 2021; and
- **Further information** 29 July 2021: supplementary information on land ownership of the bed of Lake Onslow, reasons for the Amendment; photographs of key locations at the site; an assessment of effects on cultural values, effects on Regionally Significant Wetlands, effects on aquatic plants, effects on fish and effects on waikōura; future management of the lake; and an assessment of the proposal against the NPS REG 2011, NPS-FW 2020, partially operative RPS, proposed RPS, KTKO NRMP and Te Rūnanga o Ngāi Tahu Freshwater Policy Statement 1999.
- **Further information** 9 August 2021: Response to clarification questions on supplementary information provided in relation to land ownership, surveys of plant species, history of erosion, presence of eels, natural values in the Teviot River, restrictions on take in the summer, potential for multiple draw down events in a season and mud flat creation.
- **Further information** 2 September 2021 and 9 September 2021: supplementary information describing the recreational amenity values and effects of the proposal, effects on the activity of mahika kai gathering and explanation on how the proposal will change the speed of the rate of draw down.
- **Further information** 13 September, 21 September, 23 September and 24 September 2021: clarification and technical advice on the operational effects of the proposed change.
- **Further information** 23 and 28 March 2022: modelled Lake Onslow lake level scenarios ('**Lake Onslow Model**') of current consent conditions, proposed consent conditions and current operating regime including a methodology and assumptions summary and explanation why Scenario D cannot be modelled.
- **Further information** 27 April 2022 Lake Onslow mean daily levels agreed data, 4 May 2022: Lake Onslow mean daily level agreed data – corrected version ('**Lake Onslow lake levels**') and 3 May 2022: Synthetic Lake Onslow inflow data ('**Synthetic inflow data**')
- **Further information** 24 May 2022, 25 May 2022 and 26 May 2022 – updated Lake Onslow Model and data for Model and answers to questions on Model.

2.5 ORC Technical Audits and Evidence

The ecological and amenity effects of the Application and further information have been technically audited on behalf of ORC and this advice has been relied upon in my evidence, where stated. Given the duration of the consent processing, technical experts have changed in some instances.

The following is a summary of the technical advice received:

- **Technical review (Ecology 1)** – ORC Resource Science Unit – Jason Augspurger – 11 January 2018 - initial comments (ecological) on Application⁹.
- **Technical review (Ecology 2)** – Mark James of Aquatic Environmental Sciences - 28 August 2018 - final ecological review of effects on Lake Onslow.
- **Technical review (Ecology 3)** - Mark James of Aquatic Environmental Sciences – 18 November 2020 – review of the draft Lake Onslow monitoring plan
- **Technical review (Compliance 1)** – Byron Pretorius of ORC Compliance Unit – 28 June 2021 – review of compliance history of permits being varied
- **Technical review (Ecology 4)** – Annabelle Coates of Babbage Consulting Limited – 18 August 2021 – final ecological review of effects on Taieri River, tributaries of Lake Onslow and wetlands
- **Technical review (Amenity 1)** – Dr Kay Booth for R and R Consulting Limited – 27 September 2021 – final amenity effects report
- **Technical review (Amenity 2)** - Dr Kay Booth for R and R Consulting Limited – 9 February 2022– review of submissions
- **Technical review (Ecology 5)** - review of submissions
- **Technical evidence (Ecology 6)** Annabelle Coates of Babbage Consulting Limited¹⁰ – 3 June 2022 – lake, rivers, and wetland ecology effects
- **Technical evidence (Amenity 3)** - Dr Kay Booth for R and R Consulting Limited – 3 June 2022– amenity effects
- **Peer review of Lake Levels Model (Peer review)** – Tiago Teixeira and Lobo Coutinho – 10 June 2022

2.6 Processing Timeline

The Application was lodged in 2018 and will be heard in July 2022. The below timeline (Table 1) summarises the processing steps since lodgement.

Table 1: Timeline of key processing stages

Date	Description
9 January 2018	Application lodged
10 January 2018	Written approval request sent identifying potentially affected parties
11 January 2018	Further information request sent
15 January 2018	Applicant advises written approvals to be sought and further information to be obtained
31 January 2018	Further information provided
15 February 2018	Further information request sent
5 April 2018	Further information provided
Council RSU unable to complete technical audit. Mark James of Aquatic Environmental Sciences engaged	

⁹ Mr Augspurger was seconded to another Council unit and the Council's internal science team did not have capacity to provide technical audit advice. Dr Mark James from Aquatic Environmental Sciences was engaged to review the application and further information provided to that date in May 2018.

¹⁰ Mark James of Aquatic Environmental Sciences was unable to provide evidence for a hearing in mid 2022 due to retirement. Annabelle Coates has reviewed and considered effects on lake ecology in her evidence dated 3 June 2022.

17 July 2018-19 July 2018	Technical review (draft) by Mark James completed and Further information request sent
17 August 2018	Further information provided
28 August 2018	Final technical review report by Mark James completed
Applicant engaging with potentially affected parties Sept 2018- May 2020	
Discussions on adaptive management conditions (May 2020 – May 2021) including meeting with Fish and Game on 5 August 2020	
21 June 2021	Amendment to Application lodged
5 July 2021	Site visit attempt – failed to make it to site
6 July 2022	Further information request sent
29 July 2021	Further information response
Additional further information requests and clarifications and initial technical audits by Babbage Consulting Limited and Dr Kay Booth (August 2021 – October 2021)	
2 November 2021	S95 notification decision
4 November 2021-2 December 2021	Submission period
7 December 2021-28 Feb 2022	On time extension at Applicant's request
11 April 2022	Hearing notice sent
Further information on model and scenarios (March 2022 – May 2022)	
3 June 2022	Technical evidence finalised
14 June 2022	S42A report finalised
6 July 2022	Hearing date

3. Notification and Submissions

3.1 Notification Decision

Council made the decision to process the Application on a limited notified basis under Section 95B of the RMA on 2 November 2021 (A1498867). Notice was served on the identified affected parties on 4 November 2021 and the submission period closed on 2 December 2021.

The following persons were determined to be adversely affected and were notified:

Table 2: Affected Parties identified under s95E of the RMA

Person	Reasons why they are adversely affected
The Teviot Angling Club Incorporated	<p>The Teviot Angling Club are a local fishing club that administer and care for local fishing facilities including two huts at Lake Onslow. They also hold fishing competitions at Lake Onslow.</p> <p>The Teviot Angling Club submitted on the resource consents lodged in 2001. Their submission has specific comments on the draw down rate of 0.2 m per week. They considered that this sounded reasonable only if it is not exceeded during the period December to April. They had concerns that it would leave the low points rapidly drying.</p>

	<p>The proposal is specifically seeking to change the draw down rate and to increase it from 0.2 m per seven-day period. The overall effects on fishing (including amenity effects) from this change are assessed to be minor and, given the specific concerns raised in the original submission of the Teviot Angling Club and the incomplete nature of the Recreation effects assessment¹¹, the effects of the proposal on them are minor.</p>
Otago Fish and Game Council	<p>Otago Fish and Game Council have statutory functions defined in the Conservation Act 1986. Fish and Game under the Conservation Act is a body corporate which has the rights, powers and privileges of a natural person. The primary function of Fish and Game is to manage, maintain and enhance sports fish and game resources in the recreational interest of anglers and hunters</p> <p>Otago Fish and Game Council submitted on the resource consents processed in 2001. Their submission raised concerns regarding effects on invertebrate fauna and sports fish.</p> <p>In part due to the incompleteness of assessment provided with the application, there is the potential for minor effects to trout and amenity values associated with the recreational activity of fishing. It is understood that that the LOMP is to be further developed with Otago Fish and Game. Overall, effects on Fish and Game are minor.</p>
Aukaha on behalf of rūnanga who have a mana whenua relationship with the site	<p>Aukaha (under a previous name of Kai Tahu ki Otago) submitted on the resource consents processed in 2001. The submission highlighted concerns with loss of access to sites and further loss of mahika kai and mahika kai species.</p> <p>Effects on mahika kai and any loss of wahi tapu and waahi taoka, which may be affected by the proposed variation have not been sufficiently clarified with non-expert opinion provided. Cultural effects are assessed to be minor. It is also understood that that the LOMP is to be further developed with Aukaha. Effects on local rūnanka from the proposal are minor.</p>
Department of Conservation on behalf of the Director General of Conservation	<p>The Department of Conservation (on behalf of the Director-General of Conservation) is the administrator of Crown Land within the lakebed of Lake Onslow, specifically the marginal strip. The marginal strip corresponds to the high water level mark of the lake and so may be affected by the change in draw down rate.</p> <p>Marginal strips are held for conservation purposes and particularly for maintenance of adjacent waters, water quality, aquatic life and for protection of the natural values of the strip and its natural values. They are also held to enable public access to the waters and public recreational use of the strips and adjacent waters¹². There is the potential that the change to the draw down rate could affect these values in a minor manner.</p> <p>DoC also have a statutory responsibility to preserve indigenous freshwater fisheries (as far as practicable) and to protect recreational</p>

¹¹ *Associated Churches of Christ Church Extension and Property Trust Board v Auckland Council* [2014] NZHC 3405, at [70].

¹² Department of Conservation website: [Conservation Act 1987: DOC's role](#)

	<p>freshwater fisheries and freshwater fish habitats. Lake Onslow is recognised as providing freshwater habitat for trout, common bullies and waikōura and the Teviot River for trout.</p> <p>DoC's submission on the original proposal included concerns about changes in the flow regime downstream of the dam affecting native fishery populations. The effects on these values are assessed to be less than minor from the proposal.</p> <p>Overall, the effects of the proposed change on DoC are minor.</p>
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Written approvals were not received by any persons prior to a notification decision being made.

3.2 Submissions Received

Submissions were received from two of the persons in Table 3. No late submissions were received.

Table 3: Summary of Submissions

Submitter	Submission Points	Wishes to be heard
The Teviot Angling Club Incorporated	<ul style="list-style-type: none"> • Opposes application and seeks that it is declined. • Submits that the application has the capacity to create more frequent, severe or longer low lake level events. • Low lake levels impact on angling from the shore and by boat increasing the amount of mud flats reducing opportunities for angling and creating safety hazards. • Adopt the submission of Fish and Game and the relief sought 	Yes
Otago Fish and Game Council	<ul style="list-style-type: none"> • Opposes application and seek that it be declined. Considers the proposed variation will alter the operating regime of the lake and this will affect lake levels resulting in the lake being drawn down to lower levels and/or for a greater duration than currently. • Consider adverse effects arising from the altered regime cannot be determined from the information provided. • If consent is granted, alternative relief is sought such that the change will not create additional adverse effects over the current operating regime. • Lake Onslow is submitted to be a regionally important sports fishery. Details are provided on fishery use of the lake. • Commentary and analysis of the historic water levels of the lake is provided. Supplementary information was provided by Fish and Game on 24 May 2022 on this based on updated data. • Submit that the impacts of low lake levels on anglers include mud flat exposure and access issues for on foot/boat anglers, boating/safety hazards and effects on visual amenity. • Submit that ecological effects will be to trout production as a result of changes to macrophyte distribution and reductions in associated invertebrate communities. • Submit that effects on cicadas and interaction with trout will occur at lower lake levels. Cicada hatch is an important recreational 	Yes

	<p>event for anglers and important food source for trout in mid/late summer.</p> <ul style="list-style-type: none"> • Concern about changes in the lake's footprint at different lake levels and impacts on mudflat exposure. • Do not agree with statements in application that angling is only in deep waters in late summer. • Submit that adverse effects on visual amenity should not be discounted. • Do not support the proposed adaptive monitoring regime. 	
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As evidenced from above, the key issues raised in the submissions relate to the proposal's potential change to the operating regime of the Lake with a focus on the current operating regime of the Applicant and how this could change. There are particular concerns that the duration and frequency of lower lake levels will increase. The submissions outline concerns that this will have on angler safety, angler access and visual amenity effects from increased mud flat areas. The submissions also highlight concerns on trout production that may result at lower lake levels from changes to macrophyte distribution and effects on the cicada hatch.

These submissions are considered in more detail later in this report.

4. Background and Description of the Environment

4.1 Background

A summarised background to the Teviot River Hydro electricity Scheme and its operation is given in Section 5 of the s95 notification recommendation (A1498867). The Application and further information also provide some detail on this. A brief summary is below:

- The Teviot River Scheme is a combined hydroelectric power generation (5 turbines) and irrigation scheme that operates on the Teviot River.
- Lake Onslow is a man-made lake. A new dam was constructed in 1982 and increased the storage level of the lake by 5 m. It operates as a storage dam with a regulated discharge.
- There is annual variability in use of the stored water currently. Lake Onslow is generally operated so that the lake is full (70-90%) for most of the year¹³. The storage is often used in late summer when there are low flows in the Teviot River.
- The current draw down rate over any seven-day period is variable throughout the year and across different years. It is influenced by a number of factors including irrigation and electricity demand and rainfall/surface inputs to the lake.
- The current consents held by the Applicant limit the minimum operating lake level to 5.2 m below the crest of the dam.

¹³ Supported by the data in the further information from Pioneer Energy Limited dated 26 May 2022

- The water discharged from Lake Onslow is consented to a maximum of 6 cubic metres per second (m^3/s). The Applicant has stated that the discharge currently varies between $1.4 \text{ m}^3/\text{s}$ and $5.7 \text{ m}^3/\text{s}$. The Applicant has explained that most of the time significantly less than $6 \text{ m}^3/\text{s}$ is taken due to the limitations of downstream infrastructure, additional flow sources to the river and inability for this take to be maintained over a seven-day period due to impacts on the draw down of the Lake.
- The Applicant has noted that the current draw down rate (a maximum of 0.2 m in any seven-day period) limits use of storage from 1 m below the crest of the dam as the average rate of take is constrained.
- An increased draw down would provide the Applicant with greater flexibility to react to short periods of high demand.
- A draw down greater than 0.2 m/seven days is estimated by the Applicant to be required 2 out of every 5 years for up to 10 weeks during low rainfall years in late summer/autumn.

4.2 Description of the Environment

The s95 notification recommendation (A1498867) outlines the receiving environment that was considered when assessing the effects of the proposed change. It summarises land ownership in and around the Lake and describes the location and climate. It identifies the ecological and natural values associated with the lake and associated water bodies including fish, macroinvertebrates, plants and water quality. Amenity/recreational values, cultural values and existing users are also identified. The key elements of the environment are summarised below. This is based off the Application, further information, s95 recommendation report and the technical advice/evidence I have received. I note that this reflects the environment as it is currently (referenced as Scenario A in Section 6.1 of this report).

General

- The Lake Onslow dam structure and the existing damming and take activities do form part of the receiving environment and effects were assessed on that basis.
- Land ownership of the Lake Onslow bed is not held by one person/organisation. Land ownership is primarily held by the Applicant. Other parties include the Director General of Conservation (DoC) for a piece of marginal strip.
- The Applicant does own the majority of lake bed between the high water mark to the old Lake Onslow shoreline. At low lake levels the public generally have to access the Lake via land owned by the Applicant.
- Lake Onslow is located north of Roxburgh in Central Otago. It has a moderate catchment area and generally has cool temperatures, low rainfall in late summer and autumn and higher than average winds.

Ecology and hydrology

- Lake Onslow is fed by tributaries including the north and south branches of the Teviot River. There are Regionally Significant Wetlands¹⁴ within the vicinity of the Lake. There are likely to be artificial wetlands on the lake margins and one potential natural wetland northwest of the Lake¹⁵. The Lake flows into the Teviot River via the Applicant's dam. The Teviot River is a tributary of the Clutha River/Mata-Au.
- Lake Onslow provides trout spawning habitat and habitat for adult brown trout, waikōura, common bully and invertebrates. There may be habitat for upland bully.
- Trout habitat (adult, juvenile and spawning grounds) and riparian vegetation of significance to aquatic habitats are listed in Schedule 1A of the Regional Plan: Water for Otago (RPW) as recognised natural values for Lake Onslow.
- Macro-invertebrate presence and abundance is likely to be similar to other high alpine lakes in the South Island/Te Waipounamu. Surveys show the communities are dominated by annelid worms, chironomids and caddisfly larvae¹⁶ and that the community is influenced by lake levels¹⁷.
- The Lake is not considered to provide habitat for plant weed species. The Lake does provide habitat for macrophytes. The macrophyte bed communities are dominated by *Myriophyllum sp.* but include sparse populations of *Potamogeton*. The exact species are unknown and it has not been confirmed if these are native or introduced species. Macrophyte beds are restricted to a band around the lake limited by water depth, substrate and wave action.
- The current state of water quality in Lake Onslow is 'average'. Sediment sources are mostly mud and silt.
- The headwater tributaries provide habitat for the Teviot flathead galaxiid (*Galaxias* 'Teviot') (nationally critical) and potentially dusky galaxias (*Galaxias pullus*).
- The Teviot River downstream of the dam is a single channel and is likely to provide habitat for brown trout, longfinned eels and waikōura.
- The Teviot River is listed in Schedule 1A of the RPW as having the following natural values: boulder substrata bed composition of importance for resident biota; free of aquatic pests identified in the Pest Management Strategy for the Otago Region; upper reaches are free of Crack Willow; significant area for development of juvenile trout; significant spawning area for trout; riparian vegetation of significance to aquatic habitats; and significant presence of trout.

Amenity Values

- Lake Onslow is a regionally significant angling resource for brown trout fishing due to the numbers of anglers who visit the Lake, origin of anglers and low site substitutability¹⁸. There is agreement on this significance.

¹⁴ Fortification Creek Wetland Management Area and Middle Swamp located on the southern side of the lake – more details on these wetlands and their known values are in the s95 recommendation.

¹⁵ Coates (2022) Evidence of Annabelle Coates from Babbage Consulting Limited dated 3 June 2022 – para 49

¹⁶ Ross Dungey Consulting (2017), Lake Onslow Lake Bed Profile and Invertebrate Survey; Attachment A from 'Resource Consent Application dated January 2018

¹⁷ Coates (2022) Evidence of Annabelle Coates from Babbage Consulting Limited dated 3 June 2022 – para 21

¹⁸ Booth (2022) Evidence of Dr Kay Booth from Lindis Consulting Limited dated 3 June 2022 – para 30

- Angling is popular year-round. Lake Onslow has a 12-month season for brown trout. The fishery is characterised by small to medium fish, a high catch rate and a high bag limit (10 fish). TAC hold an annual fishing competition on the lake in December¹⁹.
- The fishery is highly valued in late January/February (approximately 20 January to 20 February) during the cicada hatch period. The success of the cicada hatch period is dependent on their habitat and varies from year to year²⁰.
- All methods of fishing can be used. Angling is experienced by all demographics and includes locals, domestic tourists and international tourists (when borders are open)²¹.
- Public access to the shoreline is limited to 20-25% of the Lake only. Fishing is undertaken off the shore, off a boat or using a boat to access shore around the Lake. Boat access is primarily via two boat ramps. A concrete boat ramp near the fishing huts that is operational to approximately 3.2 m below the dam crest and a schist boat ramp near North Bay that is operational to approximately 2.5 m below the dam crest. Small boats may be launched without a ramp although mudflats may prohibit this at times²².
- There are no specific high use area and angling effort is spread across the Lake and the whole lake shoreline²³.
- The 2014/15 National Angling Survey²⁴ (Unwin 2016) estimates total angling usage of Lake Onslow at 1,420 ± 410 angler-days, less than half of the usage recorded in previous survey years (2007/08, 2001/02, 1994/95). Dr Booth is unsure of the reasons for this decline in use or whether it is a long-term trend²⁵.
- Data from all four National Angling Surveys indicate that December to March are the peak angling months at Lake Onslow (the exception being 2001/02 where the season was October to March)²⁶.
- Boating is typically associated with fishing only. The variable morphology of the lake bed is well known and the lake is known to be challenging to navigate. One drowning has occurred at Lake Onslow since records began in 1980²⁷.
- There is other recreation associated with the Lake and surrounds (waikōura trapping, game bird hunting, boating/sailing, swimming, camping, kayaking, bird watching, mountain biking, trail biking) but this is more limited in nature although there is no quantitative data available²⁸.
- It is unknown whether there is any commercial recreation at the Lake²⁹.
- The general location of amenity activities in and around Lake Onslow are shown in Figure 1 below.

¹⁹ Booth (2022) Evidence of Dr Kay Booth of Lindis Consulting Limited dated 3 June 2022 – para 35 and 40

²⁰ Booth (2022) Evidence of Dr Kay Booth of Lindis Consulting Limited dated 3 June 2022 – para 37-38

²¹ Booth (2022) Evidence of Dr Kay Booth of Lindis Consulting Limited dated 3 June 2022 – para 36

²² Booth (2022) Evidence of Dr Kay Booth of Lindis Consulting Limited dated 3 June 2022 – para 57, 60

²³ Booth (2022) Evidence of Dr Kay Booth of Lindis Consulting Limited dated 3 June 2022 – para 34

²⁴ The National Angling Survey has been repeated at intervals of six to seven years since the 1994/95 season. Data are obtained via telephone sample surveys of fishing licence holders, stratified by region, date and licence type. Data are used to estimate mean effort per licence holder for each angling water, and hence total effort for all waters (Unwin 2016).

²⁵ Booth (2022) Evidence of Dr Kay Booth from Lindis Consulting Limited dated 3 June 2022 – para 43

²⁶ Booth (2022) Evidence of Dr Kay Booth of Lindis Consulting Limited dated 3 June 2022 – para 44

²⁷ Booth (2022) Evidence of Dr Kay Booth of Lindis Consulting Limited dated 3 June 2022 – para 46-47

²⁸ Booth (2022) Evidence of Dr Kay Booth of Lindis Consulting Limited dated 3 June 2022 – para 31

²⁹ Booth (2022) Evidence of Dr Kay Booth of Lindis Consulting Limited dated 3 June 2022 – para 33

- Recreational activity on the Teviot River is low but does include some angling for brown trout in the reach below the Lake Onslow dam. The fishing season is 1 October to 30 April and the daily bag limit is four trout³⁰.
- The visual amenity value of the Lake has not been technically assessed but considered to be a very scenic high country lake by Dr Booth on her site visit³¹.



Figure 1: Recreational activities in and around Lake Onslow: Source: Applicant Further Information dated 3 September 2021

Cultural Values:

- The iwi (kaitiaki runaka) whose takiwa (area) includes Lake Onslow and the Teviot River include Te Rūnanga o Moeraki, Kāti Huirapa Rūnaka ki Puketeraki and Te Rūnanga o Ōtākou.
- Schedule 1D of the RPW identifies mahika kai and waahi taoka as Kai Tahu values associated with Lake Onslow and mahika kai only for the Teviot River.
- Mahika kai historically would likely have been moa and more contemporarily waikōura. There is uncertainty on the extent of any mahika kai gathering currently.
- Waahi taoka sites are identified in and around Lake Onslow and potentially include freshwater mussel sites. These are not considered to be mahika kai.

³⁰ Booth (2022) Evidence of Dr Kay Booth of Lindis Consulting Limited dated 3 June 2022 – para 50-54

³¹ Booth (2022) Evidence of Dr Kay Booth of Lindis Consulting Limited dated 3 June 2022 – para 66

- A Cultural Impact Assessment was undertaken for the original applications. This identified that waikōura and brown trout were considered the most important mahika kai species in the catchment.

Historic Values:

- There are no Schedule 1C (Registered Historic Places) of the RPW values associated with Lake Onslow or the Teviot River.
- The original dam structure may meet the definition under the Heritage New Zealand Pouhere Taonga Act 2014 as an archaeological site but has not been classified as such.

Existing Users (in addition to recreational users):

- Teviot Irrigation Company Limited hold resource consents for the old Lake Onslow dam. These are only implemented when the lake drops below the minimum lake level (i.e. 5.2 m below the crest).
- There are no known permitted activities or other consented activities within Lake Onslow or the Teviot River.
- There are no Schedule 1B (Water Supply Values) of the RPW associated with Lake Onslow or the Teviot River.

5. Status of the Application

This Application to vary the consent conditions of two existing permits is pursuant to **Section 127 of the Act**.

Section 127(1) of the Act states that the holder of a resource consent may apply to a Consent Authority for a change or cancellation of a condition of the consent (other than any condition as to the duration of the consent). Section 127(3) states that Sections 88 to 121 shall apply, with all necessary modifications, as if:

- (a) *the application were an application for a resource consent for a **discretionary activity**;*
and
- (b) *the references to a resource consent and to the activity were references only to the change or cancellation of a condition and the effects of the change or cancellation respectively.*

This means that when deciding the Application, the Decision Maker is limited to only considering the effects of the proposed change to the condition, rather than the terms of the existing permits themselves. The full activity (i.e. damming and taking and use of water from Lake Onslow) is not up for reconsideration. The Decision Maker may grant or decline the Application and, if granted, may impose conditions under Section 108 of the Act.

Whether an application is truly one seeking variation, or whether in reality it is seeking consent to a materially different activity, is a question of fact and degree to be determined in the

circumstances of the case. In the decision for Body Corporate 970101 v Auckland CC^[32] the High Court held that where the variation would result in a fundamentally different activity, or one having materially different adverse effects, or one that seeks to expand or extend the original activity, it should be treated as a new application. This has been upheld in the Court of Appeal following an appeal on this decision^[33]. The Council must compare any difference in adverse effects likely to follow from the proposed variation with those associated with the activity in its original form. If the change will result or potentially result in a consequential increase in adverse effects, the application must be treated as if it were for a new consent.

The proposal is seeking to change one element of the operating regime of Lake Onslow, namely the rate of draw down. The effects associated with the change are not materially different from those considered when the original application was decided, and it is not for a fundamentally different activity. While the change could be considered an expansion of the original activity, the overall scope of the activity is not changing and the adverse effects are not materially different from the original application. Therefore, the application can be processed under section 127 of the Act.

Overall, the Application is a **discretionary** activity.

5.1 Other Activities

There are Regionally Significant Wetlands located adjacent to Lake Onslow and a potential natural inland wetland located in the upper catchment. The Applicant has queried whether the Regionally Significant Wetlands meet the definition for 'natural inland wetlands' in the NPS-FM 2020. They have noted that they are in part a function of the man-made damming activity.

A determination on this is not considered necessary for the identification of whether any additional consents are required, including under the National Environmental Standard for Freshwater ("NES-FW"). This is because the proposal does not include any vegetation clearance, earthworks or land disturbance, taking, use, damming or discharge of water, or drainage of water from a wetland or within a 10-100 m setback of a wetland. The provisions of the NES-FW do not apply, and I consider that no further consents are required.

6. Section 104 Evaluation

Section 104 of the Act sets out the matters to be considered when assessing an application for a resource consent. These matters are subject to Part 2, the purpose and principles, which are set out in Sections 5 to 8 of the Act.

The remaining matters of Section 104 to be considered when assessing an application for a resource consent are:

- (a) *the actual and potential effects on the environment of allowing the activity;*
- (ab) *any measure proposed or agreed to by the Applicant for the purpose of ensuring positive effects on the environment to offset or compensate for any adverse effects on the environment that will or may result from allowing the activity;*

³² Body Corporate v Auckland City Council [2000] 6 ELRNZ 183

³³ Body Corporate 970101 v Auckland City Council [2000] 3 NZLR 513

- (b) any relevant provisions of a national environmental standard, other regulations, a national policy statement, the Regional Policy Statement (RPS), the Regional Plan: Water (RPW); and
- (c) any other matter the Council considers relevant and reasonably necessary to determine the application.

6.1 S104(1)(a) – Actual and potential effects on the environment of allowing the activity

Section 104(1)(a) of the RMA requires the council to have regard to any actual and potential effects on the environment of allowing the activity. This includes both the positive and the adverse effects.

6.1.1 Receiving Environment for Effects Assessment

When processing a resource consent regard must be had to what constitutes the “environment” to inform the assessment of the effects of a proposal. Section 95A(8) and section 104(1)(a) require an assessment of the adverse effects or actual and potential effects on the environment, respectively, to make a decision on notification and to make the substantial decision whether to grant or to refuse a consent.

Case law has established what the ‘receiving environment’ is when processing new consent applications (including replacement consent applications)³⁴. In this case, the Application is being processed under s127 of the RMA, which is for a change of consent conditions of two existing consents. S127 directs that it is only the effects of the proposed change that are considered. In establishing the receiving environment that the effects are compared against, the existing condition is used as a starting point. Once the consents have been implemented, the existing consents exist as part of the environment, even if they have not been exercised to their fullest extent³⁵. This is regardless of whether external circumstances hinder full exercise of the consent as these external circumstances could change during the consent term. In accordance with this, when assessing effects, I have compared the effects of the proposed change against a receiving environment that is the current consents exercised to their fullest extent. Expert legal evidence from Michelle Mehlhopt and Kate Dickson of Wynn Williams attached as Appendix 5 has more details on relevant case law that relates to the receiving environment for s127 application.

6.1.2 Scenarios for Receiving Environment and Proposed Environment

The Applicant and submitters acknowledge that the current operation of the lake is a result of a combination of factors that are not exclusive to the existing consent conditions. Therefore, historical lake levels since the consent was implemented (i.e. since November 2006) do not represent what the lake levels would have been like if the consents had been exercised to their fullest extent during this period. This does create challenges when comparing the effects of what may occur as a result of the proposed changes to the consent conditions against what effects have been consented to occur. The submitters³⁶ are concerned with the changes that may result

³⁴ *Queenstown District Lakes District Council v Hawthorn Estate Ltd* [2006] NZRMA 424 (CA).

³⁵ *Smith v Marlborough District Council* Environment Court, Wellington, W098/06, 9 November 2006, at [12] and *Aotearoa Water Action Inc v Canterbury Regional Council* [2020] NZHC 1625, at [196] – [200]. It is noted that this decision is under appeal, with a judgment expected from the Court of Appeal in May 2022.

³⁶ Fish and Game submission dated 2 December 2021 – para 22-28

from status quo. For simplicity and consistency, it is considered that there are four scenarios that can be considered when assessing the Application:

- A. Lake levels and lake management based on the current operating regime and current consent conditions (i.e. actual lake levels based on how the consents have been exercised with a 0.2 m per 7-day draw down). This is the grey line in the model graph below.
- B. Lake levels and lake management based on the current consents being exercised to their fullest extent (i.e. theoretical lake levels based on a 0.2 m per 7-day draw down). This is the orange line in the model graph below.
- C. Lake levels and lake management based on the proposed consents being exercised to their fullest extent (i.e. theoretical lake levels based on a 0.4 m per 7-day draw down) This is the blue line in the model graph below.
- D. Lake levels and lake management based on changes to the current operating regime with the proposed consent conditions (i.e. potential actual lake levels based on a 0.4 m per 7-days draw down). The Applicant has explained that modelling this is too difficult because of all the variables but indicates that the line on the graph would likely be between the grey and orange lines (Scenarios A and B).

Based on the case law direction, it is the comparison between Scenario B (baseline) and Scenario C (proposed) which is relevant for considering effects and when making a decision on this Application. Further details on the modelling and likely environment under Scenarios B and C are given below.

6.1.3 The Model

The Applicant has submitted as further information a Model³⁷ and methodology³⁸ to provide some context on the difference between what lake levels have been since November 2006 (Scenario A) and what they could have been if the consent had been exercised to its fullest extent since this date (Scenario B). They have also considered what lake levels could be like under the proposed change (Scenario C). I have assessed the validity of the model based on the following:

- whether the model has been objectively peer reviewed by a third party;
- the quality of the data used and any verification of the data;
- the margin or error and uncertainty within the model;
- whether any sensitivity testing has been done.

The model has been objectively peer reviewed by Tiago Teixeira and Lobo Coutinho of Babbage Consultants Limited. The peer review was completed on 10 June 2022 and is attached as

³⁷ Further information from Pioneer Energy Limited dated 23 March 2022 and updated in further information dated 24 May 2022 and 26 May 2022

³⁸ Further information from Pioneer Energy Limited dated 28 March 2022 and additional details provided in further information dated 26 May 2022

evidence in Appendix 6. I have reviewed the peer review report. I summarise the following key points from the peer review of the Model:

- The method used by the Model is a mass balance approach where the lake level variation depends on one inflow and one outflow only. Other data such as precipitation, evaporation and groundwater flows could be added to the model to improve its robustness. If there were data on actual discharges over the modelled years this could also be used to calibrate the Model. It is understood that the Applicant has this data based on further information that has been provided as part of this Application³⁹. The Decision Maker may wish to seek an updated model that includes some or all of the above if there is considered sufficient uncertainty on the outputs of the Model. I note that the Model outputs are consequential to understanding what changes may occur to Lake Onslow and the Teviot River if the consents were implemented to their fullest extent under the current consents and as proposed.
- The Model checks for the weekly draw down limits on a daily basis (i.e. the 200 mm per seven days draw down is evenly spread across a seven day period such that 28.57 mm per day is used). However, the maximum outflow volume (6 m³/s) could result in a daily draw down of 70 mm in any one day. The methodology used could underestimate the potential initial draw down after a period of high inflow. I understand this to mean there could be much larger drops of lake level in a day than the Model shows after periods of no drawdown (i.e. where inflows meet outflows). This is only significant if there is a difference between what could occur under Scenarios B and C. I am uncertain as to whether such difference exists. The Decision Maker may wish to seek further information on this under s92(1) or s41C(1) to confirm whether this has implications for lake levels.
- The minimum lake level used in the Model is -5.197 m. This may mean that the Model is overestimating the time the Lake stays at the minimum level by disregarding cumulative daily inflows. This may not be consequential as when the correction factor is applied (see below) this increases the low lake level duration. Therefore, these two may balance each other out. However, I do not have any data to base this on. The Decision Maker may wish to seek further information under s92(1) or s41C(1) to confirm if this has implications for the period of time at the lowest lake level.
- Based on the calibration data provided by the Applicant, the Model is not accurately approximating inflows. Applying a correction factor of 0.688 to the inflow data results in a better approximation to the inflow data (Figure 2 of peer review report). Without this correction factor, the Model could be overestimating inflows to the Lake. The peer review additionally notes that the calibration applied is very limited due to the short period considered and further calibration could be investigated to confirm this correction factor. The 0.688 correction factor has been applied by the peer reviewer to the Applicant's answers to the further information questions⁴⁰ and the peer review output is considered further below when assessing effects. The Decision Maker may wish to seek further information under s92(1) or s41C(1) requiring further calibration to confirm if this correction factor is appropriate. I note that when considering the effects of the changes under Scenarios B and C it is the correction factor output that I have primarily referred to.

³⁹ Further information from Pioneer Energy Limited dated 9 September 2021 included *Onslow Outflow 2015-2021*

⁴⁰ Further information from Pioneer Energy Limited dated 26 May 2022

Overall, the Model is a simple representation of lake levels under the various scenarios. It could be refined to provide more accurate data for considering how the lake levels could be under the current consents and the proposed change. For assessing effects, applying the correction factor to the Model will provide the best available information and this has been considered below. I note that this typically results in the Lake being at lower levels and for longer under both scenarios than the output from the original model. I consider that refinement to the Model will provide a more robust understanding of the Lake and Teviot River under the different scenarios. Without this, using the Model and inferences from it with the correction factor outlined above provides the best available information.

Figure 2 below shows the key output from the Model (lake levels under the various scenarios). The further information provided on 26 May 2022 describes the data from the Model and what this means for lake levels and river flows in Lake Onslow and the Teviot River. The peer review report applies the correction factor to this output. I have described below my understanding of the four scenarios based off this data and other information (including the peer review data with correction factor applied).

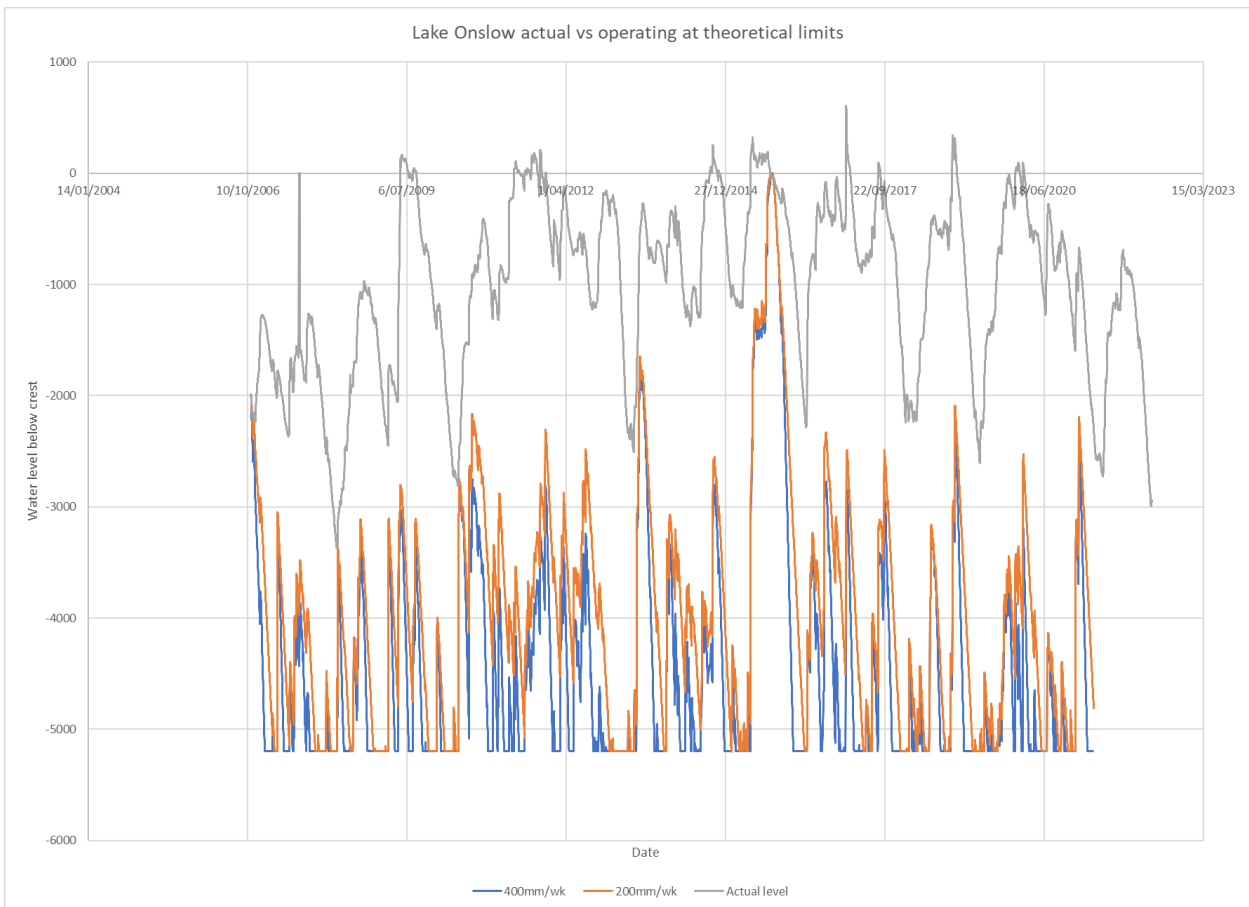


Figure 2: Graph from model showing Scenario A (grey), B (orange) and C (blue). Source: Further information 26 May 2022

6.1.4 Scenario A

I have summarised below my understanding of what Lake Onslow and the Teviot River look like under Scenario A:

- Considering the time period February 2011-February 2022⁴¹
- Lake levels were often above 1.5 m below crest (85.5 % of the time)⁴²
- Lake levels were above 2.5 m below crest for the majority of the time (97.9 %)⁴³
- Lake levels were always above 3.0 m below crest⁴⁴
- Mean lake levels were .995 m below crest.⁴⁵
- Lowest lake level (5.2 m below crest) was never reached. Lowest lake level was 3.0 m below crest.⁴⁶
- The lake level fluctuated between 0 and 3.0 m below crest. There is seasonality in fluctuation depending on rainfall/surface water inputs, electricity and irrigation demand. The lowest lake levels were typically between March and May.⁴⁷
- The Teviot River discharge from Lake Onslow was variable between 0 m³/s and 4.2 m³/s between July 2015 and August 2021⁴⁸. The average sustained discharge over the week is constrained by the draw down limit at lower lake levels – At 1 m below crest the average sustained discharge can be around 3 m³/s⁴⁹ but is dependent on inflows. Flows discharged to the Teviot River often, but not always, follow a diurnal pattern.

Under Scenario A, the Lake has been predominantly full to half fill since 2012. The lake has never been at the minimum operating level during this period. The lake level fluctuated seasonally and has been variable between years. Lowest lake levels were typically between March to May and highest lake levels between July and the end of January. The flows to the Teviot River have been variable and dependent on electricity and irrigation demand, market value for electricity, available daily storage and the lag time to the generation facilities down the Teviot River.

6.1.5 Scenario B

In Scenarios B and C, it has been considered that the consents had been exercised to their fullest extent over the time period 1 November 2006 to June 2021 and that each parameter can be exercised to the fullest extent at the same time i.e. the maximum rate of take can be taken at any draw down rate. It is understood that there are no limitations based on any other consents held by the Applicant in operating Water Permit 2001.475 and Water Permit 2001.476.V3 to their fullest extent. The main factors that influence how the consents are implemented sit outside of the consented framework. These include: irrigation demand, electricity demand and market value, the status of the generating plants, available daily storage, lag time to the generation facilities and inflows to the Teviot River downstream of Lake Onslow. These outside influences have not been considered in Scenarios B and C.

Below I summarise my understanding of what Lake Onslow and the Teviot River would look like under Scenario B.

⁴¹ This time period was selected as it relates to an assessment period in the Fish and Game Supplementary Information to support submission dated 24 May 2022 that is during the consent term.

⁴² Fish and Game Supplementary Information to support submission dated 24 May 2022

⁴³ Fish and Game Supplementary Information to support submission dated 24 May 2022

⁴⁴ Fish and Game Supplementary Information to support submission dated 24 May 2022. Pioneer Energy Limited have indicated that lake levels fell below 3 m in 2008 and the lowest was 3.37 m below crest. Further information by Pioneer Energy Limited dated 31 May 2022

⁴⁵ Further information by Pioneer Energy Limited dated 31 May 2022

⁴⁶ Fish and Game Supplementary Information to support submission dated 24 May 2022

⁴⁷ Further information from Pioneer Energy Limited dated 26 May 2022 – Lake Onslow Lake Levels Model and answer to question 8.

⁴⁸ *Onslow Outflow 2015-2021* provided as further information by Pioneer Energy Limited – 9 September 2021

⁴⁹ See clarification to further information email from Pioneer Energy Limited dated 9 August 2021 and further information email from Pioneer Energy Limited dated 13 September 2021 with *Onslow Average Outflow*.

Lake levels

- Lake levels 2.5 m below crest (schist boat ramp accessibility between 0-2.5 m):
 - The lake levels would have predominantly to always been 2.5 m- 5.2 m below the crest since the consent was implemented.
 - The maximum period of time that the lake would have been above 2.5 m below crest would have been 1/5 of the time period. When the correction factor is applied to the Model, the lake would have never been above 2.5 m below crest.
 - Since 2007, there would have been between 2 and 6 years where the lake was 2.5 m below crest or lower for the entire year. When the correction factor is applied to the Model all years would have been 2.5 m below crest for the entire year.
 - If there were lake levels above 2.5 m below crest these would have most likely occurred between July and end of January.
- Lake levels 3 m below crest (no or very limited boat ramp access (schist and concrete boat ramps)):
 - Lake levels would have frequently (more than 2/3rd of the time) been 3 m below the crest or more since the consent was implemented. When the correction factor is applied to the Model, the lake would have been above 3 m below crest approximately 1% of the time⁵⁰.
 - Since 2007, there would have been a maximum of 1 year where the lake was 3.0 m below crest or lower for the entire year. When the correction factor is applied to the Model, there would have been only one year (2015) when the Lake was above 3 m below crest⁵¹.
 - If there were lake levels above 3.0 m below crest these would have most likely occurred between July and end of January.
- Mean lake levels would have been 3.96 m below crest.⁵² The correction factor has not been applied to the mean lake levels.

Lowest lake level:

- The lake would have been at the lowest lake level for some of the time – approximately 1/10th of the time since the consent was implemented. If the correction factor was applied, the Lake would have been at or below the lowest lake level for approximately half of the time⁵³.
- The lowest lake level would not have been reached each year. There would have been variability between years in whether the lowest lake level would be reached as well as the duration at the lowest lake level⁵⁴.
- The lowest lake levels would have most commonly been in the months of March to May and highest lake levels in winter and spring (approximately June-November).

⁵⁰ Peer review of Model by Tiago Teixeira and Lobo Coutinho of Babbage Consulting Limited dated 10 June 2022

⁵¹ Peer review of Model by Tiago Teixeira and Lobo Coutinho of Babbage Consulting Limited dated 10 June 2022

⁵² Further information by Pioneer Energy Limited dated 31 May 2022

⁵³ Peer review of Model by Tiago Teixeira and Lobo Coutinho of Babbage Consulting Limited dated 10 June 2022

⁵⁴ An average of between 39 to 71 days per year. The variance over the years is shown in Table in answer to question 3(d) of the Further Information by Pioneer Energy Limited dated 26 May 2022

- The lake would have been at the lowest lake level for varying durations depending on rainfall/surface inputs. The average duration at the lowest lake level would have been 18 days based on the Applicant's Model or 26 days when the correction factor is applied to the Model⁵⁵.
- The maximum number of total days that the lake would have been held at the lowest lake level continuously between June 2007 and June 2021 would have been between 54 and 92 days (i.e. approximately (2-3 months)). When the correction factor is applied to the Model, the maximum period at the lowest lake level could have been 154 days (approximately 5 months)⁵⁶.

Lake level fluctuations:

- Lake levels would have primarily fluctuated between 2.5 m and 5.2 m below the crest when the correction factor is applied to the Model.

Teviot River flows:

- The maximum take (6 m³/s) would be discharged when the lake is being drawn down and is above the minimum operating level.
- When the lake is at the lowest lake level the discharge would be constrained to the lesser of 345 L/s (the residual flow on Water Permit 2001.476.V3) or actual inflows.

Under Scenario B, the Lake would have commonly to always⁵⁷ been half full to empty since 2007. Based on the Applicant's model, the Lake could have been above the level where there is boat ramp access for some of the time. However, when the correction factor is applied, existing boat ramp access would have not been possible for nearly all of the time⁵⁸. If there was boat ramp access, this would most likely have been during winter/spring.

The lake would have been at the lowest lake level for around 50% of the time. However, the lowest lake level would not have been reached each year. The lake would have been at the lowest lake level for varying durations, with an average of 36 days and the maximum continuous duration within this time period being approximately 5 months. The lake would have fluctuated between being half full and empty.

The flows to the Taieri River would have oscillated between being the maximum discharge rate of 6 m³/s and the residual flow of 345 L/s. The duration of the residual flow being determined by the period of time the lake was at the lowest level.

6.1.6 Scenario C

Below I summarise my understanding of what Lake Onslow and the Teviot River could look like under Scenario C.

- **Proposed change:**

⁵⁵ Peer review of Model by Tiago Teixeira and Lobo Coutinho of Babbage Consulting Limited dated 10 June 2022

⁵⁶ Peer review of Model by Tiago Teixeira and Lobo Coutinho of Babbage Consulting Limited dated 10 June 2022

⁵⁷ If the correction factor is applied to the model.

⁵⁸ Lake levels above 3 m only 1% of the time.

- To increase the draw down rate from 0.2 m per seven day period to a maximum of 0.4 m per seven-days. An increase of 0.2 m per seven day period.
- **Maximum operating range/minimum operating water level:**
 - No change to the lake's maximum operating range (a minimum operating water level of 5.2 m below the crest of the dam⁵⁹).
- **Maximum take/discharge from the lake:**
 - No changes to the maximum rate of take are sought. The maximum rate of take (and discharge) is restricted to 6 cumecs⁶⁰.
 - The current draw down rate does not enable the take/discharge to be fully exercised at lower lake levels. This is when the average take is considered over a seven-day period⁶¹. The 6 cumecs can currently be taken at any lake level but not for a sustained period.
- **Timing of use:**
 - Use of the increased draw down rate is likely to be employed in late summer and autumn (March to June) and during low rainfall years as the lake level lowers.
 - However, no temporal restrictions are proposed by the Applicant.
 - An increased draw down rate could occur any time of the year.
 - Scenarios B and C is where the increased draw down is used throughout the year (i.e. it is not just restricted to the March-June period).
- **Lake level drop over any 7-days:**
 - Scenario C will enable a greater drop in lake levels over any 7 day period than currently.
 - At the maximum take of 6 m³/s, the duration (number of days) that the lake is dropping within a 7-day period would increase⁶².
- **Lake level drop within the 7-day period:**
 - There are no current consent conditions that limit how water is taken/discharged within a seven-day period.
 - Under the proposed change, the maximum take/discharge rate is not increasing.
 - The lake level and draw down rate is not currently a limiting factor to taking the maximum discharge rate⁶³. Based on this, there is no change to the maximum lake level drop that could occur within a 7 day period between Scenarios B and C⁶⁴.
- **Lake level fluctuations within a 7-day period:**

⁵⁹ During the exercise of this consent, the minimum operating water level of the impoundment shall be 679.9 metres above mean sea level. - Condition 2 of Water Permit 2001.476.V3

⁶⁰ The maximum rate of abstraction from Lake Onslow under this consent shall not exceed 6 cubic metres per second. - Condition 1 of Water Permit 2001.476.V3

⁶¹ When the lake level drops below approximately 1 m below the dam crest the existing draw down limit of 200 mm/week limits the average weekly discharge rate to the river to around 3 cubic metres per second. See clarification to further information email by Pioneer Energy Limited dated 9 August 2021 and email dated 13 September 2021.

⁶² Further Information by Pioneer Energy Limited dated 9 September 2021 – question 2

- When the lake is full and the outflow is 6m³/s the current 200mm limit will be reached in 4.4 days at a maximum rate of 45.5mm/day. At the same flow rate the time taken to lower the lake 400 mm will be 8.8d days at a maximum rate of 45.5mm/day.
- When the lake is down 1m and the outflow is 6m³/s the current 200mm limit will be reached in 3.6 days at a maximum rate of 55.63 mm/day. At the same flow rate the time taken to lower the lake 400mm will be 7.2 days at a maximum rate of 55.63 mm/day
- When the lake is down 2m and the outflow is 6m³/s the current 200mm limit will be reached in 2.87 days at a maximum rate of 69.6 mm/day. At the same flow rate the time taken to lower the lake 400mm will be 5.75 days at a maximum rate of 69.6 mm/day

⁶³ See clarification to further information email by Pioneer Energy Limited dated 9 August 2021 and email dated 13 September 2021.

⁶⁴ Further information by Pioneer Energy Limited dated 9 September 2022 and this is confirmed by Peer review of Model by Tiago Teixeira and Lobo Coutinho of Babbage Consulting Limited dated 10 June 2022

- If the discharge rate is constant and the draw down rate is constant, then the lake level drop will be constant and even when a discharge is occurring. Fluctuations would be caused by rainfall/surface water inputs.
- **Duration of lake bed exposure:**
 - The extent of lake bed/shore line that is exposed in a 7-day period is dependent on the starting lake level and shore terrain but more lake bed is exposed at lower lake levels⁶⁵.
 - More lake bed will be exposed in a 7-day period than could currently occur. This has not been quantified for any lake level.
 - There will be no change to the maximum extent of lake bed exposure.
- **Fluctuations in lake levels:**
 - Fluctuations are based on an external factor (rainfall/surface water inflows bringing the lake level back up) as well as the outflow discharge.
 - The model suggests there would be a similar pattern of fluctuation in lake levels between Scenario B and C. The model peer review indicates that Scenario B will raise the lake level from the bottom limit more often than Scenario C and that Scenario C will drop the lake level to the bottom limit quicker.
- **Mean lake levels:**
 - Mean lake levels change from 3.96 to 4.44 m below crest. A drop of the average lake level of the period by approximately 0.5 m. A correction factor has not been applied to these mean lake levels.
- **Lower lake levels:**
 - Lower lake levels would be reached earlier in a season than under Scenario B due to the faster draw down rate. How much faster has not been able to be quantified as there are too many variables.
 - Comparing Scenario B and Scenario C and the original Model, the lake would have been at a level of 2.5 m or more below crest for between 3-9% longer over the time period and below 3.0 m or more below crest for between 1-11% longer. When the correction factor is applied to the Model, there is no change between Scenario B and Scenario C.
 - The lake would have been at the lowest lake level for longer (20-25% more of the time under Scenario C) when compared with Scenario B.
 - Since 2007, the number of years where the lake level would have not been greater than 2.5 m below crest for the entire year would have increased from 6 years in Scenario B to 10 years in Scenario C, at base inflow⁶⁶ under the original model. There would be no change when the correction factor is applied as the lake would always have been lower than 2.5 m below crest.

Table 4: Calendar years since the consent was implemented where the lake was between 2.5 m and 5.2 m below crest for the entire year for Scenarios B and C (original model) – Source: Further information 26 May 2022

	Base Flow	+10%
-2.5m @200mm	2007, 2008, 2009, 2014, 2019, 2020	2007, 2008,

⁶⁵ Dungey (2017) *Lake Onslow Lake Bed Profile and Invertebrate survey*. Prepared by Ross Dungey Consulting for Pioneer Energy Limited. Attachment A of PEL 2018 resource consent application.

⁶⁶ Question 6 of Further Information from Pioneer Energy Limited dated 26 May 2022

-2.5m @400mm	2007, 2008, 2009, 2010, 2011, 2012, 2014, 2017, 2019, 2020	2007, 2008, 2009, 2019, 2020
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- Since 2007, the number of years where the lake would have not been greater than 3.0 m below crest for the entire year would have increased from 1 year in Scenario B to 7 years in Scenario C, at base inflow⁶⁷ under the original model. There would be no change when the correction factor is applied as the lake would always have been lower than 3 m below crest excepting 2015 for both scenarios.

Table 5: Calendar years since the consent was implemented where the lake was between 3 m and 5.2 m below crest for the entire year for Scenarios B and C. (original model) – Source: Further information 26 May 2022

	Base Flow	+10%
-3.0m @200mm	2008	Nil
-3.0m @400mm	2007, 2008, 2009, 2012, 2017, 2019, 2020	Nil

- There would continue to be a similar level of variance between years in when the lowest lake level is reached but the average duration at the lowest lake level would increase slightly from 18 days in Scenario B to 21 days in Scenario C or 26 to 27 days, when the correction factor is applied to the Model.
- The maximum number of continuous days that the lake would have been held at the lowest lake level would have not changed substantially⁶⁸.
- **Seasonality of low lake levels:**
 - There is no obvious change when viewing the model graph in the timing of when the lowest lake levels would be throughout a year (i.e. the pattern of high and low lake levels is similar) and this is confirmed by the Applicant⁶⁹. However, the lake levels are likely to be lower in Scenario C than B for the lower lake levels reached.
- **Flows in the Teviot River:**
 - There would be no change to the maximum flow.
 - A greater duration at the lowest lake level means that the discharge to the Teviot River would have been at the residual flow for approximately 20-25% longer compared to Scenario B.

6.1.7 Comparison between Scenario B and C

In Table 6 below I compare Scenarios B and C and summarise the key changes to Lake Onslow and the Teviot River. I note that the Fish and Game submission expects that the proposal will result in lower lake levels more frequently and for a greater duration⁷⁰. The below table shows that proposal will result in overall lower lake levels and that the lake would be at the lowest lake

⁶⁷ Question 7 of Further Information from Pioneer Energy Limited dated 26 May 2022

⁶⁸ 1 day extra at base inflow. Question 3(a) in Further Information from Pioneer Energy Limited dated 26 May 2022 or 13 days when the correction factor is applied to the Model - Peer review of Model by Tiago Teixeira and Lobo Coutinho of Babbage Consulting Limited dated 10 June 2022

⁶⁹ Question 8 in Further Information from Pioneer Energy Limited dated 26 May 2022

⁷⁰ Fish and Game submission (2021) – para 6

level more often and for a slightly longer period of time. It provides some quantification of what these increases are in relation to what could occur currently. When the correction factor is applied to the Model, there is no change in how often the lake would be lower than 2.5 m or 3 m below crest (nearly always).

Table 6: Lake Onslow and the Teviot River under Scenario B and Scenario C and the differences between the scenarios

	Scenario B – 0.2 m per 7- days	Scenario C – 0.4 m per 7- days	Change from Scenario B to Scenario C
Minimum operating water level	5.2 m below crest	5.2 m below crest	No change
Maximum take from Lake Onslow	6 cubic metres per second	6 cubic metres per second	No change
Lake levels - duration and seasonality			
Lake levels			<ul style="list-style-type: none"> ○ Lower lake levels reached earlier in a season for Scenario C ○ No change to period of time that lake level could be below 2.5 and 3 m below crest when the correction factor is applied to the Model (100% and 99% of the time, respectively).
Mean lake levels	3.96 m below crest	4.44 m below crest	<ul style="list-style-type: none"> ○ A drop of the mean lake level by approximately 0.5 m. This is without the correction factor applied.
Duration at lowest lake levels			<ul style="list-style-type: none"> ○ At lowest lake level 20-25% more of the time ○ Limited change in which years have lowest lake levels ○ Average number of days at lowest lake level increases slightly (1-3 days). ○ Limited increase in maximum continuous period (days) of lowest lake level.
Speed at reaching lowest lake level	Not able to be quantitatively determined	Not able to be quantitatively determined	Not known
Months of highest lake levels	July to January	July to January	No change – winter and spring
Months of lowest lake levels	March to June	March to June	No change – autumn

Fluctuation and lake drop parameters			
Lake level drop over a 7 day period			More days in a 7 day period where the lake could be dropping. Number of days depends on starting lake level.
Lake bed exposure within a 7-day period	Dependent on bathymetry of lake and lake level start.		More bed exposure in a 7 day period than could occur currently. How much more is dependent on bathymetry and lake level at start.
Maximum lake level drop within a 7 day period	Constrained by maximum take limit.	Constrained by maximum take limit.	No change
Fluctuations in lake levels within 7-days	Constant discharge assumed	Constant discharge assumed	No change
Fluctuations in lake levels over a year	Fluctuations primarily due to rainfall/surface water inputs	Fluctuations primarily due to rainfall/surface water inputs.	Scenario B raises the lake level from the bottom limit more often while Scenario C drops the lake level to the bottom limit quicker.
Teviot River			
Duration that discharge to the Teviot River is at residual flow only			Approximately 20-25% more time where the discharge is at residual flow only

6.1.8 Scenario D

The Applicant has explained that it is not possible to model Scenario D⁷¹. This is because of the wide number of variables outside of the consent conditions that determine how much water is taken at any point in time. They have generally indicated that the lake levels would sit somewhere between Scenario A and B⁷². Due to this high level of uncertainty and that the focus of the assessment of effects for the proposal is those effects of the consents being implemented to their fullest extent (Scenario C), a specific description of this scenario has not been undertaken and I do not consider it is required.

6.1.9 Positive Effects

The positive effects are primarily addressed in further information from the Applicant⁷³. The proposal will have the following positive effects:

- An ability for more efficient use of the water resource when generating hydro-electricity.
- Increasing the generation output of the Lake Onslow/Teviot hydro-electricity system by enabling more flexibility in the timing and management of outflows.

⁷¹ Further information email from Pioneer Energy Limited dated 24 March 2022

⁷² Further information from Pioneer Energy Limited dated 23 March 2022

⁷³ Further information from Pioneer Energy Limited dated 29 July 2021

- Potential cumulative positive impact on local and regional renewable energy generation output.
- Enabling greater contribution by the Applicant to national targets for renewable electricity generation.
- Potential positive social and economic effects for people and communities in the locality by providing more renewable electricity to the Central Otago market, when required
- Higher flows in the Teviot River during natural low flow periods would provide increased habitat for aquatic species.

6.1.10 Adverse Effects

In considering the adverse effects, the Consent Authority:

- may disregard those effects where the plan permits an activity with that effect; and
- must disregard those effects on a person who has provided written approval.

There are no permitted activity rules that are relevant for the changes proposed.

No persons provided written approval to the Application.

The assessment of adverse effects undertaken for notification recommendation identified and evaluated adverse effects.

It is noted that the adverse effects assessment for the s95 recommendation did not explicitly consider the receiving environment as being the consents as if they had been fully implemented (i.e. Scenario B). In general, the effects assessment considered the receiving environment as being the values on the site at the point the Application was being considered (i.e. the one modified by the current operating regime). Effects were assessed through the lens of how the change in draw down would affect the operating regime and the consequential effects on those current values (i.e. generally comparing Scenarios A and D).

I consider that the proposed change to how the receiving environment is considered would not have altered the s95 decision for this Application. This is specifically regarding the effects of the activity being no more than minor. Nor would any additional parties have been considered affected than those identified (refer to Table 2 of this report). The reasons for this are that the receiving environment under Scenario B is a lake environment that would have less natural and human use values than exist at present⁷⁴ and the change to the lake environment (Scenario C) from the proposal will be less significant or similar than comparing Scenario D and Scenario A. I do not consider that this Application should have been publicly notified and was not. Overall, this change in receiving environment consideration does not prevent the decision maker from deciding this Application (s104(3)(d) of the RMA).

A summary of the effects of the proposal is provided below and includes reference to the evidence of Mrs Coates and Dr Booth who have considered the receiving environment, as detailed above. I note that Mrs Coates and Dr Booth did not consider the peer review of the Model within their evidence. They can provide supplementary advice after reviewing this, if required by the Decision Maker. The key issues in the submissions are also addressed below.

⁷⁴ Booth (2022) Evidence of Dr Kay Booth of Lindis Consulting Limited dated 3 June 2022 – para 73

6.1.10.1 Ecological Effects

Lake Onslow

- No weight has been given to Lake Onslow being a man-made lake and one that is actively managed when considering effects on the values of the Lake⁷⁵. Lake Onslow is a lake under the RMA and all relevant planning documents. The current values of the Lake, as summarised in section 4.2 of this report, have been the starting point for determining what values may have existed if the consents had been operated as per Scenario B.
- The key focus is the effects to the indigenous bullies, waikōura, brown trout, macrophytes and macroinvertebrates, as outlined in Mrs Coates evidence. These species are present under the current operating regime.
- Mrs Coates has provided advice on whether these current species would likely be present under Scenario B and any change to their abundance⁷⁶:
 - Macrophyte beds would be present and have migrated with the fluctuating water levels. Macrophyte beds would have re-established through seed deposits, fragments and rhizomes, in areas with suitable water depth. Their persistence would depend on periods of lake level stability, which the model shows would exist, regardless of the actual lake level;
 - Macroinvertebrate abundance and diversity would have fluctuated with the changing lake levels as well as due to natural variables (rainfall, temperature). There would likely have been 'lag time' between the changes in lake levels and changes to the invertebrate community;
 - Fish habitat would have moved with the changing lake levels with the deeper middle part of the lake remaining relatively stable and providing refuge for trout. The trout population would likely be smaller/less productive due to less water volume in the lake but a trout fishery would still be present. Bullies would have migrated with lake levels. All current fish species would exist within the lake with populations fluctuating with changes in lake levels;
 - No changes to fish passage into connected tributaries and spawning grounds is anticipated as this is assumed to be protected by the minimum lake level, which was considered for the original decision.

Overall, if the Lake had been managed such that the consents were implemented to their fullest extent, the Lake would have reduced ecological values to present. However, the Lake would still provide habitat for all current species. The increased fluctuations would have had periods of abundance and diversity as populations re-establish and reproduce. It is noted that the Fish and Game submission states that the stable lake levels in recent time have created a more productive fishery⁷⁷. Scenario A may have had slightly more stable lake levels than what would have occurred under Scenario B although when the correction factor is applied to the Model it shows that Scenario B would have fluctuated primarily between 3 and 5.2 m below crest so the range of lake levels is not that dissimilar from Scenario A (albeit at different lake levels). Mrs Coates has confirmed that the trout fishery would likely be smaller and less productive when the lake is at the lowest lake levels and if it remains there for an extended

⁷⁵ Refer to Legal Evidence by Michelle Mehlhopt and Kate Dickson dated 17 May 2022 – para 50-61

⁷⁶ Coates (2022) Evidence of Annabelle Coates from Babbage Consultants Limited dated 3 June 2022 – para 26

⁷⁷ Fish and Game submission (2021) – para 23

period of time⁷⁸. For clarity, I note that it is the change between Scenario C and Scenario B that is of relevance for the adverse effects assessment.

Lake Onslow – Ecological Effects

- The key changes to the ecological environment that may potentially occur are increased loss of habitat for aquatic species on a weekly basis and a reduction, or alteration of habitat for aquatic species due to the increased duration of lower lake levels.
- *Effects on macroinvertebrates:* In terms of the weekly change, the increased draw down rate will likely remove any chance macroinvertebrates have to ‘migrate’ with the water levels but Mrs Coates opinion is that this is likely to already be very low at the current draw down rate⁷⁹. She notes that adult invertebrates will continue to repopulate the aquatic environment if there is aquatic habitat available. I note that the proposal will not remove the presence of aquatic habitat.
- Changes in lake level are considered by Mrs Coates to be an important driver of macroinvertebrate productivity. Disturbance and variability in lake level created by the increased draw down rate will create new habitat and may enhance macroinvertebrate productivity. Natural variability in physical and biological conditions between years are also considered to obscure the effects of the proposal on macroinvertebrates⁸⁰. This is supported by the Application documentation⁸¹ and initial technical review by Mark James of Aquatic Environmental Sciences (Ecology 2). Overall, effects on macroinvertebrates from the proposal are considered to be negligible to low.
- *Effects on macrophytes:* The Fish and Game submission raises particular concerns about the effects the change could have on macrophyte beds due to their dewatering and longer timeframe for re-establishment and the resultant effects on trout productivity⁸². The macrophyte community occupy a limited band in the Lake (present in water less than 2 m deep). Mrs Coates has confirmed that macrophytes have no ability to migrate⁸³ and will die off as the lake levels drop but will recolonise in suitable conditions. Mrs Coates states that this will occur under the current and proposed rate of draw down⁸⁴. Mrs Coates concludes that the proposal is unlikely to significantly change macrophyte composition and abundance compared to what could occur under the current consent conditions⁸⁵. However, Mrs Coates agrees with Fish and Game and Mr Dungey⁸⁶ that macrophytes do provide habitat for invertebrates. She notes that the addition of rocky areas around the Lake could benefit macroinvertebrate populations by providing an alternative habitat for spawning and feeding⁸⁷. I note that the resultant effects on macroinvertebrate abundance and diversity and trout productivity as a result of the changes to macrophyte beds are assessed to not be significant. I have not recommended this as a condition of consent but note that it could benefit

⁷⁸ Coates (2022) Evidence of Annabelle Coates from Babbage Consultants Limited dated 3 June 2022 – para 26.4

⁷⁹ Coates (2022) Evidence of Annabelle Coates from Babbage Consultants Limited dated 3 June 2022 – para 31-32

⁸⁰ Coates (2022) Evidence of Annabelle Coates from Babbage Consultants Limited dated 3 June 2022 – para 31

⁸¹ Ross Dungey (September 2017) - Lake Onslow Lake Bed Profile and Invertebrate Survey

⁸² Fish and Game submission (2021) – para 7, 41, 42, 44

⁸³ Coates (2022) Evidence of Annabelle Coates from Babbage Consultants Limited dated 3 June 2022 – para 33

⁸⁴ Coates (2022) Evidence of Annabelle Coates from Babbage Consultants Limited dated 3 June 2022 – para 62

⁸⁵ Coates (2022) Evidence of Annabelle Coates from Babbage Consultants Limited dated 3 June 2022 –para 62

⁸⁶ Ross Dungey in further information dated 17 August 2018 – answer to question 2

⁸⁷ Coates (2022) Evidence of Annabelle Coates from Babbage Consultants Limited dated 3 June 2022 –para 63

invertebrate populations in the Lake. Further discussion on this condition is provided in Section 13.2.2 of this report.

- *Effects on fish:* Mrs Coates consider that no significant environmental effects on indigenous bully communities or brown trout habitat are anticipated with the faster draw down over a 7-day period. The fish will move with the water as the lake level drops⁸⁸.
- Mrs Coates notes that a longer duration of low lake levels may reduce fish populations (trout, bullies) temporarily, if the habitat is at carrying capacity, but the populations will increase as more habitat becomes available as lake levels rise⁸⁹. This is provided spawning habitat is available. The proposal is not anticipated to change fish passage access to spawning habitat. Effects to fish populations from a faster draw down will be temporary. Additional weeks at the lowest lake level will have negligible effects on ecological values and additional months some reduction⁹⁰. It is noted that there will be more time at the lowest and lower lake levels but that the average duration will increase by approximately 1-3 days. On that basis, habitat effects are considered to be negligible from the change.
- Mrs Coates has confirmed that the proposal is unlikely to alter the habitat enough to make Lake Onslow more suitable for trout, to the detriment of indigenous species (i.e. it is unlikely to facilitate increased predation of the bullies and waikoura)⁹¹.
- Limited effects on Waikōura are anticipated from a faster 7-day draw down and longer durations at lower lake levels. This species can be found in shallow and deep water and can dig burrows in muddy bottoms and burrow into sediments to mitigate the effects of changes on lake levels on them⁹².
- The Fish and Game submission highlights that as the shoreline moves away from permanently dry vegetation then inputs from the land, including cicadas, are reduced. They note that this could have impacts on trout during late summer⁹³. Mrs Coates considers that this effect could occur currently under Scenario B and the proposal will not significantly exacerbate this effect.⁹⁴
- There are no known pest/weed species in Lake Onslow and the proposal will not increase the range and extent of pest plant species.
- Overall effects on the ecology of Lake Onslow are assessed to be negligible to low from the proposed change.

Teviot River

- Under Scenario B the Teviot River flows would be subjected to periods of high flows when the lake is lowering and a residual flow when the lake is at 5.2 m below crest. Scenario C

⁸⁸ Coates (2022) Evidence of Annabelle Coates from Babbage Consultants Limited dated 3 June 2022 – para 34 and para 44-46

⁸⁹ Coates (2022) Evidence of Annabelle Coates from Babbage Consultants Limited dated 3 June 2022 – para 34, 35 and Ross Dungey in further information dated 17 August 2018 – answer to question 1

⁹⁰ Coates (2022) Evidence of Annabelle Coates from Babbage Consultants Limited dated 3 June 2022 – para 35, para 38 and para 66

⁹¹ Coates (2022) Evidence of Annabelle Coates from Babbage Consultants Limited dated 3 June 2022 – para 36

⁹² Coates (2022) Evidence of Annabelle Coates from Babbage Consultants Limited dated 3 June 2022 – para 36

⁹³ Fish and Game submission (2021) – para 46

⁹⁴ Coates (2022) Evidence of Annabelle Coates from Babbage Consultants Limited dated 3 June 2022 - para 64

would exacerbate this with a longer period of time at residual flow, a slight increase in fluctuations of high flows and potentially longer time with a constant discharge rate.

- The ecological values of the Teviot River under Scenario B would be similar to Scenario A⁹⁵.
- The fluctuation between high constant flows and the residual flow has been assessed by Mrs Coates in her evidence. When there are higher flows during summer (natural low flow period) this will have positive benefits for the habitat⁹⁶.
- Flat lining of low or high flows in the Teviot River creating conditions for algal growth may be increased slightly and can be managed by existing consent conditions that require flushing flows if certain triggers are met⁹⁷.
- The period of low flows may increase by 20-25 %. Low flows will be limited to the residual flow. There is no change to the consented residual flow and this was assessed previously as appropriate for aquatic habitat in the river⁹⁸.
- Any increased fluctuation in flows is not expected to be detrimental to fish habitat due to the 'U' shaped nature of the river⁹⁹ which results in very little change to wetted area.
- Adverse effects on bullies from changes in the flow regime likely to be limited due to the nature of the river habitat. There are no records of indigenous galaxiids being present in the river¹⁰⁰.
- Increased rates of discharge are unlikely to erode or create additional sedimentation effects downstream in the Teviot River when compared with flooding and flushing flow effects that can occur naturally or are currently consented.
- The key potential effect to water quality is an increase in turbidity and sedimentation due to changes in erosion processes from fluctuations in lake levels and/or faster draw down. Limited erosion to date and increased sediment load (should it occur) will have limited affects due to the fine nature of the sediment generated and water volumes in Lake Onslow and Teviot River¹⁰¹.
- Overall, effects on the ecology of the Teviot River are considered to be low to negligible from the proposed change.

Wetlands and Lake Onslow Tributaries

- Under Scenario B, wetlands associated with the lake margin would have moved with lake levels and species would likely be dominated by rapidly recolonising species such as exotics.

⁹⁵ Coates (2022) Evidence of Annabelle Coates from Babbage Consultants Limited dated 3 June 2022 – para 25

⁹⁶ Coates (2022) Evidence of Annabelle Coates from Babbage Consultants Limited dated 3 June 2022 – para 41

⁹⁷ Coates (2022) Evidence of Annabelle Coates from Babbage Consultants Limited dated 3 June 2022 – para 42

⁹⁸ Coates (2022) Evidence of Annabelle Coates from Babbage Consultants Limited dated 3 June 2022 – para 41 and 43

⁹⁹ Coates (2022) Evidence of Annabelle Coates from Babbage Consultants Limited dated 3 June 2022 – para 42

¹⁰⁰ Coates (2022) Evidence of Annabelle Coates from Babbage Consultants Limited dated 3 June 2022 – para 44

¹⁰¹ Coates (2022) Evidence of Annabelle Coates from Babbage Consultants Limited dated 3 June 2022 – para 46

- No adverse environmental effects on Fortification Creek and Middle Swamp (Regionally Significant Wetlands) and limited effects on any natural inland wetlands are anticipated due to no change in inundation extent from the proposal, location of the wetlands above the lake, deep channels connecting the Regionally Significant Wetlands with the lake and because recharge of the wetlands is by rainfall¹⁰².
- Lower lake levels may reduce the wetted area of the natural wetlands but this would occur under the current consents and there will be no permanent drainage of the wetlands¹⁰³.
- There are no changes to the consented low lake levels and fish migration to and from spawning grounds are unlikely to be affected. The lowest consented lake levels are not considered to change any existing natural barriers that prevent trout migration into the tributaries. The increase in the duration of low lake levels will not affect the habitat of species in the tributaries of Lake Onslow¹⁰⁴.
- Overall, adverse effects on wetlands and connected tributaries to Lake Onslow are considered to be negligible to low.

6.1.10.2 Amenity Effects

- The key potential effects are to the primary users of Lake Onslow and the Teviot River, being anglers and boat users¹⁰⁵.
- Under Scenario A, Lake Onslow provides a regionally significant angling experience due to the high catch rate, the fishery being open all year round and for all fishing methods and because of the high scenic value¹⁰⁶.
- There is no obvious way to know if the consent had been exercised to its fullest extent whether the angling experience would still be considered regionally significant. Dr Booth considers that Scenario A is more recreation 'friendly than Scenario B¹⁰⁷ and it is her opinion that under Scenario B the recreational values of Lake Onslow would have reduced because there would have been less angling activity. This would primarily have been a result of:
 - consistently lower lake levels limiting foot and boat access due to mud flat creation;
 - boat ramp inoperability;
 - a higher risk of boat standing; and
 - diminished visual amenity values as a result of the lake being half to fully empty for most of the time¹⁰⁸.

There will likely have been little change to angling values in the Teviot River¹⁰⁹ when comparing Scenario A and B.
- The key changes between Scenarios B and C to amenity values from changes to lake levels result to:

¹⁰² Coates (2022) Evidence of Annabelle Coates from Babbage Consultants Limited dated 3 June 2022 – para 48

¹⁰³ Coates (2022) Evidence of Annabelle Coates from Babbage Consultants Limited dated 3 June 2022 – para 49

¹⁰⁴ Coates (2022) Evidence of Annabelle Coates from Babbage Consultants Limited dated 3 June 2022 – para 50

¹⁰⁵ Booth (2022) Evidence of Dr Kay Booth of Lindis Consulting Limited dated 3 June 2022 – para 32 and para 85

¹⁰⁶ Booth (2022) Evidence of Dr Kay Booth of Lindis Consulting Limited dated 3 June 2022 – para 19

¹⁰⁷ Booth (2022) Evidence of Dr Kay Booth of Lindis Consulting Limited dated 3 June 2022 – para 68

¹⁰⁸ Booth (2022) Evidence of Dr Kay Booth of Lindis Consulting Limited – para 69

¹⁰⁹ Booth (2022) Evidence of Dr Kay Booth of Lindis Consulting Limited dated 3 June 2022 – para 69

- increased mudflat exposure for longer;
- boat and foot access being inaccessible for longer;
- reduced angling opportunity/locations for longer;
- potential increased risk of boat stranding;
- the number, health and catchability of trout; and
- visual amenity values being impacted for longer¹¹⁰.

I have addressed each of these in turn below. I note that this assessment is limited in parts because of the lack of specific details for some of the effects. I have considered the changes that may occur in relation to the identified changes in Table 6 and considered the expert advice of Dr Booth. I have noted where it is my opinion on effects based on the available information.

- *Increased mudflat presence:* The Fish and Game submission raises particular concern with the potential for increased mud flat exposure and the difficulties this would cause with access, pleasantness and safety, including challenges with finding locations to disembark safely¹¹¹. Public access difficulty and visual amenity effects due to mudflats would occur under Scenario B. It is the increase in extent and duration of mud flats as a result of the proposal that is relevant. It appears that mudflats become a hindrance to public access to the Lake before the lowest lake level is reached and that this is around the 2.5-2.7 m below crest mark¹¹². When the corrected Model is considered, the proposal will not increase the period of time that the Lake is below 2.5-3 m and the Lake would nearly always be below these lake levels¹¹³. No change to initial mudflat presence will therefore occur from the proposed change.
- There is uncertainty around the maximum extent of mudflats when the lake is at 5.2 m below crest but this is estimated to be 7,925 ha of the 10,940 ha lake area¹¹⁴ or 8,310 ha of the 11,400 ha lake area¹¹⁵. In both cases, that is roughly 72% of the lake shoreline. It is also estimated that approximately 60 percent of the lake shoreline is soft, deep mud at lake levels of 3 m below the dam crest¹¹⁶. Distance to water is highly variable on the lake bed morphology and the drops in lake levels has variable impacts on mudflat exposure.¹¹⁷ The proposal will change the mean lake level and the lake will be at lower levels for longer. The maximum change in mudflat extent between 3 m below crest and 5.2 m is 12%¹¹⁸ and the proposed change will result in less change than this if the mean lake levels change is 0.5 m¹¹⁹. I consider that the proposal is likely to increase the area of mudflats present overall. However, this change will be most consequential when the lower lake levels overlap with the key angling periods, which is likely to be limited to the period of March¹²⁰. The key effects of more mud are restricted foot access to fishing sites and limitations with fishing off the lake bed at key fishing sites. I consider that although there may be some increase in the mudflat extent from the proposal, this is not a significant effect as mudflat presence is already significant under Scenario B and Scenario C will increase this only slightly. If it were considered appropriate to

¹¹⁰ Booth (2022) Evidence of Dr Kay Booth of Lindis Consulting Limited dated 3 June 2022 – para 88

¹¹¹ Fish and Game submission (2021) – para 29-31

¹¹² Booth (2022) Evidence of Dr Kay Booth of Lindis Consulting Limited dated 3 June 2022 – para 26 and Fish and Game submission (2021) para 26 and 67

¹¹³ Table 6 of this report

¹¹⁴ Booth (2022) Evidence of Dr Kay Booth of Lindis Consulting Limited dated 3 June 2022 – para 82

¹¹⁵ Fish and Game submission (2021) – para 66

¹¹⁶ LandPro (2021b)

¹¹⁷ Booth (2022) Evidence of Dr Kay Booth of Lindis Consulting Limited dated 3 June 2022 – para 82 and Further information from Pioneer Energy Limited dated 2 Sept 2021 – answer to question 3

¹¹⁸ If 60% of shoreline is exposed at 3 m below crest and 72 % of shoreline at 5 m below crest.

¹¹⁹ Mean lake levels are to change by 0.5 m based on the Model without the correction factor applied.

¹²⁰ Lowest lake levels are March to June and key angling period is December to March

mitigate this effect, then the rocky bed condition discussed under the macrophytes effects heading would minimise this effect. Overall, the lake having an increased time at lower lake levels and the mudflats that result will not be a significant effect on public access and amenity values. I discuss effects on visual amenity further below.

- *Increased wet mud:* The proposal could increase mudflat extent within a week as more bed is exposed in a 7-day period¹²¹. Depending on the bed that is exposed, if this is shoreline with soft, deep mud then there would be more wet mud exposed than currently¹²². However, it is also recognised that the longer periods of lower lake levels will allow the mud to harden, which would enable foot access around the Lake. Fish and Game agree that mud will dry out and become firmer underfoot if it is allowed to dry out¹²³. It is the most recently exposed areas closest to the lake that have wet mud. Dr Booth has not made any conclusions on the significance of this effect¹²⁴. I consider that in terms of wet mud, the proposal could have both positive and adverse effects for public access and that these may balance each other out. I recognise there are limitations with specific data in this regard. Overall, I consider that based on the available information this effect is not significant and that the rock area mitigation discussed above could assist with mitigating some of the adverse effect, were this condition imposed.
- *Boat ramp useability:* For the s95 recommendation there was data that the concrete boat ramp was usable at all lake levels¹²⁵. During the site visit on 4 April 2022, it was confirmed that this was not the case (refer to Appendix 4). I have assessed effects on the boat ramps recognising that they are only usable until around lake levels of 3.2 m below crest of the dam. The modelling with the correction factor applied suggests that the period of time the boat ramps would be inoperable would not change. I note that the evidence of Dr Booth is that there would be an effect on boat ramp accessibility but that this is based on the Model output without the correction factor applied¹²⁶. If there were boat ramp access issues, this would limit fishing locations and fishable water and could have consequential effects on the overall angling experience. Dr Booth has suggested possible mitigation for this effect in extending the concrete boat ramp.¹²⁷ However, based on the boat ramps being inaccessible for nearly all of the time under both Scenarios B and C and given that Scenario C will not exacerbate this, I consider that the mitigation to extend the concrete boat ramp recommended by Dr Booth is not necessary.
- Dr Booth raises the issue of a ‘tipping point’ for the angling activity at Lake Onslow¹²⁸. That is if angling access became ‘too hard too often’ then displacement could occur. This means that Lake Onslow would lose its popularity amongst anglers and they would move to other locations. Dr Booth has not made any conclusions on whether this would/could occur but does note that “*recreational access is a prerequisite for recreational activity and if access is not possible or hard than the level of activity will be low...* “. I consider that as the fully exercise of the current consents could effectively limit boat access most of the time and the proposal will not exacerbate this, the proposed change will not increase the risk of this effect. Overall, effects on boat access are limited.

¹²¹ Table 6 of this report

¹²² Booth (2022) Evidence of Dr Kay Booth of Lindis Consulting Limited dated 3 June 2022 – para 93

¹²³ Fish and Game submission (2021) – para 31

¹²⁴ Booth (2022) Evidence of Dr Kay Booth of Lindis Consulting Limited dated 3 June 2022 – para 93

¹²⁵ Further information from Pioneer Energy Limited dated 2 Sept 2022

¹²⁶ Booth (2022) Evidence of Dr Kay Booth of Lindis Consulting Limited dated 3 June 2022 – para 75

¹²⁷ Booth (2022) Evidence of Dr Kay Booth of Lindis Consulting Limited dated 3 June 2022 – para 122

¹²⁸ Booth (2022) Evidence of Dr Kay Booth of Lindis Consulting Limited dated 3 June 2022 – para 74 and 125

- *Navigational safety and boat strandings:* There is sufficient evidence that navigating on the lake requires experience and skill due to the lake bed morphology¹²⁹. This is at any lake level but is exacerbated as the lake level lowers as more mudbanks and rocks are exposed and there is a higher risk of stranding¹³⁰. The retrieval or recovery of boats is also made more difficult due to the deep mud¹³¹. The Fish and Game submission highlights that if there is a potential risk of increased injury or death this is significant. This is supported by Dr Booth¹³². This is a health and safety matter, but I do agree that if the proposal could result in increased drownings at the Lake this is a significant health and safety effect due to the severity of it.
- The lake being at a lower level for longer means that the lake could be at the most challenging lake levels for navigating for a longer period and this could result in increased strandings¹³³. However, I note that it is not possible to quantify this effect and that this risk will also be high under Scenario B where the Lake is below 3 m for 99% of the time and 60% of the shoreline mud flats are exposed. I consider that the consistency with the lake being at the lower and lowest lake levels for longer under Scenario C¹³⁴ may mean that boat users would have more opportunity to become familiar with the lake morphology and the location of risky areas, which may reduce some of this effect. I note that current consent conditions require signage¹³⁵ regarding the navigational hazards at the Lake meaning that this was recognised as a potential risk when the original consent was decided. This condition could be reworded to be more explicit about the navigation risks and safety procedures if it were not considered adequate. Overall, given that high navigational risk exists under the current consents, the proposal will not exacerbate that significantly and that if the lake is more regularly at lower lake levels the navigation risks may be more apparent and understood. As Dr Booth notes, there may also be less boats on the lake at lower lake levels, which may also minimise this effect¹³⁶. Overall, I consider that the increased risk of boat stranding and effects on public safety is not significant.
- *Visual amenity:* The Fish and Game submission highlights concerns that the proposal will affect the visual amenity of the Lake noting that anglers appreciate and gain utility from being in beautiful settings¹³⁷. Dr Booth considers effects upon visual amenity to be less material than effects upon recreational access but that an increase in mudflats will likely impinge on the angler experience¹³⁸. The effects on visual amenity align with the mudflat and lower lake bed exposure. Under Scenario B, the lake could be at levels where there is high mud flat exposure and exposed lake bed¹³⁹ when the lake is 3 m or more below the crest, which is where the lake levels would be 99% of the time. The Fish and Game submission indicates that ‘a beautiful setting’ is one where the lake is full and that when the mudflats are spawning the visual amenity suffers¹⁴⁰. The proposal will marginally increase the adverse effects on

¹²⁹ Booth (2022) Evidence of Dr Kay Booth of Lindis Consulting Limited dated 3 June 2022 – para 46 and Fish and Game submission (2021) - para 35 and Further information from Pioneer Energy Limited dated 2 Sept 2022 – answer to question 4c.

¹³⁰ Booth (2022) Evidence of Dr Kay Booth of Lindis Consulting Limited dated 3 June 2022 – para 99-101

¹³¹ Booth (2022) Evidence of Dr Kay Booth of Lindis Consulting Limited dated 3 June 2022 – para 100

¹³² Booth (2022) Evidence of Dr Kay Booth of Lindis Consulting Limited dated 3 June 2022 – para 99-101 and 128

¹³³ Booth (2022) Evidence of Dr Kay Booth of Lindis Consulting Limited dated 3 June 2022 – para 100

¹³⁴ Mean lake level of 4.44 m below crest and at lowest lake level for 20-25% of the time – Table 6 of this report

¹³⁵ Condition 15 of Water Permit 2001.475: *The consent holder shall provide and maintain adequate signage, in good repair, to warn the public of safety and navigation risks associated with the lake.*

¹³⁶ Booth (2022) Evidence of Dr Kay Booth of Lindis Consulting Limited dated 3 June 2022 – para 69 in relation to Scenario B but relevant for Scenario C too

¹³⁷ Fish and Game submission (2021) – para 37

¹³⁸ Booth (2022) Evidence of Dr Kay Booth of Lindis Consulting Limited dated 3 June 2022 – para 104

¹³⁹ Refer Table 3 of Booth (2022) Evidence of Dr Kay Booth of Lindis Consulting Limited dated 3 June 2022

¹⁴⁰ Fish and Game submission (2021) – para 37

visual amenity by speeding up the dewatering of the lake and having the lake at the lowest level (i.e most dewatered and exposed) for longer. However, given that the mudflats could be a common presence under the current consents, the proposed increase is not considered to be a significant effect.

- *Cicada -hatch period:* The Fish and Game submission raises the cicada hatch period as being an important annual event for anglers and that low lake levels may have adverse effects both ecologically and recreationally¹⁴¹. The effects on ecological values are considered in sections above. As noted by Mrs Coates in her evidence, the change in lake levels is unlikely to affect the cicada hatch period. In considering the effects that the change will have on recreation, the assessment above on the effects of lower lake levels on public access to the lake visual amenity and boating safety has been considered. Lower lake levels are most likely to be exacerbated from what could currently occur with consequential effects between March and June, which is outside of the end of January to end of February cicada hatch period. On that basis, I consider that the proposal will not significantly increase effects on recreation over this crucial period from what could currently occur. I note that Dr Booth suggests that if it were warranted consent conditions could be imposed to avoid lake level changes during the peak angling months, which include this period¹⁴². The importance of the cicada hatch period for recreation is evident and if there is some uncertainty about the extent of effects to recreation during this period, limiting the draw down period to 0.2 m per seven days between 20 January and 20 February could be imposed. I note that I have not recommended this as a condition of consent.
- *Fishing locations:* The Fish and Game submission disagrees with statements made by Mr Dungey that fishing pressure moves to deeper water in late summer. It is their experience that there would still be a preference for fishing shallower waters at this time but that this becomes difficult as the lake drops and mud flats become more prominent¹⁴³. As detailed above, mud flats would be a common and prevalent feature in late summer if the consent were exercised to its fullest extent. The proposal will exacerbate this slightly. Mrs Coates also notes that trout are sensitive to temperature and oxygen levels and would likely be limited to shallower lake margins in the night and early morning/evening and that this will occur regardless of lake levels¹⁴⁴. I consider that the proposal will not have significant effects on angling in shallow waters.
- *Teviot River:* Effects on recreational use of the Teviot River from increased flows are considered to be negligible to low and have not been raised in submissions as an issue of concern¹⁴⁵.
- Overall, I consider that the proposed change will not significantly affect amenity values.

6.1.10.3 Other values: (natural character, other users, heritage, cultural values)

- *Natural character:* Effects on natural character are limited as Lake Onslow is a man-made lake that does not have a natural water level, bed form or ecology. The proposed change will

¹⁴¹ Fish and Game submission (2021) – para 46

¹⁴² Booth (2022) Evidence of Dr Kay Booth of Lindis Consulting Limited dated 3 June 2022 – para 122

¹⁴³ Fish and Game submission (2021) – para 17

¹⁴⁴ Coates (2022) Evidence of Annabelle Coates from Babbage Consultants Limited dated 3 June 2022 – para 65

¹⁴⁵ Booth (2022) Evidence of Dr Kay Booth of Lindis Consulting Limited dated 3 June 2022 – para 105-107

have negligible to limited effects on water quality, changes to lake bed morphology and ecology.

- *Heritage Values:* There are no registered historic places associated with Lake Onslow or the Teviot River. Existing heritage values will be unaffected by the change due to their location and no change in inundation area or minimum operating level.
- *Effects on other users:* There are limited other water users and no specific water supply values identified in the RPW associated with Lake Onslow/Teviot River. Effects on Teviot Irrigation Company who hold consents for damming and taking water under the 'old dam' will be very limited or non-existent as there will be no change to the minimum operating level.
- *Cultural values:* The cultural values of Lake Onslow are described in the s95 report and are predominantly mahika kai and waahi taoka. Contemporary mahikia kai values being most likely related to waikōura and brown trout. The adverse ecological effects and public access to the lake to facilitate the gathering of mahika kai are considered above. The proposal is unlikely to have any significant effects on the presence and abundance of these species or the ability for gathering to occur when considering Scenarios B and C. Waahi taoka locations would primarily be affected by a change in lake level. As this proposal does not include that then no adverse effects on waahi taoka are anticipated.

6.1.10.4 Adaptive management approach and conditions

The Applicant has proposed an adaptive management approach to quantifying the effects of the change on the ecology of Lake Onslow¹⁴⁶. The Lake Onslow Monitoring Plan (LOMP) which forms part of these conditions was originally reviewed by Mark James and a modified version was submitted with the Amendment.

The adaptive management approach was on the basis that monitoring would identify whether the proposed change resulted in more than minor adverse effects to the ecology from the status quo. Simply, the monitoring seeks to establish a current ecological baseline, identify changes, and then determine whether these are the result of the change to the draw down rate. If there was a conclusion that the change was resulting in more than minor adverse effects, then the draw down rate would revert back to 0.2 m. In effect, the monitoring proposal would be comparing Scenario D and Scenario A.

For this Application, I am considering the receiving environment to be one where the consents are exercised to their fullest extent (Scenario B). Scenario B is not the current lake environment/status quo and any baseline monitoring would be reflective of Scenario A. I consider that this does render this proposed monitoring regime as being unreflective of the effects that are being considered for this Application. On that basis, I consider draft conditions A1-A3 and B2 to be redundant and not recommended to be imposed. I do not think there is a practical way of drafting the conditions that would measure the effects that are being considered. I also note that the submitters do not support the adaptive monitoring conditions due to their complexity and potentially *ultra vires* nature¹⁴⁷.

¹⁴⁶ Proposed conditions in Amendment - Draft Conditions A1-A3 and B2

¹⁴⁷ Fish and Game submission (2021) –para 81-85

However, I do think there is value in the Applicant establishing a robust ecological and amenity effects monitoring regime if consents are likely to be re-sought on expiry. This will support an application for consent replacement. On a political note, the Applicant may wish to be in a place of certainty regarding the Lake Onslow battery project before deciding whether to commence any monitoring (i.e. the validity or requirement for these consents would need to be assessed).

If the Decision Maker were of a mind to grant the variation and to include the monitoring conditions A1-A3, it would be recommended that the advice of Mrs Coates and Dr Booth in their evidence in respect of the LOMP be taken into consideration. I would also note that the conditions would need to be updated to reflect future dates as the current dates on the consent have passed.

6.1.10.5 Summary – Actual and Potential Effects

The relevant consideration of effects for this Application is the comparison of the additional effects that arise as a result of the consents being exercised to their fullest extent with a draw down of 0.4 m per seven day period when they are compared to the effects that could occur currently if the consents were exercised to their fullest extent with a draw down of 0.2 m per seven day period. On that basis, the proposal will result in the lake being at lower lake levels more often and at the lowest lake level for longer. It will also result in more mud flats/lake bed being exposed in a seven day period. These changes reduce habitat for aquatic species and potentially increase angler access difficulties and the potential for boat stranding. The question is the magnitude and scope of the difference in these effects from what could occur currently and the significance of these effects. In most instances, although there would be a change these do not have any significantly different effects than what could occur currently. I consider that taking into consideration the positive environmental effects identified above, actual and potential effects on the environment are acceptable on balance.

6.2 S104(1)(ab)

The Applicant has not proposed or agreed to any measures for the purpose of ensuring positive effects on the environment to offset or compensate for any residual adverse effects that will or may result from allowing the proposed change to consent conditions.

6.3 S104(1)(b) Relevant Planning Documents

The relevant planning documents in respect of this Application are:

- The National Environmental Standards for Sources of Human Drinking Water Regulations 2007 (NES-DW)
- Resource Management (National Environmental Standards for Freshwater) Regulations 2020
- Resource Management (Measurement and Reporting of Water Takes) Regulations 2010 and Amendment Regulations 2020
- The National Policy Statement for Renewable Electricity Generation 2011
- The National Policy Statement for Freshwater Management 2020
- The Partially Operative Regional Policy Statement and the proposed Regional Policy Statement 2021

- The Regional Plan: Water for Otago

6.3.1 National Environmental Standard for Sources of Human Drinking Water Regulations 2007 (NES-DW)

Regulations 7 and 8 of the National Environmental Standard for Sources of Human Drinking Water (NES) need to be considered when assessing water permits that have the potential to affect registered drinking water supplies that provide 501 or more people with drinking water for 60 or more calendar days each year.

Lake Onslow and the Teviot River do not have any takes on them that provide for human drinking water and there are no specific considerations for this Application under the NES-DW 2007. Consultation on updates to the NES-DW was undertaken in early 2022. The timeframe for a decision is currently unknown. The proposal may increase sedimentation in Lake Onslow and the Teviot River when the increased draw down is being employed. However, any changes to water quality as a result of the variation will not affect any known human drinking water supplies.

6.3.2 Resource Management (National Environmental Standards for Freshwater) Regulation 2020 (NES-FW)

The NES-FW 2020 regulations came into force on 3 September 2020. They impose standards on a range of activities relating to freshwater (including takes near natural inland wetlands and fish passage through structures). They also set out a framework for consenting certain activities if the standards are not met.

It is noted that the proposal is not for a new activity (or replacement) and instead is limited to changing the draw down rate of Lake Onslow for existing water permits for damming and taking. The proposed change will not result in the drainage of any natural inland wetlands, vegetation clearance, earthwork or the taking, use, damming or diversion of water from a natural wetland over and above what is currently authorised to occur.

Subpart 3 of the NES-FW relates to the passage of fish affected by structures including dams. The proposal relates to an existing dam but does not include the alteration, extension or reconstruction of the dam. It is also noted that the NES-FW regulations do not apply to any existing structures, meaning any structure that was in the river at 2 September 2020. As previously noted, the current dam structure at Lake Onslow has been in place since 1982.

No additional consents are required under the NES-FW and no further specific consideration of the NES-FW has been given

6.3.3 National Policy Statement Freshwater Management 2020 (NPS-FM)

The National Policy Statement for Fresh Water Management 2020 (“**NPS-FM**”) provides direction to local authorities and resource users regarding activities that affect the health of freshwater and sets out objectives and policies for freshwater management under the RMA.

The NPS-FM came into force on 3 September 2020, replacing the previous 2014 NPS-FM. Although it retains some of the same principals as the NPS-FM 2014, including a strengthened focus on Te Mana o te Wai, the NPS-FM 2020, amongst other things:

- Sets out a framework of objectives and policies to manage activities affecting freshwater in a way that prioritises first, the health and well-being of water bodies and freshwater ecosystems, second, the health needs of people, and third, the ability of people and communities to provide for their social, economic, and cultural well-being, now and in the future.
- Requires regional councils to develop long-term visions for freshwater in their region and include those long-term visions as objectives in their regional policy statement.
- Requires every local authority to actively involve tangata whenua in freshwater management.
- Sets out a more expansive National Objectives Framework, and Freshwater Management Unit, environmental flows and levels setting, and take limit setting processes. This includes 13 new attribute states for ecosystem health, including national bottom lines and national targets.
- Specific requirements to protect streams and wetlands and to provide for fish passage – including new policies which must be included in all regional plans.

Part 2 of the NPS-FM sets out the national objective for future freshwater management and 15 separate policies that support this objective.

Objective

- (1) *The objective of this National Policy Statement is to ensure that natural and physical resources are managed in a way that prioritises:*
- (a) *first, the health and well-being of water bodies and freshwater ecosystems*
 - (b) *second, the health needs of people (such as drinking water)*
 - (c) *third, the ability of people and communities to provide for their social, economic, and cultural well-being, now and in the future.*

The objective establishes a priority for managing natural and physical resources and the effects the use of these has on water bodies.

The first priority is the health and well-being of the water body and associated freshwater ecosystems. The evidence of Mrs Coates is that the change to the draw down rate will have effects on the health and well-being of the water body that are low to negligible and that any changes will be similar to natural variation. Effects on freshwater ecosystems and the ability for existing species within Lake Onslow and the Teviot River to continue to function were also considered by Mrs Coates. Her evidence indicates that the proposal will have limited effects on Teviot River freshwater ecosystems and that any reduction in habitat for bullies will not be significant¹⁴⁸. In terms of the freshwater ecosystem of the Lake, Mrs Coates evidence is that the change may reduce available habitat on a weekly basis and for the extended period of low lake levels but that the species are adapted to such habitat changes. The change to macrophyte beds and populations of fish will not be significantly different to what could occur currently under the consent. Overall, it is considered that the health and well-being of Lake Onslow, the Teviot River

¹⁴⁸ Coates (2022) Evidence of Annabelle Coates from Babbage Consultants Limited dated 3 June 2022 – para 44

and any associated water bodies have been considered first and that the proposal does not denigrate these from what can occur currently.

Based on the lack of drinking water takes from Lake Onslow and the Teviot River, these water bodies are not known to provide for the health needs of people. It is not known of any other health needs provided by these waterbodies and no further consideration of this priority is given.

The third priority is considered most relevant when considering the amenity effects, economic benefits and cultural effects of the proposal. These are within the same priority in the hierarchy ranking. Further guidance on how the proposal is considered in relation to these is based off the relevant NPS-FM 2020 policies below.

- *Policy 1: Freshwater is managed in a way that gives effect to Te Mana o te Wai.*

The NPS-FM defines the concepts of Te Mana o te Wai as being:

“Te Mana o te Wai is a concept that refers to the fundamental importance of water and recognises that protecting the health of freshwater protects the health and well-being of the wider environment. It protects the mauri of the wai. Te Mana o te Wai is about restoring and preserving the balance between the water, the wider environment, and the community.”

The NPS-FM directs that every Regional Council must engage with communities and tangata whenua to determine how Te Mana o te Wai applies to water bodies and freshwater ecosystems in their region. It is noted that this has not yet occurred for the Otago Region. As outlined above, the health of the waterbody is not anticipated to be affected by the proposed change and this may enable Te Mana o te Wai to be given effect to. It is noted that no submissions were received from iwi on the proposal and so no specific direction on how Te Mana o te Wai applies in this instance is to hand.

The ORC has identified FMUs in the Otago region. The proposal is located in the Clutha River/Mata-Au FMU and the Roxburgh Rohe. The Council is in the early stages of identifying the values for this FMU. Council will undertake the remaining steps in the NOF process in upcoming years and plans to notify a new Land and Water Plan, in accordance with the NPS-FM 2020, in 2023. This will set the limits that apply to Lake Onslow, its tributaries and the Teviot River. The application of these limits to this activity will be considered when this consent is replaced (should a consent application be sought) or as part of a review of consent conditions under s128 of the RMA, or both.

- *Policy 2: Tangata whenua are actively involved in freshwater management (including decision-making processes), and Māori freshwater values are identified and provided for.*

Māori freshwater values are defined in the NPS-FM as being: *“the compulsory value of mahinga kai and any other value (whether or not identified in Appendix 1A or 1B) identified for a particular FMU or part of an FMU through collaboration between tangata whenua and the relevant regional council”*.

Tangata whenua have had the opportunity to be actively involved in this consent process through Section 95E. Maori freshwater values are defined in the NPS-FM (above) however these values

have not yet been identified for the Roxburgh Rohe. Consideration has been given to Māori freshwater values based on direction provided in the RPW and the iwi management plan (further discussed in sections 6.37 and 6.4 below).

- *Policy 4: Freshwater is managed as part of New Zealand's integrated response to climate change.*

The proposal will provide for greater operational flexibility in management of Lake Onslow and hydro electricity generation within the Teviot Scheme. This will enable the Teviot Scheme to provide more renewable electricity to the national grid at times of high demand. The management of Lake Onslow is an integral part of this, and it assists with New Zealand achieving climate change targets.

- *Policy 5: Freshwater is managed through a National Objectives Framework to ensure that the health and well-being of degraded water bodies and freshwater ecosystems is improved, and the health and well-being of all other water bodies and freshwater ecosystems is maintained and (if communities choose) improved.*

Lake Onslow and the Teviot River have yet to be defined in accordance with the National Objectives Framework. This will occur with the Land and Water Plan development. As outlined under the NPS-FM 2020 objective, the proposal will maintain the health and well-being of the waterbodies it relates to.

- *Policy 6: There is no further loss of extent of natural inland wetlands, their values are protected, and their restoration is promoted.*

The evidence of Mrs Coates and Mr Dungey concludes that the proposal will not have any effects on the upstream Regionally Significant Wetlands and is unlikely to cause any loss of natural inland wetlands above and beyond what the current consent provides for.

- *Policy 7: The loss of river extent and values is avoided to the extent practicable.*

The proposal will not result in any loss of river extent or river values. The Teviot River may receive a change in river flows but this will not reduce the extent of the river. As discussed in the evidence of Mrs Coates and Dr Booth, the Teviot River ecological and amenity values will be maintained.

- *Policy 8: The significant values of outstanding water bodies are protected.*

Lake Onslow and the Teviot River are not currently recognised in the RPW as outstanding water bodies. The development of the Land and Water Plan will undertake a process to identify and determine the outstanding water bodies in the Otago Region. Without the direction of, at a minimum, a notified Land and Water Plan it is not possible to comment further on this policy.

- *Policy 9: The habitats of indigenous freshwater species are protected.*

The evidence of Mrs Coates indicates that the proposed change to the draw down rate will not significantly change the habitats of the indigenous freshwater species of Lake Onslow and the Teviot River, specifically the bullies, waikōura, invertebrates and macrophytes (if native). It is noted that there may be less habitat at low lake levels but that these low lake levels could currently occur under the current consent conditions. In addition, the species have adapted to

variability in lake level which will have been an ongoing reality for species in this lake since it was created due to natural and operational variability.

- *Policy 10: The habitat of trout and salmon is protected, insofar as this is consistent with Policy 9.*

This policy recognises that effects on trout are a relevant consideration, provided the effects and changes from providing for trout habitat do not have negative consequence for the indigenous species of the water body. Mrs Coates evidence has considered whether the proposal will enhance trout habitat to the detriment of indigenous species and has concluded that there is unlikely to be a change from what currently could occur. In terms of effects on the habitat of trout, the evidence of Mrs Coates recognises that trout are more sensitive to water conditions but that the proposal will not have any significant effects on trout populations from lower lake levels for longer and due to the increased speed that the minimum lake level is reached. It is recognised that the proposal will not change the lowest lake level and is therefore not anticipated to affect trout fish passage to spawning grounds.

- *Policy 15: Communities are enabled to provide for their social, economic, and cultural well-being in a way that is consistent with this National Policy Statement.*

The proposal will provide for the economic well-being of the Applicant. The more efficient operation of the dam will have positive social and economic effects from the generation of additional renewable electricity generation. There are not assessed to be any significant cultural or amenity effects when considering what the existing consents enable and the change in comparison to that.

- *Clause 3.31 of the NPS-FM 2020*

Clause 3.31 of the NPS-FM 2020 provides an additional consideration for listed large hydro electric generation schemes when setting target attribute states for freshwater management units (FMU). This is when the FMU is below the national bottom line for an attribute. This includes recognition of contributions to New Zealand's greenhouse gas emissions targets, contribution to maintaining security of electricity supply and generation capacity, storage and operational flexibility. It is noted that the clause does not currently include the Applicant's Teviot Scheme. This proposal does not directly relate to the attribute states of the Roxburgh Rohe as these have not yet been determined. No further consideration of this clause has been given.

6.3.4 National Policy Statement on Renewable Electricity Generation (NPS-REG)

The National Policy Statement on Renewable Electricity Generation ('**NPS-REG**') came into effect on 13 May 2011 and has the objective of recognising the national significance of renewable electricity generation activities by providing for the development, operation, maintenance and upgrading of new and existing renewable electricity generation activities.

Objective - To recognise the national significance of renewable electricity generation activities by providing for the development, operation, maintenance and upgrading of new and existing renewable electricity generation activities, such that the proportion of New Zealand's electricity generated from renewable energy sources increases to a level that meets or exceeds the New Zealand Government's national target for renewable electricity generation

The proposed change is seeking to increase operational flexibility so that more hydro electricity can be generated from the Teviot hydro electricity scheme at periods of high consumer demand. This is in accordance with the above as it supports the government in reaching national targets for renewable electricity generation.

The most relevant policies to this proposal are:

- Policy A which relates to recognising the benefits of renewable electricity generation activities including increasing electricity generation and security of supply; and
- Policy B which relates to the practical implications of achieving New Zealand’s target for electricity generation from renewable resources and requires decision makers to have regard to even minor reductions in the generation output of existing renewable generation activities.
- Policy C2 relates to off-setting residual environmental effects that cannot be avoided, remedied or mitigated.
- Policy D relates to avoiding reverse sensitivity effects on consented and existing renewable electricity generation activities.

The proposal is consistent with the relevant policies of the NPS-REG (Policy A and B above). Granting the proposed change will enable renewable electricity activities to not only be maintained, but to operate more efficiently generating more electricity at peak times and to respond more effectively to market demand. This increases supply when required and reduces the need for finite energy sources to be used at peak periods. The proposal enables the Applicant to contribute towards meeting national targets. Imposing conditions that constrain the activity more than currently is likely to be considered contrary to Policy B. The conditions proposed do not constrain the ability of the Applicant to generate renewable electricity.

Off-setting is not proposed or considered necessary in this instance due to the extent and nature of the adverse environmental effects.

I consider Policy D most relevant if this were an activity that could have reverse sensitivity effects on a renewable electricity activity. The Applicant considers¹⁴⁹ that the amenity values and recreation effects could be considered reverse sensitivity effects for this proposal. I am of the opinion that this policy is not directive or specific enough to dismiss consideration of the recreational and amenity effects from the proposal.

6.3.6 Proposed Regional Policy Statement 2021 and Partially Operative Regional Policy Statement (PO-RPS-2019)

6.3.6.1 Partially Operative Regional Policy Statement

The partially operative RPS was made operative in part on the 14 January 2019 (“**PO-RPS- 2019**”) and through various court orders. Since then, there have has been number of appeals resolved through the Environment Court. On 15 March 2021, the Council approved and provided notice for

¹⁴⁹ Further information from Pioneer Energy Limited dated 29 July 2021 – pg 19

these further provisions to be added to the PO-RPS 2019. The provisions that are the subject of court proceedings and are not made operative is now limited to Policy 4.3.7 (significant infrastructure) and specific methods of Chapter 3. None of the remaining proposed provisions are applicable to this Application, therefore full weight and consideration can be provided to the PO-RPS.

The relevant provisions of the PORPS 2019 include:

- *Provide for the economic wellbeing of Otago's people and communities by enabling the resilient and sustainable use and development of natural and physical resources (Policy 1.1.1)*
- *Provide for social and cultural wellbeing and health and safety by recognising and providing for Kāi Tahu values; taking into account the values of other cultures; taking into account the diverse needs of Otago's people and communities; avoiding significant adverse effects of activities on human health; promoting community resilience and the need to secure resources for the reasonable needs for human wellbeing; promoting good quality and accessible infrastructure and public services (Policy 1.1.2)*

The proposal provides for the economic development of the region by increasing renewable electricity generation at key times. The proposed change is considered to be sustainable. The social, cultural and health and safety values will not be affected in a significant way by the change and health and safety effects mitigated by implementation of improved conditions requiring signage. The potential for an increase in health and safety effects is not considered significant when considering the receiving environment that the current consents provide for.

Overall, the proposal is considered to be consistent with the above policies.

- *Taking the principles of Te Tiriti o Waitangi into account including by involving Kāi Tahu in resource management processes implementation, having particular regard to the exercise of kaitiakitaka and taking into account iwi management plans (Policy 2.1.2)*
- *Managing the natural environment to support Kāi Tahu wellbeing (Policy 2.2.1)*
- *Recognise and provide for the protection of sites of cultural significance to Kāi Tahu including the values that contribute to the site being significant (Policy 2.2.2)*
- *Enable Kāi Tahu relationships with wāhi tupuna by recognising that relationships between sites of cultural significance are an important element of wāhi tupuna and recognising and using traditional place names (Policy 2.2.3)*

Consideration has been given to the relevant iwi management plan (Section 6.4 of this report) when considering this Application. Effects on Kāi Tahu have been assessed. The proposal will have limited effects on cultural values and no known sites of cultural significance will be adversely affected. Kāi Tahu were given an opportunity to submit on this Application. No submissions were received. The proposal is considered to be consistent with the above policies.

- *Achieve integrated management of Otago's natural and physical resources (Policy 1.2.1)*
- *Safeguard the life-supporting capacity of fresh water and manage fresh water to:*
 - *Maintain good quality water and enhance water quality where it is degraded, including for:*
 - *Important recreation values, including contact recreation; and,*
 - *Existing drinking and stock water supplies;*
 - *Maintain or enhance aquatic:*
 - *Ecosystem health;*
 - *Indigenous habitats; and,*
 - *Indigenous species and their migratory patterns.*

- *Maintain or enhance, as far as practicable:*
 - *Natural functioning of rivers, lakes, and wetlands, their riparian margins, and aquifers;*
 - *Coastal values supported by fresh water;*
 - *The habitat of trout and salmon unless detrimental to indigenous biological diversity; and*
 - *Amenity and landscape values of rivers, lakes, and wetlands;*
- *Control the adverse effects of pest species, prevent their introduction and reduce their spread;*
- *Avoid, remedy or mitigate the adverse effects of natural hazards, including flooding and erosion; and,*
- *Avoid, remedy or mitigate adverse effects on existing infrastructure that is reliant on fresh water.*
(Policy 3.1.1)
- *Identify and protect outstanding freshwater bodies (Policy 3.2.13 & 3.2.14)*
- *Identify and protect the significant values of wetlands (Policy 3.2.15 & 3.2.16)*
- *Consider the offsetting of indigenous biological diversity, when:*
 - *Adverse effects of activities cannot be avoided, remedied or mitigated;*
 - *The offset achieves no net loss and preferably a net gain in indigenous biological diversity;*
 - *The offset ensures there is no loss of rare or vulnerable species;*
 - *The offset is undertaken close to the location of development, where this will result in the best ecological outcome;*
 - *The offset is applied so that the ecological values being achieved are the same or similar to those being lost;*
 - *The positive ecological outcomes of the offset last at least as long as the impact of the activity*

The proposal will have low to negligible effects on fresh water and wetlands when the proposal is compared to the existing consented activity. Water quality effects will be limited to a potentially very minor increase in sedimentation; aquatic ecosystem health, habitats and indigenous species and their migratory pathways will be maintained; the habitat of brown trout will be maintained and there will be no significant change in the amenity and landscape values of Lake Onslow or the Teviot River.

The proposal will not introduce or facilitate the expansion of pest plant species, exacerbate any natural hazard or have any adverse effects on infrastructure¹⁵⁰ that is reliant on freshwater. There is no known irrigation infrastructure associated with Lake Onslow and there is no increase in the maximum discharge to the Teviot River where irrigation infrastructure may be located. Lake Onslow has not been identified to date as an outstanding water body. Indigenous biological offsetting is not proposed or considered necessary in this instance due to the nature of the effects. Overall, the proposal is considered consistent with the above policies.

¹⁵⁰ Infrastructure is defined in the PO-RPS as:

a) Pipelines that distribute or transmit natural or manufactured gas, petroleum, biofuel, or geothermal energy; b) A network for the purpose of telecommunication as defined in section 5 of the Telecommunications Act 2001; c) A network for the purpose of radiocommunication as defined in section 2(1) of the Radiocommunications Act 1989; d) Facilities for the generation of electricity, lines used or intended to be used to convey electricity, and support structures for lines used or intended to be used to convey electricity, excluding facilities, lines, and support structures if a person— i. uses them in connection with the generation of electricity for the person's use; and ii. does not use them to generate any electricity for supply to any other person; e) A water supply distribution system, including a system for irrigation; f) A drainage or sewerage system; g) structures for transport on land by cycleways, rail, roads, walkways, or any other means; h) Facilities for the loading or unloading of cargo or passengers transported on land by any means; i) An airport as defined in section 2 of the Airport Authorities Act 1966; j) A navigation installation as defined in section 2 of the Civil Aviation Act 1990; k) Facilities for the loading or unloading of cargo or passengers carried by sea, including a port related commercial undertaking as defined in section 2(1) of the Port Companies Act 1988; l) Anything described as a network utility operation in regulations made for the purposes of the definition of "network utility operator" in section 166 of the Resource Management Act 1991

- *Apply an adaptive management approach, to avoid, remedy or mitigate actual and potential adverse effects that might arise and that can be remedied before they become irreversible (Policy 5.4.2)*
- *Apply a precautionary approach to activities where adverse effects may be uncertain, not able to be determined, or poorly understood but are potentially significant (Policy 4.4.3)*

An adaptive management approach was proposed in the Amendment to the Application. Given the nature of the change, an adaptive management approach has some benefits. This is because the change could be reverted at any time and the effects of the change are unlikely to be permanent. The change would not result in the removal of a species and their habitat or degradation to a point where they are unable to repopulate and lake fill would restore any amenity values that had been reduced. However, as noted in Section 6.1.8.4, given the current operation of the consents, the current environment does not represent what could occur if the consents had been exercised to their fullest extent. On that basis, establishing a monitoring regime that collects data on the effects of the change and compares that to a baseline that is the current environment has difficulties with confirming the effects that have been considered. The adaptive management approach has not been recommended in this instance.

Given the nature of the proposal and the assessment that has been provided, there is some uncertainty on the specifics of the effects that could arise if the proposal was implemented. However, based on the available information, it has been assessed that none of these effects are potentially significant. On that basis, a precautionary approach not to grant the proposed change has not been recommended.

Overall, the proposal is considered to be in accordance with the above policies.

6.3.6.2 Proposed Regional Policy Statement 2021

On 26 June 2021, Council notified the proposed Otago Regional Policy Statement (**'P-ORPS 2021'**). This RPS gives effect to the NPS-FW 2020 and includes freshwater visions, FMU's and rohe. As this RPS has been notified, it has been included and assessed below.

MW-O1 – Principles of Te Tiriti o Waitangi

The principles of Te Tiriti o Waitangi are given effect in resource management processes and decisions, utilising a partnership approach between councils and Papatipu Rūnaka to ensure that what is valued by mana whenua is actively protected in the region.

MW-P2 – Treaty principles

Local authorities exercise their functions and powers in accordance with Treaty principles, by:

- (1) recognising the status of Kāi Tahu and facilitating Kāi Tahu involvement in decision-making as a Treaty partner,*
- (2) including Kāi Tahu in resource management processes and implementation to the extent desired by mana whenua,*
- (3) recognising and providing for Kāi Tahu values and resource management issues, as identified by mana whenua, in resource management decision-making processes and plan implementation,*
- (4) recognising and providing for the relationship of Kāi Tahu culture and traditions with their ancestral lands, water, sites, wāhi tapu, and other taoka by ensuring that Kāi Tahu have the ability to identify these relationships and determine how best to express them,*
- (5) ensuring that regional and district plans recognise and provide for Kāi Tahu relationships with Statutory Acknowledgement Areas, tōpuni, nohoaka and customary fisheries identified in the NTCSA 1998, including by actively protecting the mauri of these areas,*
- (6) having particular regard to the ability of Kāi Tahu to exercise kaitiakitaka,*
- (7) actively pursuing opportunities for:*
 - (a) delegation or transfer of functions to Kāi Tahu, and*
 - (b) partnership or joint management arrangements, and*
- (8) taking into account iwi management plans when making resource management decisions*

MW-P3 – Supporting Kāi Tahu well-being

The natural environment is managed to support Kāi Tahu well-being by:

- (1) protecting customary uses, Kāi Tahu values and relationships of Kāi Tahu to resources and areas of significance, and restoring these uses and values where they have been degraded by human activities,*
- (2) safeguarding the mauri and life-supporting capacity of natural resources, and*
- (3) working with Kāi Tahu to incorporate mātauraka in resource management.*

IM-O2 – Ki uta ki tai

Natural and physical resource management and decision making in Otago embraces ki uta ki tai, recognising that the environment is an interconnected system, which depends on its connections to flourish, and must be considered as an interdependent whole.

IM-P2 – Decision priorities *Unless expressly stated otherwise, all decision making under this RPS shall:*

- 1. first, secure the long-term life-supporting capacity and mauri of the natural environment,*
- 2. secondly, promote the health needs of people, and*
- 3. thirdly, safeguard the ability of people and communities to provide for their social, economic, and cultural well-being, now and in the future.*

IM-P5 – Managing environmental interconnections

Coordinate the management of interconnected natural and physical resources by recognising and providing for:

- (1) situations where the value and function of a natural or physical resource extends beyond the immediate, or directly adjacent, area of interest,*
- (2) the effects of activities on a natural or physical resource as a whole when that resource is managed as sub-units, and*
- (3) the impacts of management of one natural or physical resource on the values of another, or on the environment.*

IM-P6 – Acting on best available information. *Avoid unreasonable delays in decision-making processes by using the best information available at the time, including but not limited to mātauraka Māori, local knowledge, and reliable partial data.*

IM-P13 – Managing cumulative effects *Otago’s environmental integrity, form, function, and resilience, and opportunities for future generations, are protected by recognising and specifically managing the cumulative effects of activities on natural and physical resources in plans and explicitly accounting for these effects in other resource management decisions.*

IM-P15 – Precautionary approach *Adopt a precautionary approach towards proposed activities whose effects are uncertain, unknown or little understood, but could be significantly adverse, particularly where the areas and values within Otago have not been identified in plans as required by this RPS.*

The principles of the Treaty and Kāi Tahu well-being has been considered. Direction has been taken from the relevant iwi management plans as no submissions were received from Kāi Tahu rūnaka.

The proposed change is not anticipated to alter the life-supporting capacity of Lake Onslow or the Teviot River and the mauri of these waterbodies will be retained. There will continue to be habitat for freshwater species and adequate water quality to sustain these species. The health needs of people (including public safety) will be promoted by the signage advising of the inherent navigational hazards that exist on the lake and that are more prominent at lower lake levels. The proposal will enable the local community to provide for their economic well-being and it is considered that the effects of the proposal are not significant enough to prevent the social and cultural well-being of the community from not being met.

It is recognized that the changes to the management of Lake Onslow could have effects on the Teviot River system and the Clutha River/Mata-Au catchment as a whole, including tributaries

and wetlands that are connected to Lake Onslow. Effects on these interconnected environments have been considered when assessing the effects of the proposal.

To assess the effects of the proposal, there is a need to consider what the environment would look like if the Applicant's consents had been exercised to their fullest extent and a future environment that includes the full implementation of the consents with the change. Modelling has been used to contextualize what the Lake and Teviot River would look like. This modelling has been peer reviewed and the outcomes of the peer review considered when assessing the effects of the proposal. There are limitations to the information available to determine effects, but it is considered that the modelling is the best available information to understand what Lake Onslow and the Teviot River would look like in these different scenarios. The Applicant did not undertake a specific recreation assessment and Dr Booth's evidence acknowledges this. Although there is some uncertainty around effects, these are not considered to be significantly adverse and there is some direction in the current RPW around the values that Lake Onslow and the Teviot River hold. A precautionary approach is not considered appropriate in this instance.

The proposal is not considered to exacerbate any of the cumulative effects to Lake Onslow and the Teviot River.

Overall, the proposal is considered to be consistent with the above policies.

LF-WAI-O1 – Te Mana o te Wai *The mauri of Otago's water bodies and their health and well-being is protected, and restored where it is degraded, and the management of land and water recognises and reflects that:*

1. *water is the foundation and source of all life – na te wai ko te hauora o ngā mea katoa,*
2. *there is an integral kinship relationship between water and Kāi Tahu whānui, and this relationship endures through time, connecting past, present and future,*
3. *each water body has a unique whakapapa and characteristics,*
4. *water and land have a connectedness that supports and perpetuates life, and*
5. *Kāi Tahu exercise rakatirataka, manaakitaka and their kaitiakitaka duty of care and attention over wai and all the life it supports.*

LF-WAI-P1 – Prioritisation *In all management of fresh water in Otago, prioritise:*

- (1) *first, the health and well-being of water bodies and freshwater ecosystems, te hauora te wai and te hauora o te taiao, and the exercise of mana whenua to uphold these,*
- (2) *second, the health and well-being needs of people, te hauora o te tangata; interacting with water through ingestion (such as drinking water and consuming harvested resources) and immersive activities (such as harvesting resources and bathing), and*
- (3) *third, the ability of people and communities to provide for their social, economic, and cultural well-being, now and in the future.*

LF-WAI-P2 – Mana whakahaere *Recognise and give practical effect to Kāi Tahu rakatirataka in respect of fresh water by:*

- (1) *facilitating partnership with, and the active involvement of, mana whenua in freshwater management and decision-making processes,*
- (2) *sustaining the environmental, social, cultural and economic relationships of Kāi Tahu with water bodies,*
- (3) *providing for a range of customary uses, including mahika kai, specific to each water body, and*
- (4) *incorporating mātauraka into decision making, management and monitoring processes.*

LF-WAI-P3 – Integrated management/ki uta ki tai *Manage the use of freshwater and land in accordance with tikanga and kawa, using an integrated approach that:*

1. *recognises and sustains the connections and interactions between water bodies (large and small, surface and ground, fresh and coastal, permanently flowing, intermittent and ephemeral),*
2. *sustains and, wherever possible, restores the connections and interactions between land and water, from the mountains to the sea,*

3. *sustains and, wherever possible, restores the habitats of mahika kai and indigenous species, including taoka species associated with the water body,*
4. *manages the effects of the use and development of land to maintain or enhance the health and well-being of freshwater and coastal water,*
5. *encourages the coordination and sequencing of regional or urban growth to ensure it is sustainable,*
6. *has regard to foreseeable climate change risks, and*
7. *has regard to cumulative effects and the need to apply a precautionary approach where there is limited available information or uncertainty about potential adverse effects.*

LF-WAI-P4 – Giving effect to Te Mana o te Wai

All persons exercising functions and powers under this regional policy statement and all persons who use, develop or protect resources to which this regional policy statement applies must recognise that LF-WAI-O1, LF-WAI-P1, LF-WAI-P2 and LF-WAI-P3 are fundamental to upholding Te Mana o te Wai, and must be given effect to when making decisions affecting freshwater, including when interpreting and applying the provisions of the LF chapter.

Te Mana o te Wai has been given the necessary consideration when assessing this Application and has been the initial lens through which I have considered the effects of the proposal. Mana whenua were given the opportunity to be involved in the process via s95E of the RMA and guidance has been taken from the iwi management plans to understand Kāi Tahu values and effects on them. Specific consideration of effects on mahika kai has been given and the proposal will enable the habitat of mahika kai to be sustained. Overall, the proposal is considered to be consistent with the above policies.

LF-VM-O2 – Clutha Mata-au FMU vision

In the Clutha Mata-au FMU:

- (1) *management of the FMU recognises that:*
 - (a) *the Clutha River / Mata-au is a single connected system ki uta ki tai, and*
 - (b) *the source of the wai is pure, coming directly from Tawhirimatea to the top of the mauka and into the awa,*
- (2) *freshwater is managed in accordance with the LF-WAI objectives and policies,*
- (3) *the ongoing relationship of Kāi Tahu with wāhi tūpuna is sustained,*
- (4) *water bodies support thriving mahika kai and Kāi Tahu whānui have access to mahika kai,*
- (5) *indigenous species migrate easily and as naturally as possible along and within the river system,*
- (6) *the national significance of the Clutha hydro-electricity generation scheme is recognised,*
- (7) *in addition to (1) to (6) above:*
 - (a) *in the Upper Lakes rohe, the high quality waters of the lakes and their tributaries are protected, recognising the significance of the purity of these waters to Kāi Tahu and to the wider community,*
 - (b) *in the Dunstan, Manuherekia and Roxburgh rohe:*
 - (i) *flows in water bodies sustain and, wherever possible, restore the natural form and function of main stems and tributaries to support Kāi Tahu values and practices, and*
 - (ii) *innovative and sustainable land and water management practices support food production in the area and reduce discharges of nutrients and other contaminants to water bodies so that they are safe for human contact, and*
 - (iii) *sustainable abstraction occurs from main stems or groundwater in preference to tributaries,*
 - (c) *in the Lower Clutha rohe:*
 - (i) *there is no further modification of the shape and behaviour of the water bodies and opportunities to restore the natural form and function of water bodies are promoted wherever possible,*
 - (ii) *the ecosystem connections between freshwater, wetlands and the coastal environment are preserved and, wherever possible, restored,*
 - (iii) *land management practices reduce discharges of nutrients and other contaminants to water bodies so that they are safe for human contact, and*
 - (iv) *there are no direct discharges of wastewater to water bodies, and*
- (8) *the outcomes sought in (7) are to be achieved within the following timeframes:*
 - (a) *by 2030 in the Upper Lakes rohe,*
 - (b) *by 2045 in the Dunstan, Roxburgh and Lower Clutha rohe, and*
 - (c) *by 2050 in the Manuherekia rohe.*

LF-VM-P5 – Freshwater Management Units (FMUs) and rohe Otago’s freshwater resources are managed through the following freshwater management units or rohe which are shown on MAP1:

Table 1 – Freshwater Management Units and rohe

Freshwater Management Unit	Rohe
Clutha/Mata-au	Upper Lakes Dunstan Manuherekia Roxburgh Lower Clutha
Taieri	n/a
North Otago	n/a
Dunedin & Coast	n/a
Catlins	n/a

LF-VM-P6 – Relationship between FMUs and rohe Where rohe have been defined within FMUs:

- (1) environmental outcomes must be developed for the FMU within which the rohe is located,
- (2) if additional environmental outcomes are included for rohe, those environmental outcomes:
 - (a) set target attribute states that are no less stringent than the parent FMU environmental outcomes if the same attributes are adopted in both the rohe and the FMU, and
 - (b) may include additional attributes and target attribute states provided that any additional environmental outcomes give effect to the environmental outcomes for the FMU,
- (3) limits and action plans to achieve environmental outcomes may be developed for the FMU or the rohe or a combination of both,
- (4) any limit or action plan developed to apply within a rohe:
 - (a) prevails over any limit or action plan developed for the FMU for the same attribute, unless explicitly stated to the contrary, and
 - (b) must be no less stringent than any limit set for the parent FMU for the same attribute, and
 - (c) must not conflict with any limit set for the underlying FMU for attributes that are not the same, and
- (5) the term “no less stringent” in this policy applies to attribute states (numeric and narrative) and any other metrics and timeframes (if applicable).

LF-VM-O7 – Integrated management

Land and water management apply the ethic of ki uta ki tai and are managed as integrated natural resources, recognising the connections and interactions between freshwater, land and the coastal environment, and between surface water, groundwater and coastal water.

The proposal is located within the Clutha/Mata-Au FMU and is part of the Roxburgh rohe. Key features of the vision for this FMU are the interconnectedness of the systems (ki uta ki tai) and that the waterbodies support thriving mahika kai with Kāi Tahu whānui having access to the mahika kai. As noted previously, when considering the effects of the proposal, the effects assessment was not limited to Lake Onslow but considered all the connected waterbodies. The proposal is not considered to have any adverse effects on land, the coast or groundwater. In respect of mahika kai, this value has been identified and defined based on the available information. No submission was received from Kāi Tahu to provide definitive details on this. The assessment is that the proposal will have temporary but not significant effects on mahika kai habitat that will enable the current populations of waikōura to be sustained. Access to mahika kai will be limited to the same extent that public access to the Lake is affected generally. This is assessed as not significant. The proposal will not change how indigenous species migrate within the river system.

The flows in the Teviot River will be altered by the proposal, with the proportion of time at low flows increased. The residual flow was determined as appropriate for the original consent application. Full consideration of the appropriateness of the existing residual flow to restore the natural form and function of the river will be considered when the consents are replaced in the future, if such consents are sought.

Overall, the Application is considered to be consistent with the above policies.

LF-FW-08 – Freshwater In Otago's water bodies and their catchments:

- (1) *the health of the wai supports the health of the people and thriving mahika kai,*
- (2) *water flow is continuous throughout the whole system,*
- (3) *the interconnection of freshwater (including groundwater) and coastal waters is recognised,*
- (4) *native fish can migrate easily and as naturally as possible and taoka species and their habitats are protected, and*
- (5) *the significant and outstanding values of Otago's outstanding water bodies are identified and protected.*

LF-FW-P7 – Freshwater Environmental outcomes, attribute states (including target attribute states) and limits ensure that:

- (1) *the health and well-being of water bodies is maintained or, if degraded, improved,*
- (2) *the habitats of indigenous species associated with water bodies are protected, including by providing for fish passage,*
- (3) *specified rivers and lakes are suitable for primary contact within the following timeframes:*
 - (a) *by 2030, 90% of rivers and 98% of lakes, and*
 - (b) *by 2040, 95% of rivers and 100% of lakes, and*
- (4) *mahika kai and drinking water are safe for human consumption,*
- (5) *existing over-allocation is phased out and future over-allocation is avoided, and*
- (6) *freshwater is allocated within environmental limits and used efficiently.*

The proposal is considered to be consistent with the above policies that relate to freshwater, given the nature of the proposed change. It is noted that the attribute states and limits that will apply to Lake Onslow and the Teviot River are still to be determined and will be part of the Land and Water Plan to be notified at the end of 2023.

LF-FW-09 – Natural wetlands Otago's natural wetlands are protected or restored so that:

- (1) *mahika kai and other mana whenua values are sustained and enhanced now and for future generations,*
- (2) *there is no decrease in the range and diversity of indigenous ecosystem types and habitats in natural wetlands,*
- (3) *there is no reduction in their ecosystem health, hydrological functioning, amenity values, extent or water quality, and if degraded they are improved, and*
- (4) *their flood attenuation capacity is maintained.*

LF-FW-P9 – Protecting natural wetlands Protect natural wetlands by:

- (1) *avoiding a reduction in their values or extent unless:*
 - (a) *the loss of values or extent arises from:*
 - (i) *the customary harvest of food or resources undertaken in accordance with tikaka Māori,*
 - (ii) *restoration activities,*
 - (iii) *scientific research,*
 - (iv) *the sustainable harvest of sphagnum moss,*
 - (v) *the construction or maintenance of wetland utility structures,*
 - (vi) *the maintenance of operation of specific infrastructure, or other infrastructure,*
 - (vii) *natural hazard works, or*
 - (b) *the Regional Council is satisfied that:*
 - (i) *the activity is necessary for the construction or upgrade of specified infrastructure,*
 - (ii) *the specified infrastructure will provide significant national or regional benefits,*
 - (iii) *there is a functional need for the specified infrastructure in that location,*
 - (iv) *the effects of the activity on indigenous biodiversity are managed by applying either ECO-P3 or ECO-P6 (whichever is applicable), and*

- (v) *the other effects of the activity (excluding those managed under (1)(b)(iv)) are managed by applying the effects management hierarchy, and*
- (2) *not granting resource consents for activities under (1)(b) unless the Regional Council is satisfied that:*
 - (a) *the application demonstrates how each step of the effects management hierarchies in (1)(b)(iv) and (1)(b)(v) will be applied to the loss of values or extent of the natural wetland, and*
 - (b) *any consent is granted subject to conditions that apply the effects management hierarchies in (1)(b)(iv) and (1)(b)(v).*

There are wetlands located adjacent or near to Lake Onslow and some of these may be natural wetlands. The effects of the proposal on wetlands have been considered, including the loss of values and extent. It has been assessed that the proposal will have limited effects on the wetlands and their values including their hydrological functioning. The proposal is considered to be in accordance with the above policies.

LF-FW-P11 – Identifying outstanding water bodies

Otago’s outstanding water bodies are:

- (1) *the Kawarau River and tributaries described in the Water Conservation (Kawarau) Order 1997,*
- (2) *Lake Wanaka and the outflow and tributaries described in the Lake Wanaka Preservation Act 1973,*
- (3) *any water bodies identified as being wholly or partly within an outstanding natural feature or landscape in accordance with NFL-P1, and*
- (4) *any other water bodies identified in accordance with APP1.*

LF-FW-P12 – Protecting outstanding water bodies *The significant and outstanding values of outstanding water bodies are:*

- (1) *identified in the relevant regional and district plans, and*
- (2) *protected by avoiding adverse effects on those values.*

Outstanding water bodies are identified by LF-FW-P11 of the P-ORPS 2021. Those to be identified via the processes and criteria in clauses (3) and (4) of this policy have yet to be determined. Outstanding water bodies that meet these criteria will be identified within the new Land and Water Plan to be notified at the end of 2023. It is recognised that the criteria in APP1 includes water bodies that provide for the outstanding recreational experience for an activity which is directly related to water, such as fishing, and also includes water bodies that have outstanding ecological value as a habitat for salmonid fish. Lake Onslow may meet these criteria but without the clear identification within a regional plan it is not appropriate to consider the lake as outstanding and assess the activity under LF-FW-P12.

LF-FW-O10 – Natural character *The natural character of wetlands, lakes and rivers and their margins is preserved and protected from inappropriate subdivision, use and development.*

LF-FW-P13 – Preserving natural character *Preserve the natural character of lakes and rivers and their beds and margins by:*

- (1) *avoiding the loss of values or extent of a river, unless:*
 - (a) *there is a functional need for the activity in that location, and*
 - (b) *the effects of the activity are managed by applying:*
 - (i) *for effects on indigenous biodiversity, either ECO-P3 or ECO-P6 (whichever is applicable), and*
 - (ii) *for other effects, the effects management hierarchy,*
- (2) *not granting resource consent for activities in (1) unless Otago Regional Council is satisfied that:*
 - (a) *the application demonstrates how each step of the effects management hierarchies in (1)(b) will be applied to the loss of values or extent of the river, and*

- (b) any consent is granted subject to conditions that apply the effects management hierarchies in (1)(b),
- (3) establishing environmental flow and level regimes and water quality standards that support the health and well-being of the water body,
- (4) wherever possible, sustaining the form and function of a water body that reflects its natural behaviours,
- (5) recognising and implementing the restrictions in Water Conservation Orders,
- (6) preventing the impounding or control of the level of Lake Wanaka,
- (7) preventing modification that would reduce the braided character of a river, and
- (8) controlling the use of water and land that would adversely affect the natural character of the water body.

LF-FW-P14 – Restoring natural character Where the natural character of lakes and rivers and their margins has been reduced or lost, promote actions that:

- (1) restore a form and function that reflect the natural behaviours of the water body,
- (2) improve water quality or quantity where it is degraded,
- (3) increase the presence, resilience and abundance of indigenous flora and fauna, including by providing for fish passage within river systems,
- (4) improve water body margins by naturalising bank contours and establishing indigenous vegetation and habitat, and
- (5) restore water pathways and natural connectivity between water systems.

The natural character of Lake Onslow is limited, given it is an artificial lake that does not have natural behaviours and because it is actively managed. The proposal will have limited effects on natural character as the proposed change and resultant effects on lake levels and duration at lower lake levels will continue to sustain the health and well-being of the water body. The natural character of the Teviot River will not be significantly modified from what can occur currently under the existing consents, recognising that these do enable an unnatural flow regime to be maintained in the river. Overall, the Application is in accordance with the above policies.

LF-LS-P22 – Public access

Provide for public access to and along lakes and rivers by:

- (1) maintaining existing public access,
- (2) seeking opportunities to enhance public access, including by mana whenua in their role as kaitiaki and for gathering of mahika kai, and
- (3) encouraging landowners to only restrict access where it is necessary to protect:
 - (a) public health and safety,
 - (b) significant natural areas,
 - (c) areas of outstanding natural character,
 - (d) outstanding natural features and landscapes,
 - (e) places or areas with special or outstanding historic heritage values, or
 - (f) places or areas of significance to takata whenua, including wāhi tapu and wāhi tupuna

Public access is unlikely to be significantly affected by the proposal when compared to what could currently occur under the consents. There is the potential that there may be wet mud flat presence slightly more frequently than currently. The proposal is considered to be in accordance with the above policy.

6.3.7 Regional Plan: Water for Otago

The Regional Plan: Water for Otago (RPW) is the relevant regional planning document that relates to the proposal. The RPW was notified in 28 February 1998 and became operative in 1 January 2004. It is noted here, that the RPW was drafted before the NPS-FM 2014 (updated 2020) was notified and has not been updated to give effect to the NPS-FM 2020. Council notified its Progressive Implementation Programme in December 2018 and has a plan to implement the NPS-FM. This includes the proposal to notify a new Land and Water Plan by the end of 2023 that

will be consistent with the NPS-FM 2020 and the proposed RPS-2021. The following policies in the RPW are most relevant for this application.

Objective 5.3.4 To maintain or enhance the amenity values associated with Otago's lakes and rivers and their margins.

Explanation

The amenity values associated with Otago's lakes and rivers and their margins are the natural and physical qualities and characteristics that contribute to people's appreciation and enjoyment of the water body. This appreciation and enjoyment relates to the pleasantness, aesthetic coherence and cultural and recreational attributes of a lake or river. The ability to appreciate amenity values may be facilitated by physical development such as structures and through access provisions.

Principal reasons for adopting

This objective is adopted to ensure that activities that use land or water do not remove or reduce opportunities for the enjoyment or appreciation of Otago's lakes and rivers, and where appropriate to provide for the enhancement of amenity values. This reflects the importance of amenity values to the region's people and communities

Objective 5.3.5 To maintain or enhance public access to and along the margins of Otago's lakes and rivers.

Explanation

Public access to and along the margins of lakes or rivers provides the opportunity for recreational use and aesthetic appreciation of Otago's water bodies. This public access may be gained through legal access provisions or through informal arrangements. Existing public access shall be maintained or enhanced, subject to consideration of the effect on public access, and the agreement of landholders. There may be situations where it is necessary to restrict access as defined in Policy 6.5.10 of the Regional Policy Statement.

Principal reasons for adopting

This objective is adopted to provide for the management of water, and bed or margin activities consistent with Section 6(d) of the Resource Management Act and the Regional Policy Statement for Otago, which seek to maintain or enhance public access

The amenity values of Lake Onslow and the Teviot River have been identified and consideration given to how these values would have altered if the consents had been exercised to their fullest extent. The proposal may have some impact on amenity values. If the consents were currently exercised to their fullest extent, the amenity values of Lake Onslow would be less than they are currently, specifically when considering effects on angling and boating and including the visual amenity and pleasantness. This would be due to the lake being half full to 'empty' for the majority of the time resulting in vast expanses of mudflats and public access difficulties for using boats on the lake. The proposal will exacerbate these effects slightly such that mudflats extent will be greater when the lake is at lower levels but that overall, these values will be maintained.

Objective 5.3.7 To maintain the heritage values associated with Otago's lakes and rivers, and their margins.

Explanation

Heritage values associated with the bed or margin of a lake or river warrant being appropriately maintained. This objective applies to heritage values in Otago including those identified in Schedule 1C of this Plan, archaeological sites and sites with interim registration as historic places. Note that heritage values identified in any district plan will be given due regard in processes under this Plan.

Principal reasons for adopting

This objective is adopted to ensure that resource use and development activities do not remove or reduce opportunities for the study, enjoyment or appreciation of the significant heritage values of Otago's lakes and rivers and their margins.

The proposal has been assessed as having no additional adverse effects on heritage values including those that might exist in relation to the 'old' dam or any artefacts on land. This is due to

the proposal not changing the minimum operating level or maximum lake extent. The proposal is assessed to be in accordance with the above objective.

Policy 5.4.2 In the management of any activity involving surface water, groundwater or the bed or margin of any lake or river, to give priority to avoiding, in preference to remedying or mitigating:

- (1) *Adverse effects on:*
 - (a) *Natural values identified in Schedule 1A;*
 - (b) *Water supply values identified in Schedule 1B;*
 - (c) *Registered historic places identified in Schedule 1C, or archaeological sites in, on, under or over the bed or margin of a lake or river;*
 - (d) *Spiritual and cultural beliefs, values and uses of significance to Kai Tahu identified in Schedule 1D;*
 - (e) *The natural character of any lake or river, or its margins;*
 - (f) *Amenity values supported by any water body; and*
- (2) *Causing or exacerbating flooding, erosion, land instability, sedimentation or property damage.*

Policy 5.4.3 In the management of any activity involving surface water, groundwater or the bed or margin of any lake or river, to give priority to avoiding adverse effects on:

- (a) *Existing lawful uses; and*
- (b) *Existing lawful priorities for the use, of lakes and rivers and their margins.*

Policy 5.4.8 To have particular regard to the following features of lakes and rivers, and their margins, when considering adverse effects on their natural character:

- (a) *The topography, including the setting and bed form of the lake or river;*
- (b) *The natural flow characteristics of the river;*
- (c) *The natural water level of the lake and its fluctuation;*
- (d) *The natural water colour and clarity in the lake or river;*
- (e) *The ecology of the lake or river and its margins; and*
- (f) *The extent of use or development within the catchment, including the extent to which that use and development has influenced matters (a) to (e) above.*

Policy 5.4.9 To have particular regard to the following qualities or characteristics of lakes and rivers, and their margins, when considering adverse effects on amenity values:

- (a) *Aesthetic values associated with the lake or river; and*
- (b) *Recreational opportunities provided by the lake or river, or its margins.*

The natural values of Lake Onslow and the Teviot River identified in Schedule 1A and the cultural beliefs and values identified in Schedule 1D have been outlined in the s95 recommending report and adverse effects on them considered. It has been assessed that the proposal will have limited effects on these values including effects on adult trout, spawning areas and areas for development of juvenile fish when comparing the effects to those that could occur currently if the consents were exercised to their fullest extent. There are no Schedule 1B or Schedule 1C values or existing lawful priorities that will be affected.

Policy 5.4.8 of the RPW was taken into consideration when assessing effects on the natural character of Lake Onslow and the Teviot River, as outlined in the s95 recommendation. As detailed previously, the natural character of Lake Onslow will not be affected due to it being an artificial lake. It is recognised that the flows in the Teviot River are unlikely to represent the natural flow characteristics of the river. However, this is influenced substantially by the development of the catchment as a hydro-electricity scheme. The proposal will have limited effects on the natural character of the Teviot River when comparing what flows could occur currently under the consent.

The amenity values of Lake Onslow has been considered in accordance with Policy 5.4.9 of the RPW. The amenity values are described in the evidence of Dr Booth, although it is noted that a comprehensive recreational assessment has not been undertaken. From the submissions and available information, it is clear that the primary effects of the proposal are on angling and boating

use of Lake Onslow. The current consents, were they exercised to their fullest extent, would create an environment that is less desirable, has public access challenges and that potentially has an increased safety risk than how the Lake has been operated in recent years. The proposal may potentially exacerbate these effects but only slightly. No mitigation has been proposed by the Applicant.

The proposal is considered to be generally in accordance with the above policies.

Policy 5.4.4 To recognise Kai Tahu's interests in Otago's lakes and rivers by promoting opportunities for their involvement in resource consent processing.

As outlined previously, Kāi Tahu were given the opportunity to be involved in the consent process by being considered an affected party under s95E. No submissions were received from Kāi Tahu. The processing of this Application has been in accordance with this policy.

Objective 6.5.3: To minimise the adverse effects from fluctuations in the levels of controlled lakes

Principal reasons for adopting

This objective is adopted to ensure that the control of lake levels is managed to address the likely adverse effects of lake level fluctuation. This is because other users of water and the natural and human use values can be particularly vulnerable to excessive draw down and rates of change of the lake level.

Policy 6.5.2: Where lake levels are already controlled, to recognise and provide for the purpose of that control if limits are to be placed on operating levels.

Explanation

Some of Otago's lakes are controlled through the use of dams for specific purposes, storage for irrigation supply and electricity generation for example. The purposes of any existing controls are to be recognised and provided for when considering resource consents that affect lake levels. Limits on operating levels may be imposed, where necessary, in accordance with Policy 6.5.3.

Principal reasons for adopting

This policy is adopted to ensure that the purpose of controlling any lake where such control already exists is not unduly compromised. Given the investment in dams and associated structures, it would be inappropriate to prevent the use of the dammed water for the purpose for which it was dammed.

Policy 6.5.3: To limit the operating levels of any controlled lake, where appropriate, to avoid or mitigate adverse effects on:

(a) Natural and human use values identified in Schedule 1;

(b) The natural character of the lake;

(c) The amenity values supported by the lake;

(d) Lake margin stability; and

(e) The needs of Otago's people and communities.

Explanation

Changes in the levels of lakes and the rate of change can adversely affect the matters identified in (a) to (e) of the policy. It is important to consider new proposals to manage lake levels and new consents for existing dams, in order that appropriate conditions can be set to avoid or mitigate these adverse effects. These conditions will address extremes in lake levels, and the rates of change of such levels. It is also important when considering an activity affected by this policy that consideration is given to Policy 6.5.2.

Principal reasons for adopting

This policy is adopted to provide for the protection of the matters (a) to (e) above, which can be adversely affected by inappropriate lake levels and their rates of change

The proposed change is specifically related to how the lake levels of Lake Onslow are managed. As identified in Section 6.1.6, the proposal will result in some changes to the current lake levels including a lower mean lake level and extended duration at lower lake levels. The changes in lake level fluctuations were specifically considered and fluctuations in lake levels can occur currently and would continue to be enabled under the proposal.

Policy 6.5.2 requires consideration of the reasons for why the lake is controlled when any limitations are to be placed on operating levels. In this case, the proposal is to loosen an existing limitation. The Fish and Game submission suggests some conditions that could be imposed to mitigate effects. These would impose additional limits on the Applicant. The Applicant has commented on these conditions¹⁵¹ and noted that additional restrictions on the frequency or duration of low lake level events would not be feasible. Additionally, restrictions on the duration that the 0.4 m per 7-days drawdown rate can be used before reverting back to the 0.2 m per 7-days draw down rate would also not be practical. If such restrictions were to be imposed, implications on how the Lake can be managed for irrigation storage/electricity supply would need to be established and considered. The Fish and Game submission also suggested a condition to have the drawdown restriction over a longer period e.g. 0.8 m or 1.0 m per month. This was to provide short term variation without dramatically changing the current operating regime. The Applicant has stated that they proposed 1.2 m per month to Fish and Game, however this was not accepted. They indicated that anything less than that would not be favourable from an operational or economic standpoint.

Policy 6.5.3 requires the operating levels of a controlled lake to be limited, where appropriate, to avoid or mitigate adverse effects on the natural and human use values associated with the lake. The effects of the change have been considered in light of the natural and human use values associated with Lake Onslow. Although the proposal, will likely have some adverse effects. These effects have been assessed overall as not being significant, given the lake environment that would exist if the current consents were implemented to their fullest extent. Overall, the proposal is considered to be consistent with the above objective and policies that relate to management of controlled lakes.

Overall, the proposed change to the consent conditions is generally consistent with the above relevant policies of the RPW.

6.4 Section 104(1)(c) - Any other matters

6.4.1 The Kai Tahu ki Otago Natural Resource Management Plan 2005

The Kai Tahu ki Otago Natural Resource Management Plan 2005 ('**NRMP**') is a relevant other matter for the consideration of this Application. This is because the RPW is yet to be amended to take into account this Plan and this Plan expresses the attitudes and values of the four Papatipu Rūnaka: Te Rūnanga o Moeraki, Kāti Huirapa Rūnaka ki Puketeraki, Te Rūnanga o Ōtākou and Hokonui Rūnanga. The following objectives and policies are of most relevance to this Application:

It is noted the policy convention 'to oppose' that is used throughout the Kai Tahu ki Otago Natural Resource Management Plan 2005 means 'an activity or action that must not occur' in order to achieve the objectives of this Plan and protect Kai Tahu ki Otago values

¹⁵¹ Further information from Pioneer Energy Limited dated 1 March 2022 question 7

5.3.3 Wai Māori General Objectives

- i. The spiritual and cultural significance of water to Kāi Tahu ki Otago is recognised in all water management.*
- ii. The waters of the Otago Catchment are healthy and support Kāi Tahu ki Otago customs.*
- iii. There is no discharge of human waste directly to water.*
- iv. Contaminants being discharged directly or indirectly to water are reduced.*
- v. Flow regimes and water quality standards are consistent with the cultural values of Kāi Tahu ki Otago and are implemented throughout the Otago Region and lower Waitaki Catchment.*
- vi. The unresolved issues surrounding water ownership are addressed.*

5.3.4 Wai Māori General Policies

- 1. To require an assessment of instream values for all activities affecting water.*
- 2. To promote the cultural importance of water to Kāi Tahu ki Otago in all water management within the Otago Region and Lower Waitaki Catchment.*
- 3. To promote co-ordinated research into water-related issues that provides for Kāi Tahu ki Otago input.*
- 4. To protect and restore the mauri of all water.*
- 5. To encourage the use of the Cultural Health Index as a tool for monitoring waterways.*
- 6. To oppose any further cross mixing of waters.*
- 7. To promote to the Otago Regional Council and Environment Canterbury minimum flow levels, flow regimes, lake levels and lake operating levels for lakes and rivers that recognise and provide for Kāi Tahu ki Otago cultural values and the healthy functioning of associated ecosystems.*

The proposal is assessed as being in general accordance with the above policies on Wai. The instream values have been identified and assessed and the mauri of the water will be maintained. No direct promotion from Kai Tahu was provided on the lake levels to provide for cultural values. The proposed change will have no change to the current consented operating levels.

5.4.3 Wāhi Tapu Objectives:

- i. All wāhi tapu are protected from inappropriate activities.*
- ii. Kāi Tahu ki Otago have access to wāhi tapu.*
- iii. Wāhi tapu throughout the Otago region are protected in a culturally appropriate manner.*

10.3.3 Wāhi Tapu Policies in the Clutha/Mata-au Catchment

- 1 To require that wāhi tapu sites are protected from further loss or destruction.*
- 2. To require accidental discovery protocols for any earth disturbance activities*

The proposal is consistent with the above policies and will not result in loss or destruction of wāhi tapu sites.

5.5.4 Mahika Kai and Biodiversity General Policies

- 1. To promote catchment-based management programmes and models, such as Ki Uta Ki Tai.*
- 2. To promote more stringent border control protection mechanisms.*
- 3. To encourage collaborative research into indigenous biodiversity.*
- 4. To require Kāi Tahu ki Otago participation in the management of mahika kai, both introduced and indigenous.*
- 5. To identify mahika kai sites and species of importance to Kāi Tahu ki Otago.*
- 6. To protect and enhance physical access for Kāi Tahu ki Otago to mahika kai sites.*
- 7. To require that all assessments of effects on the environment include an assessment of the impacts of the proposed activity on mahika kai.*
- 8. To promote the protection of remaining indigenous fish habitat by:*
 - i. Identifying waterways that exclusively support indigenous fish.*
 - ii. Prohibiting the introduction of exotic species where they currently do not exist.*
 - iii. Ensuring fish passage (both ingress and egress).*
 - iv. Removing exotic species from waterways of particular importance where this is achievable and appropriate according to Kāi Tahu ki Otago.*
- 9. To promote the protection of traditional breeding stocks.*
- 10. To encourage the transfer of knowledge through generations.*

11. To promote the use of authorisation systems for the taking and use of cultural materials.
12. To protect and enhance existing wetlands, support the reinstatement of wetlands and promote assistance for landowners for fencing-off wetlands.
13. To promote the development of a cultural monitoring tool for vegetation and ecosystem health.
14. To encourage the creation of mahika kai parks in the Otago region.
15. To promote the reintroduction of locally extinct species of importance to Kāi Tahu ki Otago to the region.
16. To require that hazardous operations and the use, transportation and storage of hazardous substances are not to impact mahika kai and other cultural values.
17. To require that fish screens be fitted to all pumps and race intakes.
18. To promote best-practice methodologies for drain maintenance or diversions to ensure minimal damage to ecosystems with no further adverse effects on mahika kai and other cultural values

10.4.3 Mahika Kai and Biodiversity Policies in the Clutha/Mata-au Catchment:

1. To require native fish ingress and egress past all dams and structures.
2. To support programmes and initiatives that enhances mahika kai.
3. To continue to manage weka to enable sustainable use.
4. To source locations for the expansion of the weka population.
5. To encourage customary use practises.
6. To encourage environmental and educational efforts to halt the spread of lagarosiphon and other pest species.
7. To require co-ordinated pest management controls

The proposal is generally consistent with the relevant parts of the above policies on mahika kai. The proposal has assessed effects on mahika kai and the proposed change will likely have limited effects on mahika kai habitats and access to obtaining mahika kai, provided the recommended conditions are imposed.

10.2.3 Wai Māori Policies in the Clutha/Mata-au Catchment

Dams:

1. To oppose the creation of new dams within this Catchment.
2. To require gradual rather than instantaneous ramping to control fluctuations in river flow.
3. To require flow regimes that mimic natural flows.
4. To require effects associated with dam management (e.g. flow issues, changes to waterways upstream downstream, habitat changes, fish passage, inundation of values habitats, health and safety issues, siltation concerns, erosion) are addressed. Where the scale of effects is such that it cannot be addressed to the satisfaction of Kā Papatipu Rūnaka and depending on the legal status of the dam Kā Papatipu Rūnaka may advocate for either the removal of existing dams or decline consent to dam.

This proposal is not for the re-consenting of the damming activity in full and s127 of the RMA limits consideration to the effects of the change only. The proposal has the potential to alter the flow regime of the Teviot River. The current consents do not provide for a natural flow regime in terms of the discharge to the river and the proposed change will not improve that. The appropriateness of the flow regime and natural flows will be considered when the consents are replaced, if such an application is lodged. The effects associated with dam management as they relate to the change have been assessed and the proposal has been identified as not having any significant effects. As previously noted, no submission was received from any of the rūnaka.

It is considered that overall, the proposal is consistent with the NRMP.

6.4.3 Te Rūnanga o Ngāi Tahu Freshwater Policy Statement 1999

The Ngāi Tahu Freshwater Policy Statement 1999 ('NTFP') is considered to be a relevant other matter for the consideration of this Application because the RPW is yet to be amended to take into account the NTFP. The NTFP expresses the attitudes and values of Te Rūnanga o Ngāi Tahu

The following objectives and policies are of most relevance to this Application:

6.1 *Wāhi Tapu* – To afford total protection to waters that are of particular spiritual significance to Ngāi Tahu.

6.2 *Mauri*: To restore, maintain and protect the mauri of freshwater resources.

- Identify freshwater resources where:
 - *Mauri is unaffected by modification and human activity so that these waterbodies can be afforded total protection; and*
 - *Mauri is adversely affected, and the activities that cause such affects.*
 - *Accord priority to ensuring the availability of sufficient quantities of water of appropriate water quality to restore, maintain and protect the mauri of a waterbody, in particular priority is to be accorded when developing water allocation regimes.*

6.3 *Mahinga Kai* – To maintain vital, healthy mahinga kai populations and habitats capable of sustaining harvesting activity.

- *Protect critical mahinga kai habitats and identified representative areas.*
- *Restore and enhance the mahinga kai values of rivers, streams, wetlands and riparian margins.*
- *Ensure that the activities in the upper catchments have no adverse effects on mahinga kai resources in the lower catchments.*

Lake Onslow has not been specifically identified as a water body of particular spiritual significance to Ngāi Tahu. The mauri of the Teviot River has been affected by the damming of the river. However, the proposal being considered is not to replace the damming activity but a change to how the damming activity operates. This change is considered to maintain the existing mauri of the waterbody. Mahinga kai values have been identified and assessed. The proposal is likely to maintain the existing mahinga kai populations in Lake Onslow and the Teviot River downstream of the dam.

It is considered that, overall, the Application is consistent with the objectives and policies of the NTFP.

6.4.4 Sports Fish and Game Management Plan for Otago Fish and Game Region 2015-2025

This Sports Fish and Game Management Plan for Otago Fish and Game Region 2015-2025 describes the sports fish and game bird resources in the region and outlines issues, objectives and policies for management over the period. The Management Plan supports the conclusions that Lake Onslow provides important angling amenity and is a regionally important sports fishery. It provides some details on the type of fishing undertaken at the lake, users and surveyed angler numbers. It is noted that Dr Booth has reviewed and taken into consideration the Management Plan within her evidence¹⁵².

11. Part 2 of the Act

Under Section 104(1) of the RMA, a Consent Authority must consider resource consent applications "subject to Part 2" of the RMA, specifically, sections 5, 6, 7 and 8.

¹⁵² Booth (2022) Evidence of Dr Kay Booth of Lindis Consulting Limited dated 3 June 2022 – para 36 and 81

Section 5 identifies the purpose of the RMA as the sustainable management of natural and physical resources. This means managing the use of natural and physical resources in a way that enables people and communities to provide for their social, cultural and economic well-being while sustaining those resources for future generations, protecting the life supporting capacity of ecosystems, and avoiding, remedying or mitigating adverse effects on the environment.

Section s6, 7 and 8 outline the principles of the Act. Section 6 sets out a number of matters of national importance which need to be recognised and provided for, section 7 identifies a number of “other matters” to be given particular regard by the council, and section 8 requires the council to take into account the principles of the Treaty of Waitangi.

The Court of Appeal has clarified how to approach the assessment of “subject to Part 2” in section 104(1). In *R J Davidson* the Court of Appeal found that decision makers must consider Part 2 when making decisions on resource consent applications, where it is appropriate to do so. The extent to which Part 2 of the RMA should be referred to depends on the nature and content of the planning documents being considered.

Where the relevant planning documents have been prepared having regard to Part 2 of the RMA, and with a coherent set of policies designed to achieve clear environmental outcomes, consideration of Part 2 is not ultimately required. In this situation, the policies of these planning documents should be implemented by the consent authority. The consideration of Part 2 “would not add anything to the evaluative exercise” as “genuine consideration and application of relevant plan considerations may leave little room for Part 2 to influence the outcome”. However, the consideration of Part 2 is not prevented, but Part 2 cannot be used to subvert a clearly relevant restriction or directive policy in a planning document.

Where it is unclear from the planning documents whether consent should be granted or refused, and the consent authority has to exercise a judgment, Part 2 should be considered.

In the context of this Application to change the conditions of consent relating to the draw down rate of a controlled lake, I consider that the key objectives and policies of the relevant statutory documents were prepared having regard to Part 2 of the RMA and that they capture all relevant planning considerations and contain a coherent set of policies designed to achieve clear environmental outcomes. They also provide a clear framework for assessing all relevant potential effects, and I find that there is no need to go beyond these provisions and look to Part 2 in making this decision. An assessment against Part 2 would not add anything to the evaluative exercise.

12. Overall Recommendation

Under section 104B it is recommended that this consent Application is approved subject to conditions.

- In accordance with an assessment under ss104(1)(a) and (ab) of the RMA, the actual and potential effects from the proposal are found to be acceptable, because:
 - The currents consents had they been exercised to their fullest extent would create a receiving environment with diminished amenity and ecological values than currently. The proposed change will exacerbate some of these effects but not significantly
 - The effects can be adequately mitigated via existing consent conditions.

- The proposal will likely have a neutral to minimal risk of increasing navigation issues and navigation safety can be improved via clear and specific signage at the key access area to the lake.
- The proposal will support that Applicant in producing electricity at periods of peak demand and contribute to the national goals on renewable electricity generation.
- In accordance with an assessment under s104(1)(b) of the RMA, the proposal is found to be generally consistent with the relevant statutory documents, including the NPS-FM 2020, NPS-REG, PO-RPS 2019, P-ORPS 2021 and RPW for the following reasons:
 - The proposal provides for the economic wellbeing of the region's people and assists with New Zealand achieving climate change targets.
 - The proposal is consistent and in accordance with the NPS-REG. Imposing conditions that constrain the activity more than currently could mean that the proposal was not in accordance.
 - The proposal gives effect to Te mana o Te Wai and prioritises the health and well being of the waterbodies.
 - The natural values of Lake Onslow including the habitats of indigenous species have been identified and considered and the proposal will have limited effects on these values.
 - Effects on trout and trout production have been specifically considered. The proposal will have some effect but this has been assessed as limited. The proposal will not favour trout to the detriment of indigenous species.
 - The proposal will have limited effects on any natural or Regionally Significant Wetlands and will not result in loss or extent any greater than what could currently occur.
 - Consideration has been given to the effects of the proposal on the wider catchment and effects on adjacent and downstream water bodies are assessed to be limited.
 - The natural character of Lake Onslow and the Teviot River has been specifically considered and effects are assessed to be limited.
 - The amenity values of Lake Onslow and the Teviot River including public access have been specifically considered and these values will be not be significantly affected.
 - Lake Onslow is not currently considered to be an outstanding water body.
 - The proposal will have nil to limited effects on any existing users, heritage values or water supply values.
 - Kāi Tahu were involved in the consent process and effects on Kāi Tahu values were specifically considered.
 - The proposal is in accordance with the specific policies and objectives that relate to the operating levels of controlled lakes with effects on the specific values identified assessed.

- In accordance with an assessment under s104(1)(c) of the RMA the following other matters have been considered and the proposal is found to be consistent with the NRMP, NTFP for the following reasons:
 - The proposal will have no known effects on Wāhi Tapu values.
 - The proposal will maintain the mauri of Lake Onslow and Teviot River and all associated waterbodies.
 - The proposal will have limited effects on mahika/mahinga kai species including effects on their habitat and access to sites for harvesting.
- Due consideration has been given to the Sports Fish and Game Plan for the Otago Fish and Game region
 - The Council must not grant a resource consent if the application should have been notified and was not. No matters have arisen in the assessment of this Application that would indicate the application should have been publicly notified.
 - There is no need to look to Part 2 of the RMA in making this decision, as the objectives and policies of the relevant statutory documents were prepared having regard to Part 2 of the RMA and they have captured all relevant planning considerations. They also contain a coherent set of policies designed to achieve clear environmental outcomes and provide a clear framework for assessing all relevant actual and potential effects. An assessment against Part 2 would not add anything to the evaluative exercise

Overall, I recommend that the s127 variation is granted. Whilst the proposal will have some additional effects from those that could currently occur, these effects are not significant when considering what the environment could be if the existing consents were implemented to their fullest extent. These effects can be appropriately mitigated with the consent conditions detailed below or if those with a similar intent are imposed and implemented.

13 Section 108 and 108AA of the Act

Should the decision maker decide to grant the Application, the attached conditions on Water Permit 2001.475 and 2001.476.V3 are recommended in accordance with Sections 108 and 108AA of the Act. The changes to the consents are detailed below. I first identify which of the proposed conditions be included and then I comment on other conditions that be imposed to mitigate the effects of the proposal, should these be considered necessary.

13.1 Proposed changes to current conditions:

13.1.1 Change to rate of draw down

It is recommended that the change to the rate of draw down proposed by the Applicant from 0.2 metres over any period of seven days to 0.4 metres over any period of seven days be granted for the reasons outlined above.

I note that the Fish and Game submission sought further restrictions on the draw down rate¹⁵³ including a monthly draw down limit of 0.8 m or 1.0 m per month. I am not sure if this was intended to be per calendar month or a set period of days. The Applicant has indicated that this limit would have operational and economic constraints but that they would consider a limit of 1.2 m per month. I have not recommended that the condition be changed to a monthly limit but if it were considered appropriate to limit the draw down on a monthly basis, I do not see any planning challenges with this provided that time period is clearly defined. I note that further details from submitters and the Applicant may be required to determine a limit.

13.1.2 Monitoring lake levels

The Applicant has proposed a condition to monitor lake levels. This will enable compliance with the above draw down condition to be assessed. I have recommended a condition that is reflective of current conditions imposed for measuring the rates and volumes of water taken for water take consents. The recommended condition will ensure that Council has daily access to the lake levels. It also provides certainty around the accuracy of the measuring and recording devices. This includes the requirement for regular verification and that malfunctions of the devices are repaired in a timely manner.

13.1.3 Adaptive management regime

I have not recommended that the adaptive management regime conditions be imposed. The reasons for this are outlined in Sections 6.1.8.4 and 6.3.6.1 of this report.

13.2 Other conditions recommended to be imposed:

The following condition has been recommended to be modified in order to avoid/ remedy/ mitigate the effects of the proposed change. There is scope for this conditions to be amended as it relates to the effects of the changes to the consents and they meet the general requirements for consent conditions under s108AA.

13.2.1 Signage

I propose changes to current Condition 15 of 2001.475, which relates to public safety and signage to advice of navigation risks associated with the Lake. It is recommended that this condition is strengthened to include specifics on where the sign is located, the size of the sign and the specific details to include on the sign. This condition is an existing condition and addresses an adverse effect of the proposal. It is not known whether there are any consents required from Central Otago District Council to place signs on land near Lake Onslow.

13.2.2 Other conditions

I have not recommended any other conditions of consent be imposed. I note that in Section 6.1.10.1 under Lake Onslow effects, Mrs Coates had suggested that mitigation in the form of rocky bed (large cobble) areas could be provided to increase invertebrate habitat within the Lake. I note that this could have dual benefits if sites were selected in consultation with Fish and Game and TAC such that the sites might also be able to provide a safe disembarking spot from a boat and/or a mud-free fishing location. I have not recommended this condition be imposed, given the conclusions made on effects. However, I have provided some advice and a potential condition below if such a condition was considered necessary to be imposed to mitigate ecological and/or amenity effects.

¹⁵³ Fish and Game submission (2021) – para 87 and 96

A timeframe for these works to be completed would be required. I would suggest 1 December 2023 to provide adequate time for consultation on preferred locations and for scheduling of the works. I would suggest that 3 sites around the lake be selected. This provides an opportunity for new habitat to be created in multiple locations but is not overly onerous for the Applicant. Under the RPW, the placement of rocks is not considered to be a structure. The relevant rules for this activity are in Chapter 13.5 for the alteration of the bed¹⁵⁴. There are no permitted activity rules that provide for the placement of rocks on the bed of a lake. The activity would be a discretionary activity under 13.5.3.1. If there were concerns that the condition could derogate the grant of the variation, then s91 of the RMA may be able to be used ensure that consent was secured before the final decision was made on this Application.

It is understood that most of the lake bed within the maximum operating range of the Lake is owned by the Applicant so the location of the rocky beds is likely to be on land that they manage. Depending on the location of the rocky bed areas, land owner access may be required to access the land adjacent to the bed to undertake the works. This would need to be resolved during the location selection process.

An example condition is included below:

17. (a) *Prior to 1 December 2023, the Consent Holder must have created 3 new rocky bed areas on the bed of Lake Onslow.*
- (b) *The location of the 3 rocky bed areas must be selected in consultation with Otago Fish and Game Council and the Teviot Angling Club. Once the locations have been finalised, the Consent Holder must provide a map of Lake Onslow to the Consent Authority at least 20 working days prior to commencing the works that shows the locations of the rocky bed areas and that includes a NZTM map reference for each rocky bed area.*
- (c) *The design of the rocky bed areas must be undertaken in consultation with a suitably qualified ecologist.*
- (d) *The Consent Holder must provide a plan of the rocky bed areas to the Consent Authority at least 20 working days prior to commencing the works for certification. No works must be undertaken until the plan has been certified.*
- (e) *The Consent Holder must notify the Consent Authority in writing of the completion of the establishment of the rocky bed areas no more than 10 working days following the completion of the last rocky bed area, and must provide photographs of each completed rocky bed area. Photographs must be in colour and be no smaller than 200 x 150 millimetres in size and be in JPEG form.*

The full set of recommended conditions is appended to this s42A recommendation with the changed conditions shown in track changes.

13.1 Term of Consent (Section 123)

This Application is made under s127 of the RMA which states that: *no holder of any consent may apply for a change or cancellation of a condition on the duration of the consent (s127(1)(b)).*

¹⁵⁴ Under the RMA 1991 bed for a controlled lake is: *In relation to any lake controlled by artificial means, the space of land which the waters of the lake cover at its maximum permitted operating level*

Accordingly, no change to the consent terms are sought and Water Permit 2001.475 and Water Permit 2001.476.V3 will still have a consent term expiring on 1 April 2041.

13.2 Review Condition (Section 128)

The RMA provides for the council to review conditions at any time or times specified for that purpose in the consent where there are any adverse effects that may arise from the exercise of the consent, or in relation to a coastal, water or discharge permit where a regional plan or NES has changed. In addition, the council can review other conditions (such as those outlined in the advice note above) without having to set out in a condition the timeframes within which it will review them.

Review conditions are currently on Water Permits 2001.475 and 2001.476.V3. This enables a review within 3 months of key anniversaries (every 5 years) of the consent for specific reasons.

These review conditions are generally considered to be appropriate in light of the changes to the consent conditions. It is recommended that clause (d) for 2001.476.V3 is broadened to include the water level measuring or that the more generic version of 2001.475 is applied. It is also noted that there is now not legal restriction to enabling a review to be undertaken at any time¹⁵⁵. It is also recommended that clause (c) is broadened to include *relevant regional plans, and/or the Otago Regional Policy Statement*.

¹⁵⁵ S128 of the RMA previously restricted the review to very specific time periods.

Appendix 1: Recommended Conditions of Consent – Water Permit 2001.475 and 2001.476.V3

Our reference: [A384685](#) Consent No. 2001.475.V1

WATER PERMIT

Pursuant to Section 104C of the Resource Management Act 1991, the Otago Regional Council grants consent to:

Name: Pioneer Generation Limited

Address: 11 Ellis Street, Alexandra

To dam the Teviot River with a 17 metre high gravity dam (Lake Onslow Dam)

for the purpose of creating Lake Onslow for hydroelectric power generation and for irrigation

for a term expiring on 1 April 2041.

Location of activity: Lake Onslow Dam, Lake Onslow.

Legal description of land adjacent to point of damming: Sec 40 SO 22593

Map Reference: [NZMS 260 G43:438-120NZTM 2000 E1333973 N4950253](#)

Conditions:

Lake Levels

1. During the exercise of this consent, the minimum operating water level of the impoundment shall be 679.9 metres above mean sea level.
2. The rate at which the lake shall be drawn down ~~must~~ not exceed 0.42 metres over any period of seven days.

Dam Safety Requirements

3. The consent holder shall ensure that the Lake Onslow Dam structure and all its appurtenant component and accessory structures are maintained in a safe and stable condition.
4. Safety of the dam shall be managed in accordance with the principles of the operative New Zealand Dam Safety Guidelines, issued by the New Zealand Society on Large Dams (NZSOLD).
5. The consent holder shall provide a report confirming the safety of the Lake Onslow Dam signed by an independent engineer registered under the Chartered Professional Engineers Act 2003, or an equivalent independent engineer with a recognised international qualification, approved by the Consent Authority as having the relevant expertise for the purpose. The report shall be provided on each anniversary of the commencement of this consent or an alternative date as agreed

to in writing by the Consent Authority. The report provided to the Consent Authority shall include:

- (a) photographs of monitoring points which show any visible change from the most recent photographs submitted to the Consent Authority,
- (b) deformation survey results;
- (c) an assessment of dam safety; and
- (d) advice as to works undertaken on the dam for the purposes of dam safety since the last report, and the rationale for such works.

Operation, Maintenance and Surveillance

6. The consent holder shall prepare an Operations, Maintenance and Surveillance Manual, within three months of the commencement date of this consent, for the Lake Onslow Dam and its associated structures. This manual shall be prepared in accordance with the operative New Zealand Dam Safety Guidelines, issued by the New Zealand Society on Large Dams (NZSOLD), and shall be to the satisfaction of the Consent Authority. The manual shall include but not be limited to:
 - (a) Details of routine, intermediate, comprehensive and emergency inspections, including:
 - (i) photographs of monitoring points, such as deformation survey points, seepage zones or crack monitoring devices, during low flow/dry conditions and high flow/wet conditions; and
 - (ii) a plan showing the positions of monitoring points.
 - (b) Surveillance monitoring and data analysis; and
 - (c) Deficiency identification and remediation.
7. The Operations, Maintenance and Surveillance Manual shall be reviewed by an independent suitably qualified person and a copy of the manual and the results of the review shall be provided to the Consent Authority within six months of the commencement of this consent.
8. The Operations, Maintenance and Surveillance Manual shall be updated as required, and a copy of the most up to date plan shall be forwarded to the Consent Authority within one month of any change made. The Consent Authority may request that the manual be reviewed by an independent suitably qualified person at no less than two yearly intervals. The results of the review shall be provided to the Consent Authority within three months of the review being requested.

Emergency Action Plan

9. An Emergency Action Plan shall be prepared within six months of the commencement date of this consent for the Lake Onslow Dam and its associated structures. The Plan shall be prepared in accordance with the operative New Zealand Dam Safety Guidelines, issued by the New Zealand Society on Large Dams (NZSOLD), and shall be to the satisfaction of the Consent Authority.
10. The Emergency Action Plan shall be reviewed by an independent suitably qualified person and a copy of the plan and the results of the review shall be

forwarded to the Consent Authority within nine months following the commencement date of this consent.

11. The Emergency Action Plan shall be updated as required, and a copy of the most up to date plan shall be forwarded to the Consent Authority within one month of any change made. The Consent Authority may request that the plan be reviewed by an independent suitably qualified person, at no less than two yearly intervals. The results of the review shall be provided to the Consent Authority within three months of the review being requested.

Dam Safety Review

12. A Dam Safety Review shall be certified by an independent engineer registered under the Chartered Professional Engineers Act 2003, or an equivalent independent engineer with a recognised international qualification, approved by the Consent Authority as having the relevant expertise for the purpose. This review shall be undertaken in accordance with the operative New Zealand Dam Safety Guidelines, issued by the New Zealand Society on Large Dams (NZSOLD), within three years following the commencement date of this consent, and at intervals of no more than every five years thereafter.
13. The results of the Dam Safety Review shall be forwarded to the Consent Authority and the Central Otago District Council within three months of the review being completed.
14. In the event that an earthquake with an intensity of more than VIII on the Modified Mercalli scale is experienced at the Lake Onslow Dam, or lesser intensity if, in the opinion of the Consent Authority, the structural integrity of the dam may be compromised, an inspection and accompanying audit shall be undertaken as soon as practicable by an independent engineer registered under the Chartered Professional Engineers Act 2003, or an equivalent independent engineer with a recognised international qualification, approved by the Consent Authority as having the relevant expertise for the purpose. A summary report detailing the results of the inspection and audit shall be provided to the Consent Authority within one month of the inspection being undertaken.

Public Safety

15. ~~Prior to 1 December 2023, the Consent Holder shall must provide erect and maintain adequate public warning signssignage, adjacent to the concrete boat ramp at approximately NZTM 2000 E1334593 N4949886-. The signs must:~~
 - ~~(a) Be maintained in good repair, at all times by the Consent Holder.~~
 - ~~(b) Be at least 500 millimetres by 500 millimetres and have wording that can be clearly read from 1 metre away;~~
 - ~~(c) to Warn the public of safety and navigation risks associated with the lake, especially at lower lake levels. The signage must include contact details and procedures for if a boat stranding does occur.~~

Waikoura Survey

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16. Within 30 months of the commencement date of this consent, the consent holder shall undertake a survey of the waikoura population in Lake Onslow to ascertain its status. The results of the survey shall be forwarded to the Consent Authority and Kai Tahu ki Otago Ltd.

Measurement of Lake Levels

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17. (a) The Consent Holder must install, maintain and operate a lake level monitoring site in Lake Onslow at or near the Lake Onslow dam for the duration of this permit.

(b) Prior to 1 December 2022, the Consent Holder must install:

(i) A lake level recorder.

(ii) A datalogger that time stamps a pulse from the lake level meter at least once every 15 minutes and has the capacity to hold at least 12 month of lake level data

(iii) a telemetry unit that sends all data to the Consent Authority.

(c) The Consent Holder must provide telemetry data once daily to the Consent Authority. The Consent Holder must ensure data compatibility with the Consent Authority's time-series database and conform with Consent Authority's data standards.

(d) Within 20 working days of the installation of the lake level recorder/ datalogger/ telemetry unit, any subsequent replacement of the lake level recorder / datalogger/ telemetry unit and at five yearly intervals thereafter, and at any time when requested by the Council, the Consent Holder must provide written certification to the Consent Authority signed by a suitably qualified person certifying, and demonstrating by means of a clear diagram, that:

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(i) Each device is installed in accordance with the manufacturer's specifications; and

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(ii) Data from the recording device can be readily accessed and/or retrieved in accordance with the conditions above..

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(e) The lake level recorded / datalogger / telemetry unit must be installed and maintained throughout the duration of the consent in accordance with the manufacturer's instructions.

(f) All practicable measures must be taken to ensure that the recording device(s) are fully functional at all times.

(g) The Consent Holder must report any malfunction of the lake level recorder / datalogger/ telemetry unit to the Consent Authority within 5 working days of observation of the malfunction. The malfunction must be repaired within [10] working days of observation of the malfunction or within a timeframe agreed with the Consent Authority in writing and the Consent Holder must provide proof of the repair, including photographic evidence, to the Consent Authority within 5 working days of the completion of repairs.

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Review

~~187~~. The Consent Authority may, within three months of each anniversary of this consent, in accordance with sections 128 and 129 of the Resource

Management Act 1991, serve notice on the consent holder of its intention to review the conditions of this consent to ensure the consent holder uses the best and most up-to-date standards of practice in maintaining dam safety and demonstrating compliance with the consent holder's obligations to maintain dam safety.

198. The Consent Authority may, in accordance with sections 128 and 129 of the Resource Management Act 1991, serve notice on the consent holder of its intention to review the conditions of this consent within three months either side of the 5th, 10th, 15th, 20th, 25th, and 30th anniversaries of the commencement date of granting of this consent, or within 3 months of receiving any results, reports or plans required under this consent, for the purpose of:

- (a) determining whether the conditions of this consent are adequate to deal with any adverse effect on the environment which may arise from the exercise of this consent and which is appropriate to deal with at a later stage; or
- (b) requiring the consent holder to adopt the best practicable option to remove or reduce adverse effects on the surrounding environment due to the exercise of this consent; or
- (c) ensuring the conditions of this consent are consistent with any National Environmental Standards, relevant regional plans, and/or the Otago Regional Policy Statement; or
- (d) reviewing the frequency, type or method of reporting or adequacy of monitoring.

Issued at Dunedin this 13th day of December 2006.

Reissued at Dunedin this 22nd day of December 2006 to correct the legal description.
Reissued at Dunedin this XX day of XX 2022 to change Conditions 2 and 15 and to add Condition 17. Note the remaining conditions have been renumbered.

Our Reference: A384688

Consent No. 2001.476.V43

WATER PERMIT

Pursuant to Section 104B of the Resource Management Act 1991, the Otago Regional Council grants consent to:

Name: Pioneer Generation Limited and Teviot Irrigation Company Limited

Address: 11 Ellis Street, Alexandra

To take and use surface water non-consumptively from Lake Onslow at a maximum rate of 6 cubic metres per second for the purpose of hydroelectric power generation and flow augmentation

For a term expiring 1 April 2041.

Location of activity: Lake Onslow Dam, Lake Onslow.

Legal description of land adjacent to point of abstraction: Sec 40 SO 22593

Map reference: NZTM 2000 E133397342 N49502537

Conditions:

1. The maximum rate of abstraction from Lake Onslow under this consent shall not exceed 6 cubic metres per second.
2. During the exercise of this consent, the minimum operating water level of the impoundment shall be 679.9 metres above mean sea level.
3. The rate at which the lake shall be drawn down ~~shall~~ must not exceed 0.4 metres over any period of seven days.
4. At all times a residual flow of at least 345 litres per second shall be maintained in the Teviot River, immediately downstream of the Lake Onslow Dam, at grid reference NZTM 2000 E1333942 N4950257.
5.
 - a) The Consent Holder shall install and maintain a:
 - i. Water meter that which will measure the rate and the volume of water taken to within an accuracy of +/- 10% over the meter's nominal flow range at NZTM 2000 E1333817 N4950150. The water meter shall be capable of output to a datalogger.
 - ii. Datalogger that time stamps a pulse from the flow meter at least once every 15 minutes and have the capacity to hold at least twelve months data of water taken.
 - iii. Telemetry unit which sends all of the data to the Consent Authority.
 - b) The Consent Holder shall provide telemetry data once daily to the Consent Authority. The Consent Holder shall ensure data compatibility with the Consent Authority's time-series database and conform with Consent Authority's data standards.

- c) Within 20 working days of the installation of the water meter, datalogger and telemetry unit, any subsequent replacement of the water meter, datalogger and telemetry unit and at five yearly intervals thereafter, when requested by the Consent Authority upon any observed malfunctions, the Consent Holder shall provide written certification to the Consent Authority signed by a suitably qualified person certifying, and demonstrating by means of a clear diagram, that:
- i. Each device is installed in accordance with the manufacturer's specifications;
 - ii. Data from the recording device can be readily accessed and/or retrieved in accordance with the conditions above; and
 - iii. that the water meter has been verified as accurate.
- d) The water meter, datalogger and telemetry unit shall be installed and maintained throughout the duration of the consent in accordance with the manufacturer's instructions.
- e) All practicable measures shall be taken to ensure that the water meter and recording device(s) are fully functional at all times.
- f) The Consent Holder shall report any malfunction of the water meter, datalogger and telemetry unit to the Consent Authority within 5 working days of observation of the malfunction. The malfunction shall be repaired within 20 working days of observation of the malfunction and the Consent Holder shall provide proof of the repair, including photographic evidence, to the Consent Authority within 5 working days of the completion of repairs.
6. (a) The Consent Holder must install, maintain and operate a lake level monitoring site in Lake Onslow at or near the Lake Onslow dam for the duration of this permit.
- (b) Prior to 1 December 2022, the Consent Holder must install a
- (i) A lake level recorder.
 - (ii) A datalogger that time stamps a pulse from the lake level meter at least once every 15 minutes and has the capacity to hold at least 12 month of lake level data
 - (iii) a telemetry unit that sends all data to the Consent Authority.
- (c) The Consent Holder must provide telemetry data once daily to the Consent Authority. The Consent Holder must ensure data compatibility with the Consent Authority's time-series database and conform with Consent Authority's data standards.
- (d) Within 20 working days of the installation of the lake level recorder/ datalogger/ telemetry unit, any subsequent replacement of the lake level recorder / datalogger/ telemetry unit and at five yearly intervals thereafter, and at any time when requested by the Council, the Consent Holder must provide written certification to the Consent Authority signed by a suitably qualified person certifying, and demonstrating by means of a clear diagram, that:
- (i) Each device is installed in accordance with the manufacturer's specifications; and
 - (ii) Data from the recording device can be readily accessed and/or retrieved in accordance with the conditions above.
- (e) The lake level recorded / datalogger / telemetry unit must be installed and maintained throughout the duration of the consent in accordance with the manufacturer's instructions.
- (f) All practicable measures must be taken to ensure that the recording device(s) are fully functional at all times.
- (g) The Consent Holder must report any malfunction of the lake level recorder / datalogger/ telemetry unit to the Consent Authority within 5 working days of observation of the malfunction. The malfunction must be repaired within [10] working days of observation of the malfunction or within a timeframe agreed with the Consent Authority in writing and the Consent Holder must provide proof of the

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repair, including photographic evidence, to the Consent Authority within 5 working days of the completion of repairs.

~~7.~~ The Consent Authority may, in accordance with sections 128 and 129 of the Resource Management Act 1991, serve notice on the consent holder of its intention to review the conditions of this consent within three months either side of the 5th, 10th, 15th, 20th, 25th, and 30th anniversaries date of granting of the commencement of this consent, or within 3 months of receiving abstraction records under condition 5 of this consent, for the purpose of:

- (a) adjusting the consented rate or volume of water under condition 1, should monitoring under condition 5 or future changes in water use indicate that the consented rate or volume is not able to be fully utilised; or
- (b) determining whether the conditions of this consent are adequate to deal with any adverse effect on the environment which may arise from the exercise of the consent and which it is appropriate to deal with at a later stage; or
- (c) ensuring the conditions of this consent are consistent with any National Environmental Standards, relevant regional plans, and/or the Otago Regional Policy Statement; or
- (d) adjusting or altering the frequency or method of water take and water level data recording and transmission.

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~~7.~~ 8. The Consent Authority may, in accordance with sections 128 and 129 of the Resource Management Act 1991, serve notice on the consent holder of its intention to review the conditions of this consent within six months of 1 October 2021 for the purpose of restricting the exercise of this water permit to allow the exercise of another permit.

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Issued at Dunedin this 13th day of December 2006

Reissued at Dunedin this 22nd day of December 2006 to correct the legal description

Reissued at Dunedin this 13th day of November 2013 to change the purpose, to change Condition 4 and Condition 5, and to update the map reference to New Zealand Transverse Mercator,

Reissued at Dunedin this 27th day of August 2021, to reflect changes to Condition 5,

Reissued at Dunedin this XX day of XX 2022 to change Conditions 3 and to add Conditions 6. Note: the remaining conditions have been renumbered.

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Appendix 2: Technical Evidence (Ecology) by Annabelle Coates (Babbage Consulting Limited)

INTRODUCTION

- 1 My full name is Annabelle Julia Coates. I am employed by Babbage Consultants Limited (Babbage) as an ecologist. I have been employed by Babbage since July 2018.
- 2 I hold a Bachelor of Science in Biology, endorsed in Environmental Science, and a Master of Science in Environmental Science from the University of Canterbury. I am a member of the Environment Institute of Australia and New Zealand, a professional body for environmental practitioners.
- 3 My role at Babbage includes ecological surveys and monitoring, assessments of ecological value, assessments of effects of proposed works, and provision of ecological and surface water quality advice to private clients and regional councils. Babbage currently have contracts with Otago Regional Council and Canterbury Regional Council to review resource consent applications on their behalf. I have written many assessments of effects for projects in freshwater, estuarine, marine and terrestrial environments. I have completed ecological surveys and undertaken monitoring required by resource consents throughout New Zealand.
- 4 I have previously written evidence and appeared at hearings on behalf of clients from both a resource consent, and a plan change perspective.
- 5 I have no conflicts of interest that I am aware of with regard to reviewing this application on behalf of ORC, or with regard to the applicant or submitters.

CODE OF CONDUCT

- 6 While this is a Council Hearing, I acknowledge that I have read and am familiar with the Code of Conduct for Expert Witnesses contained in the Environment Court Practice Note 2014, and agree to comply with it. I confirm that this evidence is within my area of expertise, except where I state that this evidence is given in reliance on another person's evidence. I have considered all material facts that are known to me that might alter or detract from the opinions I express in this evidence.

SCOPE OF EVIDENCE

- 7 I have been asked by Otago Regional Council (ORC) to review ecological information provided by Pioneer Energy (the applicant) to support their application to change the conditions of their existing consent to operate Lake Onslow for hydroelectric power

generation. The change in conditions would allow the applicant to draw down the level of Lake Onslow by 0.4m/7 days, compared to the 0.2m/7days currently allowed for. No amendments to the rate of take, the minimum operation level of the lake or the residual flows are proposed.

- 8 My original review of the application focused on effects on the Teviot River, with minor comment on effects on the lake itself. I have subsequently been asked to expand my scope to cover ecological effects of the whole system. I therefore refer to the review prepared by Aquatic Environmental Sciences (AES)¹ covering their review of the effects on Lake Onslow, including areas where I am in agreement and any areas of disagreement.
- 9 My evidence is divided into two parts. Part 1 consists of a summary of the ecological effects of the project, based on my understanding and the information provided by the applicant. Part 2 outlines issues raised in regards to ecology by submissions received, and my response to those matters. Part 2 also includes comment on the proposed draft resource consent conditions put forward by the applicant in relation to ecology.
- 10 In preparing my evidence, I have reviewed the following documents:
 - 10.1 Existing resource consents issued by ORC to Pioneer Energy numbers 2001.475 – 478.
 - 10.2 Resource consent application and assessment of effects prepared by Landpro, dated 9 January 2018.
 - 10.3 Resource Science Unit Information assessment of RM18.004, dated 11 January 2017
 - 10.4 Extra information provided by Tony Jack of Pioneer Energy dated 30 January 2018. The information covered storage data, calculated ramp rate for average outflow, and lake levels.
 - 10.5 Extra information provided by Ross Dungey Consulting, dated 5 April 2018. The information covered effects on the Teviot Catchment.

¹ Aquatic Environmental Services, 16 July 2018 (revised 28 August 2018), Review of Pioneer Energy Ltd amendment to consent for Lake Onslow, prepared for Otago Regional Council.

- 10.6 Extra information provided by Landpro, dated 29 July 2018. The information covered various aspects, but I specifically reviewed the photographs, and information provided by Ross Dungey regarding wetlands, macrophytes and fish.
- 10.7 Extra information provided by Ross Dungey dated 17 August 2018. The information covered invertebrate and bully habitat and macrophytes.
- 10.8 File Note, Onslow tributaries and fish passage, prepared by Ross Dungey, dated May 2021.
- 10.9 Review of Pioneer Energy Ltd amendment to consent for Lake Onslow, prepared by Aquatic Environmental Sciences, dated 16 July, 2018, and revised 28 August 2018.
- 10.10 Submission from Otago Fish and Game Council, prepared by Nigel Paragreen, dated 2 December 2021.
- 10.11 Submission from the Teviot Angling Club Incorporated, dated 1 December 2021.
- 10.12 Proposed Lake Onslow Monitoring plan, prepared by Ross Dungey, dated May 2021.
- 10.13 Current and historic aerial images from various sources including Google Earth, LINZ, and Retrolens.co.nz.

EXECUTIVE SUMMARY

- 11 Pioneer Energy have applied to ORC to change the conditions of their existing consent to increase the maximum speed of drawdown of Lake Onslow.
- 12 Lake Onslow is a manmade lake governed by both natural (climatic) and manmade (dam discharge) phenomena. Ecological values in the lake include habitat for invertebrates, macrophytes and fish. All ecological values are already subject to influence from the fluctuating lake levels.

- 13 I am in agreement with the applicant, as well as other reviewers, that the effects of the increased drawdown rate will be negligible to low. I note effects on ecology have already been realised and addressed through the existing consent. Effects from the increased drawdown rate are unlikely to differ significantly from effects already experienced.
- 14 I respond to submitters regarding the effects on Lake Onlsw, particularly the trout fishery.
- 15 I provide a review of the proposed monitoring plan provided by the applicant.

EVIDENCE

PART 1: ECOLOGICAL EFFECTS

- 16 My evidence considers four scenarios in order to fully understand expected effects of the proposed change in conditions. The scenarios are:
- 16.1 Scenario A - Lake levels and lake management based on the current operating regime and current consent conditions (i.e. actual lake levels based on how the consents have been exercised with a 0.2 m per 7-day draw down). This is the grey line in Figure 1.
- 16.2 Scenario B - Lake levels and lake management based on the current consents being exercised to their fullest extent (i.e. theoretical lake levels based on a 0.2 m per 7-day draw down). This is the orange line in Figure 1.
- 16.3 Scenario C - Lake levels and lake management based on the proposed consents being exercised to their fullest extent (i.e. theoretical lake levels based on a 0.4 m per 7-day draw down). This is the blue line in Figure 1.
- 16.4 Scenario D - Lake levels and lake management based on changes to the current operating regime with the proposed consent conditions (i.e. potential actual lake levels based on a 0.4 m per 7-days draw down). The applicant has explained that modelling this is too difficult because of all the variables but indicates that the line on the graph would likely be between the grey and orange lines in Figure 1.

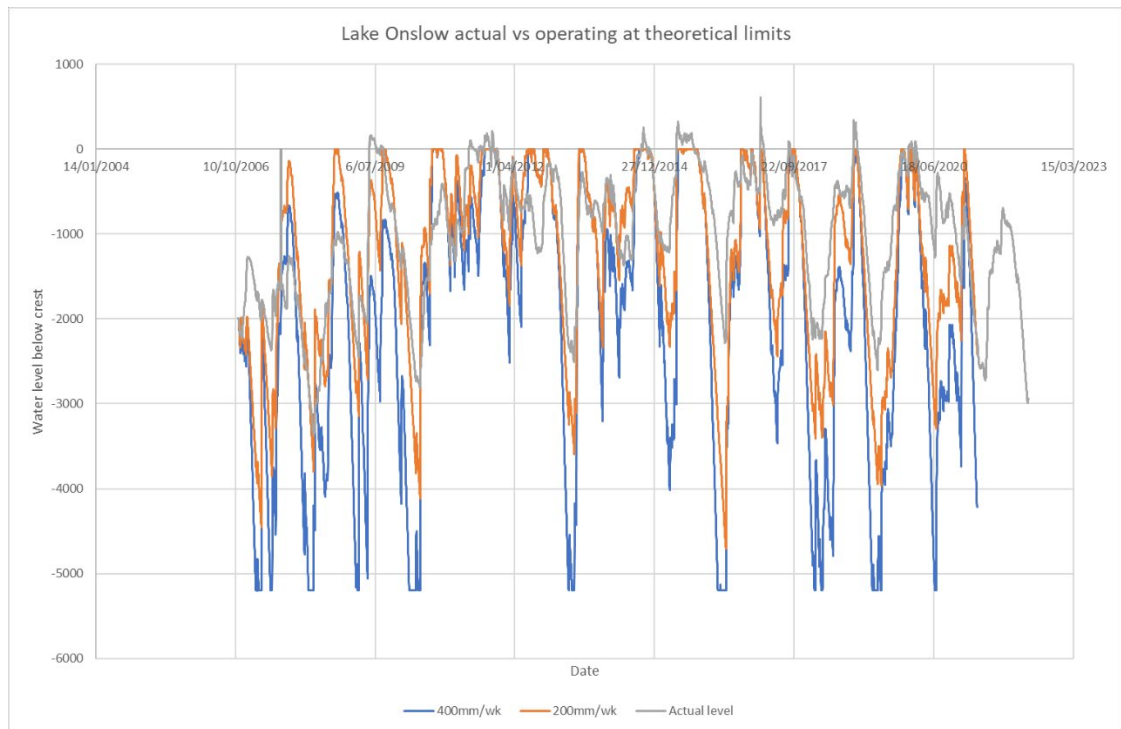


Figure 1: Theoretical Lake Onslow levels under the two drawdown rates, compared to actual lake levels

Existing Ecological Values - Scenario A

- 17 Lake Onslow is an artificial lake, first constructed in 1890. It separates the Teviot River with the north and south branches of the river flowing into the lake, as well as a number of other smaller tributaries, and the Teviot River flowing out of the lake via the dam at the western extent of the lake. The Teviot River then continues to flow westwards before discharging to the Clutha River/Mata-Au near Roxburgh.
- 18 Lake Onslow is listed in Schedule 1A of the Regional Plan: Water, 2004 as having riparian vegetation of significance to aquatic habitats; significant trout spawning areas and areas for the development of juvenile trout, and; significant presence of trout.
- 19 There are two regionally significant wetlands within the vicinity of Lake Onslow – Fortification Creek Wetland Management Area and Middle Swamp. Both are located on the southern side of the lake.
- 20 Ecological values and effects of the application were considered by Mr Ross Dungey of Ross Dungey Consulting in various documents including supplementary information.

- 21 Macroinvertebrate communities in Lake Onslow during surveys were dominated by annelid worms, chironomids and caddisfly larvae². The community is influenced by lake levels with sampling in 1993 occurring after a recent increase in lake level and resulting in very high densities of macroinvertebrates. The increase in lake level would have increased invertebrate productivity as new habitat became inundated. As new habitat becomes available, macroinvertebrates rapidly recolonise.
- 22 A similar phenomenon is likely to occur with macrophytes. Mr Dungey, in his supplementary information dated 17 August, 2018, states the macrophyte communities are dominated by *Myriophyllum* sp. but include sparse populations of *Potamogeton*. There are both indigenous and exotic species in these genera and it is unknown which species from each genera are present in the lake. Macrophytes are restricted to a band around the lake limited by water depth, substrate and wave action. They are only present if conditions (mainly water depth) are suitable for them.
- 23 The Teviot River downstream of the dam is contained within a steep sided U-shaped channel (or gorge). A small number of photographs were provided by the applicant. I have reviewed aerial images and topographic maps to confirm the shape of the channel. The river is considered to be a single channel, rather than a braided river with multiple relatively shallow channels. A number of fish are present in the Teviot River catchment including the Threatened – Nationally Endangered dusky galaxias (*Galaxias pullus*) and Teviot flathead galaxias (*Galaxias* “Teviot”)³. Both are found in small headwater streams, rather than the Teviot River itself.

Likely Ecological Values - Scenario B

- 24 Under Scenario B lake minimum levels would be reached periodically as various factors (e.g. inflows, electricity demand, irrigation demand) allow. The same type of effects experienced under Scenario A would occur within the Lake, being loss/change of macrophyte beds, loss/change of invertebrate communities, and changes to fish habitat and populations. The nature of the aquatic biota in the lake is that it can only persist if appropriate conditions are present, namely, if water is present. Habitat availability would have fluctuated with the changing lake levels and the lake would have experienced periods of die off as the levels decrease and stay at low levels for a period of time, followed by significant increases in production as lake levels rise and the volume and surface area of the lake increase. Available habitat would have been directly tied to the lake level, and therefore volume.

² Ross Dungey Consulting, 2017, Lake Onslow Lake Bed Profile and Invertebrate Survey; Attachment A from 'Resource Consent Application to Otago Regional Council to Amend Water Permit (Dam) 2001.475 and Water Permit 2001.476.V1' prepared by Landpro, dated January 2018

³ Records retrieved from the New Zealand Freshwater Fish Database, operated by NIWA.

- 25 Discharges into the Teviot River under Scenario B would likely be relatively stable, and at or near to the maximum allowable discharge rate while drawdown to the minimum lake level occurred. The values of Teviot River under Scenario B would be essentially the same as under Scenario A, with the exception of them occurring for a longer period of time and therefore flows remaining stable for a longer period. Based on information from the applicant, it is likely increased flows would occur of the drier summer months. Once minimum lake level was reached, the discharge would then have remained at or above the consented residual flow discharge of 345 L/s until such a time as lake drawdown was resumed. I am assuming the residual low flow is appropriate to maintain ecological values, as assessed during the original consent application process.

Likely Ecological Effects – Scenario B

- 26 If the current consent had been exercised to its current fullest extent I consider the following would likely have occurred, in relation to ecology:
- 26.1 There would have been significant variations in lake level, as indicated by the model presented in Figure 1. Lake levels would have reached the consented minimum on a number of occasions, followed by partial recharge of the lake resulting from rainfall and surface water inflows.
- 26.2 Macrophyte beds would have migrated with the fluctuating lake levels. As lake levels change, beds would re-establish through seed deposits, fragments and rhizomes, in areas where water depth was suitable for them. The ability for a macrophyte bed to persist in a specific location would have depended on how long the lake level remained stable, regardless of the lake level at the time.
- 26.3 Macroinvertebrate abundance and diversity would have fluctuated both as a result of the change in lake levels, as well as natural conditions such as temperature, rainfall, wind and natural variability in populations. Adult species would continue to lay eggs in the aquatic environment at depths and in habitats suitable for them. This would occur regardless of lake level, though there may be some 'lag time' between increases in lake level and the effects appearing in the invertebrate community. It is in this 'lag time' that repopulation occurs.
- 26.4 Fish habitat would have moved with the changing lake levels. The deeper middle part of the lake would have remained relatively stable providing a refuge for trout. By the nature of a smaller lake volume, the trout fishery

would likely be smaller/less productive when the lake is at its lowest level, more so if the lake remains at this level for an extended period of time, but it would still be present. Bullies would have migrated with lake levels to remain in their preferred shallower benthic habitat. Fish populations, including bullies, crayfish/koura and trout would have fluctuated with the change in water level, as the lake level affects the amount and type of habitat available. The high fecundity of fish species means providing the habitat is still available, populations would recover from a lake level induced decline, as the volume of the lake increases. There would likely be periods of higher productivity resulting from lake increases, interspersed with periods of lower productivity during lake drawdown. I am assuming fish passage to tributaries is maintained to allow for spawning, particularly for trout. I assume effects on fish passage/spawning were assessed during the original consent to allow permission to be given to reduce the lake to the consented minimum.

- 26.5 Wetlands associated with the lake margin would have moved with lake levels where present. Species would likely be dominated by rapidly recolonising species, likely exotic. Where natural wetlands are present, water levels and extent may have altered as the lake reached its minimum level however they would have recovered as lake levels rose again. Any species that may have reduced would re-establish from seed, fragments or rhizomes once conditions were appropriate again.

Assessment of Effects – Scenario C

- 27 The only effects considered in my evidence relate to the change in drawdown rate and those influenced by that rate. All other effects of operation of the hydroelectric scheme are considered to have been addressed during prior consenting processes.

Lake Onslow

- 28 Increasing the drawdown rate from 0.2m/7 days to 0.4m/7 days will increase the speed the lake is drawn down. It will not affect the minimum level the lake can be drawn down to and will not affect the maximum rate of discharge to the Teviot River. The most likely consequence of the increased drawdown rate is that the lake may experience an increased period of time when levels are lower than is currently experienced, or currently consented for. However, lake levels are influenced by a number of factors including weather, inflows to the lake, and electricity market patterns influencing the need for generation from the scheme. Natural factors such as weather and inflows cannot be controlled by the scheme operation. The lake may naturally experience persistent low levels as a result of natural conditions, however it

is likely these would occur less frequently than as a result of lake drawdown for electricity. At this point, I also note, Lake Onslow is an artificial lake, and while it has been present in some form or another for close to 130 years, without the dam, lake conditions would not persist.

- 29 The main effects on ecology in Lake Onslow are considered to result from a quicker decrease in lake level, and a longer period of low levels.
- 30 The applicant provided extra information in March 2022 showing the difference in lake levels between regimes informed by the two different drawdown rates. The model showed theoretical lake levels based on historic data (2006-2022) if the consent had been exercised to the minimum lake level (Figure 1). Actual lake levels over part of this period were also illustrated for comparison. The model is currently undergoing peer review, however the review results were not available at the time of writing this evidence. The applicant has stated under the faster drawdown rate (0.4m/7 days), the minimum lake level would be reached earlier than if the 0.2m/7 day drawdown rate is used. Review of Figure 1 shows both drawdown rates follow roughly the same pattern. The proposed 0.4m/7 day drawdown rate would result in the lake being at lower levels for longer, however lake levels peak at essentially the same time, regardless of drawdown rate. The applicant has also stated it is unlikely the minimum level will be reached on a regular basis as lake levels that low would likely mean the lake would not fill sufficiently to be able to provide useful storage in the following summer. This is supported by the actual data (the grey line) in Figure 1. I note that that these assessments rely on modelling and therefore I am reliant on others determining the models accuracy. However, for the purposes of my assessments, comparison of historical data under the two theoretical regimes, does provide a reasonable picture of how the lake may behave, if the drawdown rate is increased.
- 31 If drawdown is slow enough, some invertebrates may have some ability to 'migrate' with the water levels, however it is more likely they will either bury themselves (including bivalves and some gastropods), or will simply die and be replaced by the next generation. Macroinvertebrates can have multiple generations per season. Adult invertebrates are generally terrestrial, but lay eggs in the aquatic environment and larvae and juveniles remain there until they emerge as adults. Providing aquatic habitat is still present, adults will continue to repopulate the aquatic environment. The increased drawdown will likely remove any chance macroinvertebrates have to migrate, however this chance is low to start with. AES stated in their 2018 review, that natural variability in physical and biological conditions between years will obscure any effects of the proposal. I agree with this statement. The natural conditions within the lake are influenced by a number of factors (e.g. rainfall, temperature, snowmelt,

wind, nutrients, inputs from rivers, sediment inputs, extreme natural events, among others) and lake level, either natural level or influenced by drawdown, is just one factor. All these factors interact to influence habitat for invertebrates, macrophytes and fish, and combined have a larger influence over invertebrate population and health than just lake level on its own. In addition, the conditions resulting from the change in drawdown may occur naturally.

- 32 Changes in lake level can be an important driver of macroinvertebrate productivity. Recolonisation of newly available habitat can result in increases in diversity and abundance. This is suggested to be the reason why monitoring during 1993 yielded such high abundances of macroinvertebrates as lake levels had recently increased. These changes also occur naturally.
- 33 Macrophytes have no ability to migrate. As lake levels drop, or increase, macrophytes (stated to be present in water less than 2m in depth⁴) will die off, and recolonise in conditions suitable for them. This would occur naturally, regardless of the rate of drawdown. The macrophytes present require specific conditions to persist. In the absence of these conditions, they die. Reaching the minimum lake level earlier, if the proposed drawdown rate is consented, is unlikely to significantly change macrophyte composition and abundance compared to the current rate. *Myriophyllum* are able to survive short term dewatering (days rather than weeks) and have a moderate ability to spread through seed, fragments and/or rhizomes. *Potamogeton* also has moderate ability to spread vegetatively, and seed is important.
- 34 Fish populations within the lake include bullies, freshwater crayfish/koura, and brown trout, a recognised sport fishery. Populations persist despite the natural variability the lake experiences including changes in lake level (beyond those influenced by the lake discharge, and wave action). Bullies in lakes are generally benthic species and are most abundant in shallow water around the lake margins. Freshwater crayfish/koura can be found in both shallow and deeper areas of lakes. They dig burrows in muddy bottoms and are known to burrow into sediments if their habitat dries. Brown trout are an introduced species that are relatively sensitive to water conditions including temperature and oxygen levels. They can be present in all areas of lakes, but will be limited by warm shallow water around the lake margins during the day, in summer, and will likely seek refuge in deeper cooler water, or well shaded areas as necessary. The increased drawdown rate will not affect the habitat available for use by these fish, over and above what has already been consented. Despite the potential increase in

⁴ Supplementary information provided August 2018

speed the minimum lake level is reached, fish cannot persist if there is no water, therefore they will simply move with the lake levels.

- 35 If lake levels remain at lower levels for longer due to the increased drawdown rate, fish populations will reflect the habitat available. There may be some decrease in fish population if low levels persist for extended periods of time, however, fish have a relatively high fecundity (capable of producing a large number of eggs), and therefore populations will increase as habitat increases, providing spawning habitat is available. Changes in population will be temporary in nature with recovery linked to increases in lake level/volume. I understand trout are known to spawn in tributaries of Lake Onslow. Providing fish passage is maintained, the population will reflect habitat available.
- 36 The increased rate of drawdown is unlikely to alter habitat enough to make Lake Onslow more suitable for trout, to the detriment of indigenous species. Trout, bullies and crayfish/koura coexist in many lakes and waterways throughout New Zealand. Trout do predate on bullies and crayfish/koura, and can be observed chasing bullies in the shallows that bullies inhabit. Despite predation, the bullies within Lake Onslow (likely common bully, *Gobiomorphus cotidianus*; and upland bully, *Gobiomorphus breviceps*) generally remain a common species in New Zealand and are both listed as Not Threatened⁵. Freshwater crayfish/koura (*Paranephrops zelandicus*) are listed as an At Risk – Declining species⁶. I consider it unlikely the change in drawdown rate will result in higher rates of predation on bullies and crayfish/koura, over and above what could be experienced if the consent was exercised to its current consented maximum.
- 37 Changes in macroinvertebrate and macrophyte communities can impact fish communities. The application suggests manipulation of the lake level may increase invertebrate production and therefore fish production. While this is theoretically possible, there are more influences on trout population than just macroinvertebrate availability. The effects of the proposal on trout are discussed further in Part 2 in response to submissions.
- 38 The main effect on Lake Onslow will be a product of lower lake levels for potentially a longer period at a time. Table 1 provides calculated lake area at different lake

⁵ Dunn, N. R., Allibone, R. M., Closs, G. P., Crow, S. K., David, B. O., Goodman, J. M., Griffiths, M., Jack, D. C., Ling, N., Waters, J. M., & Rolfe, J. R., 2018, Conservation Status of New Zealand freshwater fishes, 2017, New Zealand Threat Classification Series 24, Department of Conservation, Wellington.

⁶ Grainger, N., Harding, J., Drinan, T., Collier, K., Smith, B., Death, R., Makan, T., & Rolfe, J., 2018, Conservation Status of New Zealand freshwater invertebrates, 2018, New Zealand Threat Classification Series 28, Department of Conservation, Wellington.

heights. Despite the significant difference in area between a full lake and when it reaches 5m below the dam crest, the effects of this reduction, and persistence at this level could be realised regardless of the drawdown rate. Extending the period of time the lake is at its lowest for by a matter of weeks will have negligible effects on ecological values. Extending by a matter of months may result in some reduction of fish populations, however as discussed, providing spawning habitat is available, the population should recover relatively quickly. If it is at this level for >years, it is likely there are other factors at play, such as prolonged drought, and these would be experienced regardless of drawdown rate.

Table 1: Areal extent of mudflats at Lake Onslow for different lake levels (based on Dungey 2017 with mudflat area calculations added by Ms Kay Lindis)

Water level (m) (below dam crest)	Lake area (ha)	Mudflats area (ha) (from: 10,940 ha - Lake area)
0	10,940	0
-0.5	10,150	790
-1.0	9,355	1,585
-1.5	8,563	2,377
-2.0	7,770	3,170
-2.5	6,978	3,962
-3.0	6,185	4,755
-3.5	5,393	5,547
-4.0	4,600	6,340
-4.5	3,808	7,132
-5.0	3,015	7,925

- 39 Overall, I agree with both the applicant, and AES that the increased drawdown rate will have a negligible to low effect on ecological values within Lake Onslow, including the trout sport fishery. Lake biological communities show significant variation on a weekly, monthly and yearly basis as a result of natural influences.

Teviot River

- 40 Only limited information on the Teviot River was provided by the applicant in the main application, with further information provide in April 2018. Existing studies referenced in the extra information show the macroinvertebrate community in the Teviot River generally indicates high quality habitat. I note the depth, flow and shape of the river

downstream of the dam make sampling difficult. I also note there are a number of other water storage/take points in operation on the Teviot River.

- 41 The change in drawdown rate will not affect the maximum consented discharge rate into the Teviot River. Increased drawdown does mean that water may be discharged for longer than currently occurs, up to the maximum discharge rate, resulting in more water being present in the river than would occur through natural processes such as rainfall. The applicants have stated this is most likely to occur in late summer. If this is the case, there may be positive effects on the Teviot River as it can be expected that the late summer wetted area will increase and temperatures will not increase to the same level as currently experienced. As a result, more habitat will be available for aquatic biota during this period. Positive effects would persist for as long as targeted discharge occurs. Once the lake reaches the minimum level, discharge will drop significantly to the consented residual discharge of 345 L/s. It is likely under this regime flows in the Teviot River will decrease significantly for a period of time until lake drawdown resumes. Reduced flows would result in effects on fish and invertebrates through decreased habitat availability, and likely warmer water temperatures and increased algal growth (though I note periodic flushing flows are still required). I cannot comment on the appropriateness of the residual discharge amount, however I assume it was adequately assessed during the original consenting phase.
- 42 There is the potential for a higher level of fluctuation in summer flows as a result of the increased drawdown, however this is not expected to be significantly detrimental to habitat, including fish habitat, in the Teviot River while discharge above the residual discharge is occurring. As the Teviot River is largely 'U' shaped, fluctuating river levels are not expected to alter summer wetted areas significantly, rather the depth will fluctuate. As trout tend to prefer cooler water, they avoid the shallow benthic areas that will be affected by fluctuations. Conversely, sustained stable discharge may result in 'flattening' of the flow in the river, reducing the peaks and troughs a river experiences as a result of rainfall. Stable flow conditions can result in easier establishment of periphyton, macrophytes and rooted terrestrial vegetation as flood or scour flows are not present to flush the river. However, the existing consent requires periodic flushing flows and therefore I consider the effect of flattened flows will be able to be mitigated effectively.
- 43 There is also the potential for decreased discharges to the Teviot River if/when the lake reaches its minimum level. If this occurs, the Teviot River would be maintained by the residual flow, as well as any inputs to the river originating downstream of the dam. Condition 1 of the existing discharge permit (2001.477) provides a minimum

residual flow of at least 345 L/second. The application does not seek to change this. Providing the residual flow does occur as conditioned, the increase in drawdown rate will have no effect on the Teviot River with regards to low flows.

- 44 Bullies and galaxids in the Teviot River were not specifically addressed. Bullies are more tolerant of warm waters and tend to prefer shallow benthic habitats. From review of the photos provided and aerial images, it appears their habitat is less prevalent in the reaches below the dam. Migratory galaxids are unlikely to be present at the site due to the downstream barriers and distance from the coast. Non-migratory galaxids may be present, though I note there are no records in the NZ Freshwater Fish Database for the upper reaches Teviot River itself, likely due to the difficulty of surveying it. Dusky and Teviot flathead galaxias are highly unlikely to be present in the Teviot River itself as habitat is not suitable for them. They are generally found in the headwaters of tributaries, beyond the influence of trout. There are no records of freshwater crayfish/koura in the Teviot River. Habitat below the dam is likely unsuitable due to the rock banks and beds. If present, they will be present further downstream where the channel is less steep and habitat for them is available. There are records of freshwater crayfish/koura in tributaries of the Teviot River, however these will not be affected by the proposal.
- 45 Higher and deeper flows generally mean less algal growth, although I note this is also influenced by other factors such as nutrient inputs. Existing consent conditions already require flushing flows to flush algal accumulation from the river.
- 46 There is potential for an increase in sediment loads in the Teviot River as a result of increased exposure of the lake bed resulting from longer periods of lower lake levels. The applicants considered this unlikely as the faster drawdown means base level is reached sooner so the intervening sediments between top level and drawdown level spend less time in shallow water and potentially being worked by wind/wave action. I generally agree with this supposition, although weather conditions are likely to be a strong influence affecting how much shallow areas are disturbed to generate the sediment. I also note rivers are subject to periodic higher inputs of sediment as a result of natural processes, and therefore biota within rivers are adapted to periodic pulses of sediment.
- 47 Overall I consider the effects on the Teviot River to be negligible to low, with potential for positive outcomes during the summers when the increased drawdown rate is exercised.

Wetlands and Lake Onslow Tributaries

- 48 The regionally significant wetlands are upstream of Lake Onslow, and as such will be unaffected by the proposed increased drawdown rate. The applicants have stated the hydraulic controls that controlled flow from the wetlands originally are still in place and are visible when the lake level is 2m below the weir crest. The controls limit the flow from the streams entering the lake, and therefore also the rate at which the water leaves the wetlands. It is the inflows to the wetlands that generally affect water levels, rather than the outflows, providing the control structures remain as they are currently. Water flows into the wetlands are controlled by rainfall, not the lake level itself.
- 49 It is likely there are other wetlands around the lake. Wetland habitat solely associated with the lake margins (i.e. boggy areas that appear/recede as lake levels change) are considered to be artificial wetlands under the NPS – FM due to their association with a constructed habitat, being Lake Onslow (if there was no dam, there would be no lake, and therefore no wetland habitat). Artificial wetlands are not subject to the same controls as natural wetlands. Natural wetlands, not directly associated with the lake are also likely present though the applicant has not undertaken a formal wetland survey. From review of aerial images there appears to be at least one wetland located to the north west of the lake (Figure 2; please note this is indicative only and I have drawn a rough area based on aerial images). Wetlands such as this are generally associated with a surface waterway, spring or overland flow path and were likely present prior to Lake Onslow being constructed. I have not been able to confirm this as aerial images do not extend far enough back. The level of the lake may influence wetland levels to some degree as high lake levels can act as a barrier to water flowing out of the wetlands, and low lake levels may result in more water flowing out and therefore the wetland extents decreasing. Groundwater levels can also affect wetlands. If low lake levels reduce groundwater levels, there may be some effect on wetlands in the area. However, providing the lake remains, there will be no permanent drainage of any natural wetlands. Low lake levels may just mean they behave in a more 'natural' manner and experience wetter and drier periods. It is likely detailed hydrological assessments would be required to determine this. I note, that the speed of drawdown is unlikely to affect wetlands around Lake Onslow, as it is lake levels, not drawdown rate that will influence them, and therefore effects have already been realised through the exercise of the existing consent.

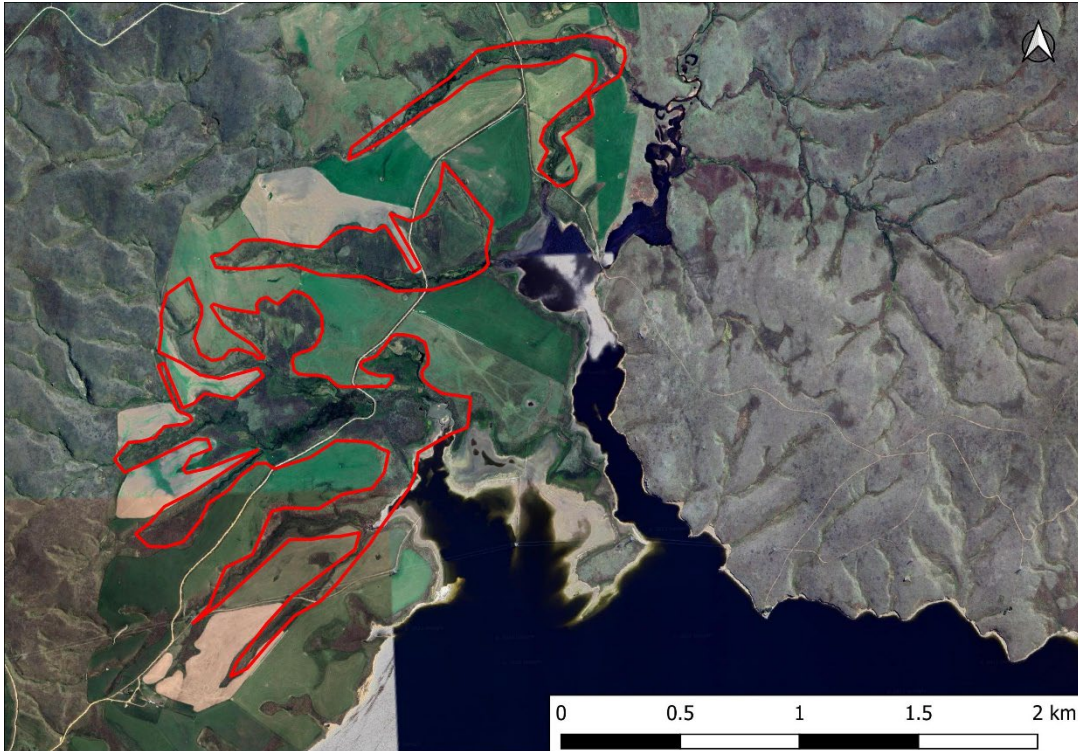


Figure 2: Potential natural wetland in the north west of the lake

50 A number of small tributaries flow into Lake Onslow. There are limited records in the New Zealand Freshwater Fish Database for the majority of these tributaries, with the exception of the wetland complex in the north west of the lake, and scattered records for tributaries flowing into the south side of the lake. Teviot flathead galaxias have been recorded in the north west tributaries, in small streams where trout are absent. Lake levels under this application will not affect the habitat within these tributaries, with the possible exception of wetland levels as discussed in the point above. Records of Teviot flathead galaxias are shown in the upper reaches of these tributaries, beyond the influence of lake levels.

Assessment of Effects – Scenario D

51 Determining the effects of Scenario D is problematic due to the large number of unknowns under this Scenario. The applicant has stated they are unlikely to exercise their consent to the maximum, meaning the minimum lake level is unlikely to be reached regularly, if ever.

52 Effects on Lake Onslow are likely to fall somewhere between Scenario A and Scenario C. There will be reductions/changes to the macrophyte beds, macroinvertebrate and fish communities as a result of the increased drawdown and potentially longer periods of time the lake is at lower levels for. The scale of these

effects largely depends on the length of time the lake is at lower levels for, though I note, low levels for extended periods of time could occur under all scenarios, as the result of natural climatic conditions.

- 53 Effects on the Teviot River are also likely to be somewhere between Scenarios A and C. There are likely to be more fluctuations in discharge volume as a result of demand for water, and servicing of this demand. Fluctuations are expected to be higher than any experienced under Scenario D. Periods of increased, stable flow during times when the lake is being drawn down, will be followed by periods of less discharge (either at or above the residual flow) when storage is being maintained/increased.
- 54 Ultimately, Scenario D will have less effects on ecological values compared to Scenario C, however, the scale of the decrease is not possible to quantify.

Overall effects

- 55 With the exception of the lake potentially being at lower levels for longer, I consider there are no significant differences on the effects on ecological values between the two drawdown rates (Scenarios B and C). Scenario D is preferable over Scenario C, however due to the large number of unknowns, it will not be possible to impose conditions that effectively restrict the applicant to Scenario D over C.
- 56 Overall, I am in agreement with both AES and the applicant that the effects on ecological values of Lake Onslow, the Teviot River, and associated habitat, will be negligible to low.

PART 2: RESPONSE TO SUBMISSIONS AND THE PROPOSED MONITORING PLAN

Issues raised by Submitters

- 57 Submissions were received from two parties:
- 57.1 Otago Fish and Game Council (Fish and Game)
- 57.2 Teviot Angling Club Inc.
- 58 The Teviot Angling club adopted Fish and Game's submission in full and therefore my comments address only the Fish and Game submission. Both parties opposed the application.

- 59 Fish and Game state the most productive trout fisheries are not subject to large degrees of variation. I note trout are an introduced species to New Zealand. I also note Lake Onslow is a constructed lake, first dammed in 1890, and in the absence of this lake, the trout fishery of the area would be significantly reduced.
- 60 The main concern of Fish and Game from an ecological perspective is the impact the increased drawdown could have on macrophyte beds, therefore affecting food resources for trout. Fish and Game do agree that variation in lake level can be positive and that rewetting lake edges following dry periods can lead to a flourish of macroinvertebrate activity.
- 61 Fish and Game place a lot of emphasis on current lake operating regimes, which I note have not resulted in drawdown to the consented minimum level in recent years (Figure 1). There is therefore some level of uncertainty as to what is the 'baseline condition' to which Fish and Game are using to compare detrimental effects to. Is it to the consented minimum low lake level or to the average lake conditions over recent years? As the application is to change the conditions to allow for faster drawdown, not to alter the maximum low lake level, I consider the effects of the drawdown to minimum low level have already been addressed in previous consents. It is therefore my opinion that the emphasis Fish and Game place on the loss of/changes to macrophyte beds is unfounded and has already been addressed in the previous consents.
- 62 The increased rate of drawdown will have no significant effect on macrophyte beds, over and above what has currently been consented for. Macrophytes can only persist where water is present, and where water depths allow enough light to penetrate (the applicants have stated they are rare below 2m in water depth and absent below 3m). Any rate of drawdown will result in macrophyte death. Macrophyte death will also occur when lake levels naturally decline (or increase) due to weather conditions. There may even be some positive effects on macrophytes if the lake is at stable, low levels for longer periods. The stability of lake levels would allow macrophytes to persist in one place for longer. This would flow on to benefits for macroinvertebrate and fish populations. Though I also note, low water levels, regardless of stability would constitute less habitat through decreased lake surface area and therefore the positive effects may be cancelled out.
- 63 Macrophytes do present habitat for the invertebrates that trout feed on. To provide a more stable habitat less subject to influence from water levels, there may be some benefit in the addition of rocky areas (consisting of large cobble sized material), at various points around the lake. Rocky areas will provide a habitat more suitable than

mud flats and exposed lake bed for invertebrates to lay eggs and reside on, and encourage a greater variety of macroinvertebrate taxa than just macrophytes. These areas could serve double duty if they could be incorporated into armouring, protection or other structures, however that would need to be investigated by an engineer. Rocky areas would mean macroinvertebrates were not reliant on macrophytes to provide habitat for spawning and feeding.

- 64 Fish and Game also raised concerns regarding the loss of terrestrial inputs to Lake Onslow, such as cicadas, as the shoreline moves away from permanently dry vegetation. Terrestrial inputs do provide some level of food resource for fish, including trout. Cicadas generally only fly relatively short distances and therefore reduced lake levels may result in less inputs to the lake itself. However, again, this could be experienced regardless of the drawdown rate, if the lake is drawn down to the minimum level. This could also happen naturally, if a prolonged and significant drought were to occur, and therefore I consider the effects of loss of terrestrial inputs beyond the scope of the change in drawdown rate investigations. Regardless, low lake levels during cicada hatches are unlikely to result in significant adverse effects ecologically. Trout are an exotic species that are known to feed on indigenous fish species.
- 65 Fish and Game have stated they disagree with Mr Dungey's statement that fishing pressure moves to deeper water in late summer. I note that trout are sensitive to temperature and oxygen levels. They may be present around the shallower lake margins year round, however in summer, they are likely to be limited to these areas only during the night and early morning and evening, when temperatures are lower and therefore oxygen levels are higher. As temperatures warm, they will seek deeper water or areas of shade. This will occur regardless of lake levels or drawdown regime.
- 66 Looking only at the increased drawdown rate, and therefore increased speed to reach the minimum level and longer period of time the lake is at the minimum level, there will ultimately not be any less habitat for trout than what was assessed in the original consent with the slower drawdown. There may be some pressure put on the trout population if the habitat size decreases faster than they can adapt to, but to fully quantify this, there would need to be some long and complicated studies to determine the carrying capacity (of trout) at different lake levels and the ability of the population to change as lake levels fluctuate. I do not believe the scale of effects of this proposal make it necessary for a study such as this to be completed. I also note these effects will occur naturally as lake levels vary naturally, and will occur at the slower drawdown rate as well. Any loss of habitat area, regardless of regime, will only result

in a decline in trout population if the population is at carrying capacity/overstocked prior to lake levels decreasing (either naturally or artificially). The lake is unlikely to be at carrying capacity for trout under any water level.

- 67 Fish and Game seek additional conditions if the consent is granted and provided a number of conceptual conditions for consideration. The applicant provided further information 23 March 2022 that provides modelled lake levels under the current consented drawdown rate and the proposed new drawdown rate for historical data, if the lake is operated to its minimum level (Figure 1). Under the faster drawdown rate, the lowest lake level is reached faster, and remains at this level for a longer period of time, though I note this is gauged from a model based on historic climate conditions.
- 68 In my opinion, the effects of the change in drawdown rate are not significant enough to warrant further controls from an ecological perspective. It is the minimum lake level that will affect habitat, not the drawdown rate itself.
- 69 The remainder of Fish and Game's submission related mainly to amenity and recreation values which are beyond the scope of my evidence.

Monitoring Plan

- 70 A monitoring plan has been developed to determine if increased drawdown rates have an effect on the ecology of Lake Onslow. The plan includes the following variables:
- 70.1 Monitor the species composition, extent and density of key weed beds
- 70.2 Collect macroinvertebrate kick samples from weed beds and a rocky shoreline
- 70.3 Collect invertebrate sediment core samples from the boat ramp and two weed bed sample sites
- 70.4 Collect 'bag' invertebrate samples from weed bed sites
- 70.5 Sample the bully population on a rocky shoreline
- 70.6 Monitor fish lengths of angler caught Onslow Trout
- 70.7 Visually inspect fish passage to two spawning streams (North and South Branches of the Teviot River)

70.8 Photographs

- 71 Three monitoring sites have been proposed, the boat ramp, a bay approximately one kilometre northwest of the boat ramp, a bay to the north of the pylons. I have not been on site so cannot comment as to the suitability of these sites. I note the boat ramp has been monitored previously.
- 72 I generally consider the methods proposed to be suitable for monitoring the named parameters. I would however recommend five replicates of the invertebrate quantitative sampling (bag and core sampling) be collected. Three samples are the minimum needed to undertake statistical analysis. Five samples would provide a more robust data set for statistical analysis.
- 73 There are no sampling depths (for the core samples) proposed. The original Cawthron⁷ assessment, that the sampling methodology was based on, sampled at six depths (0.5m, 1m, 2m, 3m, 4m and 5m). The proposed monitoring programme states sampling will occur at four depths, though the depths are not specified. I would recommend sampling occur at 0.5m, 1m, 2m and 3m at the minimum. Below 3m, macrophyte growth is apparently absent and therefore invertebrate diversity is likely to reduce, though I note the Cawthron study recorded higher diversity at 5m, than at 1-4m.
- 74 In my experience, electric fishing for bullies in lakes or waterways where there is little flow is ineffective. I would recommend gee minnow traps or similar are used instead to survey bully populations. Traps should be deployed for at least two nights. The number of traps will depend on the size of the shoreline to be sampled.
- 75 I support utilising 'expert anglers' and fish size data collected from the Teviot Anglers club, providing data are collected and recorded in a rigorous and unbiased manner. I have experience using community collected data and have found large variations in the quality of the data collected. It may be necessary to provide training and audit data before they are submitted for analysis.
- 76 I support the January to March time period for monitoring. The period should be long enough to avoid adverse weather conditions, while still monitoring during a time when the lake is likely to be at its lowest.

⁷ Cawthron, 1997, 'Freshwater Biological Assessment of Environmental Effects for the Proposed Central Electric Ltd Horseshoe Bend Hydro-electric Scheme on the Teviot River, Central Otago', Cawthron Report no. 389.

- 77 A baseline data set consisting of the results from the 1997, 2016, 2017 and 2021 (assume this survey has been undertaken but I have not seen results) already exists. This data set includes results from four separate surveys collected from the lake at four separate times where different conditions were present for each survey. Methods appear to be largely similar between the surveys, although I note the 1997 sampling only occurred at one site (the boat ramp). At least one additional survey using the methods outlined in the monitoring plan should be undertaken prior to any changes in drawdown rate. Results from the five surveys can then be used as an indication of 'baseline' conditions. Though I note natural variation may mean the 'baseline' results are still not true average baseline conditions. I recommend these results are referred to as 'pre-drawdown rate increase' conditions rather than 'baseline.' Following an increased drawdown rate being implemented, monitoring should occur during that season, and then annually for two subsequent seasons. This will help to identify any delayed effects.
- 78 I have no comment regarding monitoring occurring only if the drawdown rate of greater than 0.2m/7 days AND a lake level that equates to 2.5m or more below the weir crest. The benefit of this conditions will depend on the frequency the lake is below this level.
- 79 Data should be analysed using appropriate statistical methods by an appropriately qualified person.
- 80 If after the three annual surveys following an increased drawdown rate an appropriately qualified ecologist determines there have been detrimental effects on the ecological values of Lake Onslow, I recommend the drawdown rate return to the current 0.2m/7 days, unless the decline in ecological values can be demonstrated to be unrelated to this (e.g. unrelated water quality decline).
- 81 With regard to monitoring fish passage between the lake and the North and South Branches of the Teviot River, this should occur more than once following the increased drawdown rate being implemented. Based on the information provided by the applicant on 23 March 2022 showing how lake may change under the increased drawdown rate, I would recommend monitoring occur weekly for a minimum of 6 weeks. However, I also note if fish passage is affected, it will be difficult to attribute this to the increased drawdown, rather than the level of the lake itself. Fish passage is important for indigenous fish species, not just trout.

SUMMARY AND CONCLUSION

- 82 Lake Onslow is an artificial lake, controlled by both natural factors (weather), and manmade factors (demand for electricity generation). As a result, it experiences level fluctuation both over the short and long term.
- 83 Increasing the drawdown rate from 0.2m/7 days to 0.4m/7 days will increase the speed at which the minimum lake level can be reached. The effects associated with the increased drawdown rate on Lake Onslow are essentially the same as what are already experienced under the current drawdown regime. It is the lake level, rather than the speed at which the level is reached that influences ecological values.
- 84 No change in minimum level or discharge rate is proposed. However, due to the faster drawdown, water may be discharged to the Teviot River at higher volumes for longer than is currently experienced. Increased volumes may have a positive effect on the Teviot River by providing more water during warmer summer months when flow is generally lower, providing discharge over and above the residual flow occurs. Once minimum lake levels are reached, it is likely flow in the Teviot River will decrease.
- 85 Overall, I am in agreement with the applicant, and AES, that the effects of increasing the drawdown rate on ecological values are low to negligible.

Annabelle Coates

3 June 2022

Appendix 3: Technical Evidence (Amenity) by Dr Kay Booth (Lindis Consulting Limited)

**BEFORE THE COMMISSIONERS ON BEHALF OF
THE OTAGO REGIONAL COUNCIL**

Consent No. RM18.004

BETWEEN

PIONEER ENERGY LIMITED

Applicant

AND

OTAGO REGIONAL COUNCIL

Consent Authority

EVIDENCE OF KAY LENORE BOOTH

3 June 2022

INTRODUCTION

Qualifications and Experience

1. My full name is Kay Lenore Booth.
2. I am a consultant recreation planner and the Director of Lindis Consulting Limited. I hold the tertiary qualifications of PhD from the University of Otago, MSc in Geography from the University of Canterbury, and BA (Honours) in Geography from the University of Otago. My doctoral research was on public access for outdoor recreation.
3. My career spans 36 years working in recreation and conservation leadership, research and planning within the public, private and university sectors. I specialise in people's use of natural areas, particularly outdoor recreation and nature-based tourism.
4. Within the public sector, I held the role of Deputy Director-General Partnerships for the Department of Conservation Te Papa Atawhai from 2013 to 2021. In the 1980s I held research positions with the Department of Statistics, the Department of Conservation and the Department of Lands and Survey, primarily focused on outdoor recreation research and advice. I was an academic at Lincoln University in parks, recreation and tourism for 13 years.
5. Within the private sector, I have been a recreation and tourism planning consultant for over ten years. First with Tourism Resource Consultants and subsequently for my own consultancy firm, Lindis Consulting Limited, which I established in 2007. As a consultant, I have worked on projects in New Zealand and overseas, virtually all of which have focused upon recreation and tourism within natural areas. In addition, I have established and co-owned a map and navigation retail and services business.
6. I have held Ministerial appointments on the New Zealand Conservation Authority, the New Zealand Walking Access Commission Board, the New Zealand Geographic Board, and the Canterbury Aoraki Conservation Board. I have been on the Executive Board for various professional bodies in New Zealand, including Recreation Aotearoa (previously called the New Zealand Recreation Association), the Outdoors Assembly of New Zealand (previously the professional body for outdoor recreation professionals, now disbanded) and the New Zealand Geographical Society. I have been a Board member for the Banks Peninsula Conservation Trust, the Isaac Centre for Nature Conservation and I represented New Zealand on the Access and Environment Commission for the International

- Mountaineering and Climbing Federation. I am a member of the World Commission on Protected Areas which is part of the World Conservation Union, also known as the IUCN.
7. I am an accredited Recreation Professional with Recreation Aotearoa and a Fellow of that organisation. I am certified as a Resource Management Hearings Commissioner.
 8. I have published approximately 70 research papers on recreation and conservation planning and research, including more than 30 peer-reviewed journal articles and book chapters. I have been invited to speak at international conferences on the topic of recreation, tourism and conservation over many years.
 9. I have worked on the recreation and tourism values of rivers and lakes in various capacities, including:
 - a. *Assessments of environmental effect:* I have prepared AEEs for existing and proposed hydro-electric power schemes, for example, the Tongariro power scheme for Genesis Energy and the proposed scheme on the Wairau River for Save the Wairau Incorporated.
 - b. *Research:* I have undertaken many studies on recreational use and values of rivers and lakes in New Zealand. I co-developed a tool for regional councils to assess significance for river values, which is called the River Values Assessment System. I reviewed and synthesised the recreation research literature focused on New Zealand rivers and lakes for Sport and Recreation New Zealand (now Sport New Zealand) (Booth and Lynch 2010, Booth et al. 2010).
 - c. *Examination of river protection:* I led the New Zealand Conservation Authority's investigation of river protection in New Zealand (New Zealand Conservation Authority 2011).
 - d. *Policy development:* I have been a member of several government working groups for the development of environmental policy.
 10. I have been the decision-maker under the Conservation Act for approximately ten concession applications to undertake various types of activities on public conservation land, such as skifields and aircraft landings, including re-permitting existing infrastructure and applications for new activities.

11. In August and September 2021 I audited the Application with respect to amenity values for the Otago Regional Council. In February 2022 I reviewed the submissions received in response to notification of the Application. I have been engaged to provide recreation expert evidence in extension of this earlier work.

Code of Conduct

12. I confirm that I have read and agree to comply with the Environment Court Code of Conduct for Expert Witnesses (Consolidated Practice Note 2014). This evidence is within my area of expertise, except where I state that I am relying on the evidence or information provided by other parties. I have not omitted to consider material facts known to me that might alter or detract from the opinions I express.
13. I have no conflict of interest with respect to this Application, the Applicant or the submitters.

SCOPE OF EVIDENCE

14. My evidence includes:
 - a. a summary of my evidence;
 - b. my critique of the Application with respect to recreational values and effects;
 - c. an outline of my approach to prepare this evidence;
 - d. a description of the recreation values of Lake Onslow and the Teviot River;
 - e. a review of relevant statutory documents;
 - f. an assessment of the potential effects of the proposal on the recreation values of Lake Onslow and the Teviot River;
 - g. a review of submissions and my responses;
 - h. recommendations for potential consent conditions to avoid or minimise adverse effects on recreation; and
 - i. a conclusion.

15. To inform my assessment, I have used the following:
- a. the Application and subsequent information provided by the Applicant in response to requests for further information (PEL 2018; Dungey 2017, 2018a, 2018b, 2021a, 2021b and 2021c; LandPro Limited 2021a, 2021b and 2021c; and email correspondence between the Applicant and the Otago Regional Council seeking to clarify expected changes in the scheme’s operating regime as a result of the proposed consent variation (‘the proposal’));
 - b. audits of the Application undertaken by Aquatic Environmental Sciences (2018) and Augspurger (2017);
 - c. submissions lodged by the Otago Fish & Game Council (‘Fish & Game’) and the Teviot Angling Club;
 - d. a site visit to Lake Onslow on 4 April 2002 accompanied by Tony Jack (Pioneer Energy Limited (‘PEL’)), Nigel Paragreen (Fish & Game), Ian Hadland (Fish & Game), John Preedy and Graeme Rae (Teviot Angling Club) and Natasha Pritchard (Otago Regional Council);
 - e. the evidence of Ms Annabelle Coates of Babbage Consultants which I rely on for ecological advice, noting that angling is dependent on the health of the fishery. I will identify links to her evidence where appropriate; and
 - f. the Scenarios for Existing Environment and Proposed Environment (‘scenarios’) presented in section 6.1.2 of the s42A Officer’s Report. I refer to these scenarios when I describe recreation values and effects in my evidence. For completeness, I summarise the four scenarios here:
 - Scenario A – Existing consents as exercised by the Applicant;
 - Scenario B – Existing consents if they were exercised to their fullest extent;
 - Scenario C – Proposed consents if they were exercised to their fullest extent;
 - Scenario D – Proposed consents if they were exercised in a similar way to Scenario A. I note that Scenario D has not been modelled and, for this reason, I do not address this scenario in my evidence. I further note that the Applicant has indicated that the lake levels likely under Scenario D would sit between Scenario A and B.

16. I have not considered the Lake Onslow lake levels model peer review report in preparing my evidence, as it was not completed in time for me to do so.
17. I will provide any comment I have on the lake levels model peer review report and any additional new information through written supplementary evidence which I would lodge prior to the hearing.

SUMMARY OF EVIDENCE

18. The Applicant proposes to amend its existing consents to operate the Teviot River hydro-electric scheme, specifically to increase the drawdown rate for Lake Onslow from the currently consented 0.2m/7-days to 0.4m/7-days. The company initially proposed to increase the drawdown rate to 0.5m/7-days but revised this down to 0.4m/7-days in response to concerns raised by Fish & Game. These concerns were about effects on ecological and amenity values.
19. The Applicant has proposed an adaptive management approach, based on ecological monitoring, to verify that effects from the proposal are as anticipated. If they are not, then the drawdown regime would revert back to 0.2m/7-days.
20. My evidence assesses the information provided by the Applicant with respect to recreation values of Lake Onslow and the Teviot River and the effects of the proposed consent variation upon those values.
21. Lake Onslow is a regionally significant angling resource. Its brown trout fishery offers a high catch rate (that is, number of fish caught per trip) and is open all year round for all types of fishing methods. Many anglers use boats to access fishing spots on and around the lake. The high scenic value of the setting contributes positively to the angling experience. These values are provided at Lake Onslow within the lake conditions established by the Applicant's execution of their existing consent conditions (that is, Scenario A).
22. I conclude that the most material potential recreation-related effects of the proposal would be to exacerbate access difficulties and, potentially, to increase the risk of boat stranding. The access issues include both boat and foot access, and relate to extension of time the lake is at its lowest levels and, therefore, when access is most difficult.

23. Consent conditions could help mitigate any potential effects during the busy angling period (December - March) and particularly during the cicada hatch (late January to late February). Extension of the concrete boat ramp so that it could be used at all lake levels would enhance boating access. It would be helpful to include recreation-related metrics in the proposed monitoring regime, if it were to be included as a condition of consent.

METHOD AND DATA LIMITATIONS

24. I consider the Application to be inadequate with respect to identification and assessment of recreation values. In my audit of the Application (Booth 2021) I make the following key points:
- a. The Applicant relies heavily upon the ecological assessment of the angling resource (especially trout) with limited information about other factors that affect the recreation experience, for example, access to the resource;
 - b. The *Draft Interim Lake Onslow Amenity Report: Lake Onslow Recreation Values* (Dungey 2021c) provides a useful but incomplete description of recreational values and use. The report's primary weakness is its reliance on the knowledge of a single individual which results in a lack of comprehensiveness. Furthermore, it references out-of-date angling data; and
 - c. An effects assessment for recreation is absent. The Applicant asserts that the proposal will result in little modification to the existing operating environment and, therefore, effects upon lake recreational users are not expected to be significant.
25. I have not undertaken an independent assessment of recreation values and effects of the proposed consent variation upon those values as that is not my role. However, I have sought to plug information gaps through a review of publicly available information about recreation opportunities (from web pages and published guide books) and direct contact with Water Safety New Zealand to obtain data. Input from angling representatives on a site visit held 4 April 2022 provided further information. Quantitative data is available only for angling activity, and I report these data later.
26. In my recreation assessment, the following parameters of the operating regime are of particular interest:

- a. the **duration of low lake levels**, that is, whether the lake will be at low levels for longer because foot and boat access to the lake is more difficult at low levels owing to increased expanse of mudflats. I refer to 'low lake levels' to mean levels at which lake recession reveals a vast extent of mudflats; while not an exact reference, I mean levels lower than around 2.5m below dam crest;
 - b. the **rate of drop of the lake level**, that is, how quickly the lake level lowers over the short-term (minutes to hours), as this may increase the risk of boat stranding; and
 - c. the **time of year** that the proposed consent condition is likely to be used. The Applicant describes this as late summer/autumn (March to June) and I note that this coincides with the tail end of the peak angling months (December to March) and is typically a period of low lake levels, which makes lake access more difficult.
27. I note that new information with respect to the proposed operating regime was provided by Tony Jack (PEL) at the site visit. Specifically, that the proposal could result in lake level drops earlier in the season than currently occurs.

RECREATION VALUES OF LAKE ONSLOW AND THE TEVIOT RIVER

28. This section outlines the key recreation values of Lake Onslow and the Teviot River. I will present these values for Scenario A - C.

SCENARIO A: RECREATION VALUES WITH EXISTING CONSENTS AS EXERCISED

29. I will now describe the values that exist within the environment created by the current operating regime of the hydro-electric scheme (that is, Scenario A).

Recreational activity on and near Lake Onslow

30. Lake Onslow is a regionally significant angling location. The basis for my assessment is:
- a. Numbers of anglers: 1,000 - 4,000 annual angler-days¹;

¹ Based on data from National Angling Surveys (Unwin 2016) and accounting for error margins.

- b. Origin of anglers: anglers come from across Otago and Southland to fish Lake Onslow (pers. comm. John Preedy and Graeme Rae, Teviot Angling Club, 4.4.22) and some international anglers fish the lake (Dungey 2021c);
 - c. Site substitutability: no alternative exists for this productive brown trout fishery with a high catch rate (easy to catch a fish) and high daily bag limit, set in a scenic high country landscape with easy road access and basic angling facilities; and
 - d. Agreement on regional angling significance: the Applicant states that *“Onslow is one of Otago’s premier high-country fisheries”* (Dungey 2021c:3), Fish & Game categorise the lake as a regionally important sports fishery (Fish & Game New Zealand 2015), and angling guidebooks and websites also indicate its importance – for example: nzfishing.com states: *“Lake Onslow is one of Otago’s best lake fisheries for brown trout offering excellent fishing for all skill levels and all methods.”*
31. Other recreational activities undertaken on or near Lake Onslow appear to be undertaken by relatively fewer participants albeit quantitative data are not available. Activities include waikōura trapping, waterfowl hunting, swimming, camping, four-wheel driving, cycling, adventure motorbiking and hunting deer and pigs.
32. The effects of the proposal will be felt primarily by activities associated directly with the water given the main potential effect is lake level changes. For this reason, I focus on angling and boating. I note that boating on the lake appears to be mostly fishing related.
33. I did not discover any references to commercial recreation for the area although commercial fishing guides may take clients to the area. I note that the Applicant refers to commercial waikōura (freshwater crayfish) harvesting in Lake Onslow.

Angling on Lake Onslow

34. Angling is the primary recreational activity undertaken at Lake Onslow. The Applicant and Fish & Game agree that anglers fish along the whole lake shoreline and all of the lake by boat. They both consider the whole lake to be ‘high use’.
35. Lake Onslow has plentiful brown trout, easy road access and is located in a scenic high country setting. The lake fishery is characterised by small to medium sized fish, a high catch rate and a high bag limit. Lake Onslow is the only Otago lake with a daily bag limit for trout of 10 fish (pers. comm. Ian Hadland, Fish & Game, 4.4.22). The lake has a 12-

month season. All fishing methods are used, described by one fishing guidebook as follows: *“Most fish are taken by trolling and harling from a boat and spinning from the shore, but from December to the end of February there is good shoreline fly fishing”* (Kent 2009:263).

36. Fish & Game’s Otago Sports Fish and Game Management Plan (Fish & Game New Zealand 2015:83) describes Lake Onslow as “a regionally important sports fishery” within a natural setting, noting that it is used for fly, spin, bait, and troll fishing by local and regional users, as well as by juniors and commercial users.
37. The cicada hatch period, typically from about 20 January to 20 February, is described as the “most exciting fishing” on the lake (Kent 2009:264) and the Applicant’s consultant states that *“it is an anglers’ Eldorado if your visit coincides with a cicada hatch and this event is watched for closely by keen anglers”* (Dungey 2021c:5-6) and that *“Onslow is particularly renowned for angling opportunity based around the cicada hatch at which time expert anglers may catch up to 40 trout per day. In a season when the cicadas hatch, perhaps prime number years, there is a major increase in the level of angling activity”* (Dungey 2021c:4).
38. The success of the cicada hatch is dependent on their habitat and varies from year to year – in a good year, the trout gorge themselves on cicadas and become very easy to catch, attracting anglers from across Southland and Otago (pers. comm. John Preedy and Graeme Rae, Teviot Angling Club, 4.4.22).
39. Lake Onslow is listed by Tourism Central Otago² as one of five top Central Otago fishing spots. The list is: Poolburn Dam, Lake Dunstan, Lake Onslow, Upper Manorburn Dam, and the waters of the Maniototo and Upper Taieri. Fish & Game has compiled an access brochure for Lake Onslow; one of 16 brochures for fishing waters in Otago.
40. The Teviot Angling Club holds an annual competition on the Lake in early December, called the Society Cup, that typically attracts 10 - 20 entrants.

² <https://centralotagonz.com/experience/outdoors/hunting-and-fishing/>

41. The 2014/15 National Angling Survey³ (Unwin 2016) estimates total angling usage of Lake Onslow at 1,420 ± 410 angler-days, less than half of the usage recorded in previous survey years, as shown in Table 1.

Table 1: Estimated annual angler-days for Lake Onslow recorded in the 1994/95 - 2014/15 National Angling Surveys (Unwin 2016:137)

2014/15 survey	2007/08 survey	2001/02 survey	1994/95 survey
1,420 ± 410	3,130 ± 780	3,450 ± 570	2,720 ± 490

42. Lake Onslow ranks third highest of Central Otago reservoirs (excluding small dams) in the 2014/15 season, with Poolburn Reservoir (5,150 ± 1,280 angler-days) and Loganburn Reservoir (1,790 ± 530 angler-days) attracting more angling activity.
43. A decreasing trend in lake angling between 2007/08 and 2014/15 is evident for Otago. Lake angler-days decreased 23% for Otago lakes and 25% for Otago reservoirs (Unwin 2016). In comparison, Lake Onslow data show a 55% decrease. I am not clear on the reason for Lake Onslow's larger decrease over this 7-year period, nor whether it represents a one-off or longer-term trend.
44. Data from all four National Angling Surveys indicate that December - March are the peak angling months at Lake Onslow, except in 2001/02 when the peak use period was longer (October - March).

Boating on Lake Onslow

45. Anglers use boats to fish across the lake and also to access parts of the lakeshore from where they fish on foot.
46. The Applicant states that the lakebed is known for its variable morphology and that local knowledge is required to safely navigate the lake at all lake levels (LandPro 2021b). Navigational challenges of the lake were confirmed as well-known at the April site visit, also that boat stranding occurs on the lake although it is not common (pers. comm. John Preedy and Graeme Rae, Teviot Angling Club, 4.4.22).

³ The National Angling Survey has been repeated at intervals of six to seven years since the 1994/95 season. Data are obtained via telephone sample surveys of fishing licence holders, stratified by region, date and licence type. Data are used to estimate mean effort per licence holder for each angling water, and hence total effort for all waters (Unwin 2016).

47. A drowning occurred on Lake Onslow in 2009 associated with fishing from a boat. Water Safety New Zealand (2022) confirms this fatality is the only drowning on Lake Onslow recorded since 1980 when its database was established.

Other water-based recreational activity on Lake Onslow

48. Waterfowl hunting occurs on Lake Onslow but it does not appear to be a key activity. The activity has decreased on the lake over the past ten years (pers. comm. Ian Hadland, Fish & Game, 4.4.22).
49. A small amount of waikōura (freshwater crayfish) harvesting is undertaken on the lake, often as a family activity while the adults are fishing (pers. comm. John Preedy and Graeme Rae, Teviot Angling Club, 4.4.22).

Recreational activity on the Teviot River

50. The 2014/15 National Angling Survey (Unwin 2016) estimates total angling usage of the Teviot River as 190 ± 120 angler-days, as shown in Table 2. No clear trend in use is evident across the four survey periods.

Table 2: Estimated annual angler-days for the Teviot River recorded in the 1994/95 - 2014/15 National Angling Surveys (Unwin 2016:137)

2014/15 survey	2007/08 survey	2001/02 survey	1994/95 survey
190 ± 120	100 ± 80	330 ± 200	160 ± 70

51. Difficult access along the Teviot River limits its angling utility. The fishing season is 1 October - 30 April and the daily bag limit is four trout. Methods used in this brown trout fishery are fly, spin and bait fishing.
52. Data from the four National Angling Surveys indicate that October - March are the peak angling months on the Teviot River. Every March, PEL sponsors a fishing competition on the Teviot River and a sample of the fish caught are recorded. As a result, a 21-year dataset on fish length has been developed (Dungey 2018a).
53. A fishing guidebook (Kent 2009:264) describes angling on the Teviot River as follows: *“The best water to fish on this small, peat-stained stream lies between Bridge Huts and Lake Onslow. Trout cannot be spotted but blind fly fishing usually yields results as brown trout numbers are very high. The stream flows down a rock and stone bed and the tussock*

banks are easy to negotiate. The fish are small but respond to a wide variety of dries, nymphs and small spinners. When the wind isn't blowing this is a great learner fly stream."

54. A website for southern New Zealand⁴ states: *"This stream is particularly suitable for all learning anglers. It has a large population of small- to medium-sized brown trout and is a good place to take junior anglers as the fish only have to be 20cm in length to be taken from this water. Access is quite difficult in some places but bridge huts and below the Lake Onslow Dam are very popular places."*

The recreation setting

55. The recreation experience is influenced by the setting in which the activity takes place. I will comment on four aspects of the recreation setting provided by Lake Onslow:
- a. recreational access;
 - b. on-site facilities;
 - c. the fishery; and
 - d. visual amenity value.

Recreational access

56. PEL owns the lake bed from the old Lake Onslow shoreline to the current shoreline; public access across exposed lakebed to the water is at the discretion of PEL (pers. comm. Tony Jack , PEL, 4.4.22).
57. The Applicant (LandPro 2021b) notes that about 75 - 80 percent of the lake does not have public access to the shoreline, so anglers mostly use boats to get to those areas. Also that there is foot access along part of the western and north western shoreline across private land with permission and some (presumably private) roads and tracks offer vehicle access (presumably with landowner permission) to this area of shoreline. See Figure 1.

⁴ <http://www.nzsouth.co.nz/centralotago/fishing.html>



Figure 1: Lake Onslow recreational access and facilities map (sourced from Dungey 2021c:3 with blue stars added by me to locate both boat ramps)

58. As the lake drops, the extent of mudflats increases and navigational challenges for boaties increase. Anglers respond by changing where and how they fish – the places they can fish (especially on foot) and the quality of the fishing experience decreases at lower lake levels (pers. comm. Nigel Paragreen, Fish & Game, 4.4.22). Under the current operating regime (Scenario A), fishing can always take place somewhere on the lake (pers. comm. John Preedy and Graeme Rae, Teviot Angling Club, 4.4.22).

On-site facilities

59. Angling-related facilities have developed to support fishing activity at the lake. Approximately 18 huts are scattered around the shoreline; about a dozen of these are clustered near the concrete boat ramp on the western lake shore. These huts are used primarily for fishing, are privately owned (including two held by the Teviot Angling Club) and occupy the land at the landowner's discretion (pers. comm. John Preedy and Graeme Rae, Teviot Angling Club, 4.4.22).
60. Boats access the lake primarily via the concrete boat ramp on the western lakeshore. On the site visit it was concluded that the concrete boat ramp was usable down to a lake level of approximately 3.2m below dam crest. Below this lake level, the boat ramp likely

would be inoperable – boats would run off the formed concrete ramp onto mud. This contradicts the Applicant’s statement that the ramp will remain usable at all lake levels under the proposed change.

61. A schist ramp near the causeway in North Bay is also used to launch boats. At the site visit it was concluded that this ramp was usable down to a lake level of approximately 2.5m below dam crest.
62. Both ramps are shown as access points by Fish & Game’s online fishing spots access maps⁵. Small boats may be launched without a ramp although mud may prohibit this.

Fishery

63. Angling is highly dependent on the health of the fishery. Lake Onslow’s brown trout fishery has been described as very productive – there are a lot of fish, tending to be small to medium sized. An angling guidebook describes trout averaging 1.4 kg with fish over 3 kg not unusual (Kent 2009).

Visual amenity value

64. The naturalness of the setting in which outdoor recreation takes place is a critical dimension of the recreation experience and influences the quality of that experience.
65. The Application does not provide any technical information on visual amenity value.
66. At the site visit, I found Lake Onslow to be a very scenic high country lake. A fishing guidebook (Kent 2009:263) describes Lake Onslow as follows: “... *the lake is very exposed, windswept and cold in winter, but on a calm, sunny summer’s day with the cicadas chirping, the golden tussock and blue lake present a special kind of Central Otago beauty.*”

SCENARIO B: RECREATION VALUES IF THE EXISTING CONSENTS WERE FULLY EXERCISED

67. I will now comment on the recreation values of Lake Onslow and the Teviot River under Scenario B, that is, if the existing consents were exercised to their maximum extent. I will compare the likely recreation values under Scenario B with the values evident under Scenario A.

⁵ <https://fishandgame.org.nz/otago/freshwater-fishing-in-new-zealand/fishing-locations-and-access/>

68. In summary, I believe that the way Lake Onslow has been operated by the Applicant under their existing consents (Scenario A) is more recreation 'friendly' than if the consents had been exercised to their maximum extent (Scenario B). Broadly speaking, higher lake levels enhance recreation value.
69. I believe that Scenario B (in comparison with Scenario A) may result in:
- a. Less angling activity – largely as a result of greater access difficulty by foot and boat. I note that the months of highest lake levels (July - January) partially coincides with the period of highest angling activity (December - March) but not completely. The period when cicadas hatch (and the ensuing angling 'Eldorado' angling opportunity) occurs late January to late February;
 - b. More difficult foot access for a greater amount of time – owing to large expanses of exposed mudflat being present for most of the time under Scenario B (a result of lower lake levels). As well as this increased frequency of difficult access conditions, the lake levels will be much lower exposing substantially more mudflats area. However, mudflats on the lake margins will remain dry most of the time and are likely to harden enabling easier travel on them;
 - c. Less boat activity – because both boat ramps would be inoperable for around two-thirds of the time, and the schist boat ramp for longer (approximately 80% of the time). Boat ramps would typically be out of action February - June which coincides with some of the busiest angling months (which are December - March) including the popular cicada hatch period. Some years, boat ramp access will not be possible for the full 12 month period. More specifically, boat access to the lake would only be possible for small boats that could be launched from the shoreline (made more difficult by the increased distance to the water across mudflats at lower lake levels) and for larger boats when the concrete ramp was operable (that is, the lake level was higher than approximately 3.2m below dam crest);
 - d. A higher risk of boat stranding – however, because the number of boats on the lake would likely be lower, the number of strandings potentially would be reduced; and
 - e. Diminished visual amenity value – as a result of the lake being half to fully empty most of the time.

- f. Little change to angling opportunity on the Teviot River.
70. In reaching these conclusions, I have relied on the scenarios in section 6.1.2 of the s42A Officer's Report. I have taken into account the following lake level assumptions which I have summarised from the s42A report:
- a. Lake levels would have been substantially lower under Scenario B – with lake levels predominantly between 2.5m and 5.2m below crest, whereas under Scenario A they have been predominantly higher than 2.5m below crest;
 - b. The lowest lake level reached under Scenario A has been 3.37m below crest. Modelling suggests that under Scenario B the lowest lake level (5.2m below crest) would have been reached approximately one-tenth of the time, with a maximum continuous period of 2-3 months (approximately). Variability would have occurred across years in terms of duration and whether the lowest level was reached in any given year;
 - c. The lowest lake levels, for both Scenario A and B, would typically occur between March and May. The Applicant's data indicate that the highest lake levels for Scenario B would have been from July to the end of January;
 - d. Scenario B modelling shows the schist boat ramp would have been inoperable around four-fifths (or 80%) of the time, noting that the ramp can be used when the lake level is higher than approximately 2.5m below crest. The model shows the lake level as higher than 2.5m below crest for one-fifth of the time, mainly in the period of July to the end of January, but sometimes the lake level would have precluded the schist boat ramp from being used for a full year (that is, a lake level continuously lower than 2.5m below crest for a full year);
 - e. In a similar way, Scenario B modelling suggests that the concrete boat ramp (and also the schist ramp) would have been inoperable for approximately two-thirds of the time (that is, the lake level was lower than 3.0m below crest). The model indicates that one year since 2007 would have seen both boat ramps unable to be used for the full year and the concrete boat ramp would have been operable mainly during the period of July to the end of January;

- f. The lake would have fluctuated over a larger range under Scenario B (between 0-5.2m) compared with Scenario A (between 0-3.3m); and
- g. Discharge into the Teviot River would have been more abrupt (oscillating between high and residual flows) under Scenario B, while Scenario A has provided a variable discharge rate.

SCENARIO C: RECREATION VALUES IF THE PROPOSED CONSENTS WERE FULLY EXERCISED

- 71. I will now provide my opinion on the recreation values of Lake Onslow and the Teviot River under Scenario C, that is, if the proposed consents were exercised to their maximum extent. I will compare the likely recreation values under Scenario C with the values I have described already for Scenario B.
- 72. In summary, I believe that Scenario C would offer lower recreation value than Scenario B. This primarily relates to the longer amount of time that Lake Onslow would be at its lowest levels.
- 73. It is my assessment that the difference in recreation value between Scenario A and B is greater than the difference in value between Scenario B and C. In other words, the shift from the existing operating regime exercised by the Applicant (Scenario A) to a 'maximum implementation' regime (Scenario B) erodes more recreation value than would an increase in the drawdown rate as proposed when considered with consents being fully exercised in both cases (Scenarios B and C).
- 74. My assessment has one caveat – whether the erosion of recreation value under Scenario C may result in Lake Onslow reaching a 'tipping point' for angling activity whereby access is 'too hard too often' and Lake Onslow loses its popularity amongst anglers. I have no information on which to reach any conclusion on this hypothesis except to note that:
 - a. currently anglers fish the lake at all lake levels (which are considerably higher than forecast under Scenario C and therefore this point offers limited insight); and
 - b. recreational access is a prerequisite for recreational activity – if access is not possible or very hard, then the level of activity will be low (or non-existent if there's no access).

75. I believe that Scenario C (in comparison with Scenario B) may result in:
- a. Access difficulties affecting more anglers – this is because lower lake levels would coincide with a greater proportion of the high-use angling period that occurs between December and March. The lowest lake levels would occur from the end of January to June, making the cross-over period with busy angling months the end of January to the end of March;
 - b. Both boat ramps becoming not viable – the schist ramp would likely become disused (modelling suggesting it would be operable roughly 10-20% of the time) and, similarly, the concrete boat ramp would likely be operable roughly 20-30% of the time. Furthermore, the number of years when both ramps would be inoperable for the full year is projected to increase;
 - c. A reduction in angling opportunity (that is, the amount of fishable water is reduced) – boaties would be disinclined to trailer boats to the lake unless they were confident they could launch them. Likely outcomes might be that anglers switch to small craft able to be launched from the lake edge (albeit the long haul over mudflats may discourage this), or that boating on the lake dramatically declines. The latter outcome would reduce the parts of the lake able to be fished, limiting angling to locations accessible by foot;
 - d. Little change to the recreation value of the Teviot River – the increase in the time that the Teviot River receives only a residual flow may make river access marginally easier, but angler access challenges are associated with the terrain more than the flows. I will reference ecological values in a later section when I describe recreation effects from the proposal.
76. In reaching these conclusions, I have relied on the scenarios in section 6.1.2 of the s42A Officer's Report. I have taken into account the following lake level assumptions which I reproduce here from the s42A report, which compares Scenario C to Scenario B:

Lake levels – duration and seasonality

- a. Lower lake levels reached earlier in a season for Scenario C;

- b. Lake level 2.5m below crest (schist boat ramp approximate usability threshold) or lower for approximately 3-9% more of the time. An increase in years when the lake is never above 2.5m below crest;
- c. Lake level 3.0m below crest (concrete boat ramp approximate usability threshold) or lower for 1-11% more of the time. An increase in years when the lake is never above this lake level;

Duration at lowest lake levels

- d. At lowest lake level 25% more of the time;
- e. Limited change in which years have lowest lake levels;
- f. Average number of days at lowest lake levels doubles;
- g. Limited increase in maximum continuous period of lowest lake level;

Other lake parameters

- h. Rate of drop (speed) to reach lowest lake levels is unknown;
- i. No change to the months when the lake is at its highest and its lowest levels;
- j. More days in a 7-day period where the lake is dropping. Number of days depends on starting lake level;
- k. More bed exposure in a 7-day period. How much more is dependent on bathymetry and lake level at start;
- l. No change in the maximum lake level drop within a 7-day period;
- m. No change to fluctuations in lake levels within a 7-day period;
- n. Over one year, fluctuations in lake levels increase slightly with more fluctuations at the lower lake levels; and

Discharge to the Teviot River

- o. Approximately 25% more time when the discharge to the Teviot River is at residual flow only.

REVIEW OF STATUTORY PLANS

77. I will now consider the statutory policy and planning documents that pertain to the area's recreation values.
78. The National Policy Statement for Freshwater Management 2020 states that its objective is to ensure that natural and physical resources are managed to prioritise three things, the third priority being "the ability of people and communities to provide for their social, economic, and cultural well-being, now and in the future" (s2.1). This intent is expressed in the *Proposed Otago Regional Policy Statement* (June 2021) in various ways, including that this is the third priority for the management of fresh water in Otago (LF-WAI-P1, p121).
79. The Proposed Regional Policy Statement has provisions around public access (LF-LS-P22, p138): "Provide for public access to and along lakes and rivers by:
- (1) maintaining existing public access,*
 - (2) seeking opportunities to enhance public access, including by mana whenua in their role as kaitiaki and for gathering of mahika kai, and*
 - (3) encouraging landowners to only restrict access where it is necessary to protect: [lists specific matters to be protected]."*
80. The Regional Plan: Water for Otago (2004) has four policies that are particularly relevant and I reproduce these here in full:
- 5.3.4** *To maintain or enhance the amenity values associated with Otago's lakes and rivers and their margins.*
- Explanation**
The amenity values associated with Otago's lakes and rivers and their margins are the natural and physical qualities and characteristics that contribute to people's appreciation and enjoyment of the water body. This appreciation and enjoyment relates to the pleasantness, aesthetic coherence and cultural and recreational attributes of a lake or river. The ability to appreciate amenity values may be facilitated by physical development such as structures and through access provisions.
- Principal reasons for adopting**
This objective is adopted to ensure that activities that use land or water do not remove or reduce opportunities for the enjoyment or appreciation of Otago's lakes and rivers, and where appropriate to provide for the enhancement of amenity values. This reflects the importance of amenity values to the region's people and communities
- 5.3.5** *To maintain or enhance public access to and along the margins of Otago's lakes and rivers.*
- Explanation**
Public access to and along the margins of lakes or rivers provides the opportunity

for recreational use and aesthetic appreciation of Otago's water bodies. This public access may be gained through legal access provisions or through informal arrangements. Existing public access shall be maintained or enhanced, subject to consideration of the effect on public access, and the agreement of landholders. There may be situations where it is necessary to restrict access as defined in Policy 6.5.10 of the Regional Policy Statement.

Principal reasons for adopting

This objective is adopted to provide for the management of water, and bed or margin activities consistent with Section 6(d) of the Resource Management Act and the Regional Policy Statement for Otago, which seek to maintain or enhance public access

Policy 5.4.2 *In the management of any activity involving surface water, groundwater or the bed or margin of any lake or river, to give priority to avoiding, in preference to remedying or mitigating:*

- (1) Adverse effects on:
 - (a) Natural values identified in Schedule 1A;*
 - (b) Water supply values identified in Schedule 1B;*
 - (c) Registered historic places identified in Schedule 1C, or archaeological sites in, on, under or over the bed or margin of a lake or river;*
 - (d) Spiritual and cultural beliefs, values and uses of significance to Kai Tahu identified in Schedule 1D;*
 - (e) The natural character of any lake or river, or its margins;*
 - (f) Amenity values supported by any water body; and**
- (2) Causing or exacerbating flooding, erosion, land instability, sedimentation or property damage.*

Explanation

The natural and human use values of Otago's lakes and rivers can be adversely affected by the following activities: (a) Taking, damming and diversion of surface water; (b) Taking of groundwater where there is a close connection to surface water; (c) Discharges to water, and to land in circumstances which may result in a contaminant entering water; (d) Activities in, on, under or over the bed or margins of lakes or rivers. Some activities can cause or exacerbate hazards and lessen the ability of people and communities to prevent, or protect themselves from the hazard. When considering these activities, priority must be given to avoiding adverse effects, in preference to remedying or mitigating them, on the identified values of Otago's lakes and rivers. The opportunity to do so will arise when preparing or reviewing plans under the Resource Management Act and when considering applications for resource consents. The avoidance of adverse effects on the identified values will be sought in the first instance. Where adverse effects are considered to be unavoidable, a resource consent may be declined or, if granted, may be subject to conditions requiring unavoidable adverse effects to be remedied or mitigated. In the case of diversion, reclamation or damming, appropriate compensation may be required as provided for by Policies 6.5.6 and 8.4.2. With respect to heritage values covered by this policy, archaeological sites are protected under Section 10 of the Historic Places Act from being destroyed, damaged, or modified.

Principal reasons for adopting

This policy is adopted to ensure that the natural and human use values of Otago's lakes and rivers are maintained or enhanced. It is important to retain these values due to their significance to the region's communities, including Kai Tahu, and their intrinsic value. Activities that can affect water, lakes and rivers need to be managed

so that any adverse effects on the values identified in this Plan are avoided, and where adverse effects are unavoidable they shall be remedied, mitigated or, in the case of diversion, reclamation or damming, appropriately compensated for. Similarly, some activities require management to ensure that the health and safety of Otago's people and communities, and natural values are not adversely affected through causing or exacerbating a hazard.

Policy 5.4.9 To have particular regard to the following qualities or characteristics of lakes and rivers, and their margins, when considering adverse effects on amenity values:

- (a) Aesthetic values associated with the lake or river; and
- (b) Recreational opportunities provided by the lake or river, or its margins.

Explanation

The qualities and characteristics of lakes and rivers which can contribute to amenity values and their appreciation are identified above. These reflect the existing character of these water bodies, as may have been modified by resource use and development. It is also recognised that the nature of amenity values can change over time. The recreational opportunities provided by Otago's lakes and rivers and their margins can include angling for sports fish, hunting game birds and a range of other active and passive recreation.

Policy 5.4.2 gives priority to avoiding adverse effects on amenity values.

Therefore these qualities and characteristics will need to be taken into account when preparing plans under the Resource Management Act and when considering applications for resource consents.

Principal reasons for adopting

This policy is adopted to ensure those elements that contribute to the amenity values of Otago's lakes and rivers and their margins are recognised. In this way, these values, which are enjoyed and appreciated by Otago's people and communities, can be protected from inappropriate use and development.

81. Some strategies and management plans from other organisations reference Lake Onslow but do not provide any guidance beyond points I have raised elsewhere in my evidence. These documents include:

- a. Camping in Central Otago (Camping Strategy revised October 2010)⁶ – Lake Onslow is included as a camping location but little information is provided; and
- b. Sports Fish and Game Management Plan for Otago Fish and Game Region 2015-2025 (Fish & Game New Zealand 2015) – I outline information about Lake Onslow from this document at paragraph 36.

⁶<https://www.codc.govt.nz/repository/libraries/id:2apsqkk8g1cxbyoqohn0/hierarchy/sitecollectiondocuments/strategies-and-policies/parks-and-property/Camping%20Strategy.pdf>

ASSESSMENT OF EFFECTS

82. This section considers potential recreational effects associated with the change from Scenario B to Scenario C, that is, from the existing consent conditions to the proposed consent conditions (assuming consents were exercised to their fullest extent in both scenarios).
83. In my assessment of recreational effects, I rely upon the scenarios in section 6.1.2. of the s42A Officer's Report. I have described pertinent parameters of the scenarios at paragraphs 70 and 76.

Summary of effects upon recreation

84. The Applicant has assessed the effects on recreational values as not significant on the basis that the proposal will not alter the existing operating environment.
85. I consider that the most material potential effects upon recreation to be angling access and boating safety. I regard angling to be the primary affected activity because it is of regional significance and access to the water (by foot and by boat) is altered by the level of the lake.
86. As I have explained earlier, I believe the change from Scenario A to Scenario B would result in greater adverse effects for recreation than the change from Scenario B to Scenario C. This conclusion has the caveat that Scenario C might offer such limited access (especially by boat) that the recreation opportunity becomes less attractive to the degree that anglers go elsewhere. This is called displacement. It occurs when the recreation experience is adversely impacted by aspects of the recreation setting to the extent that recreationists chose not to return to that location.
87. The most likely outcome of Scenario C would be a reduction in the quality of the angling experience – as a result of increased access difficulty and the reduction in locations available for fishing as the lake recedes. It is unlikely that anglers' ability to fish the lake would be impeded to the extent that they could not go fishing at all on Lake Onslow; however, access might become so difficult that displacement occurs and the numbers of anglers visiting Lake Onslow decline.

88. Effects upon angling on the lake would likely include:

- a. foot and boat access;
- b. the ability to use the two boat ramps;
- c. the risk of boat stranding;
- d. the number, health and catchability of trout; and
- e. visual amenity value.

89. I will now discuss these effects in more detail.

Difficulty of public access to the lake may be exacerbated

90. Access difficulties experienced under Scenario B would be exacerbated under Scenario C, that is, the period of time when access to and across the lake is most difficult would be extended. Put simply, the challenge presented to anglers is the increased distance to the water associated with the difficulty of walking across mud (especially when it is wet and sticky).

91. This sits alongside the difficulty of launching a boat, especially when the lake has receded below the boat ramps, and then navigating safely on a shallow lake with variable morphology. While lake levels are projected to be below the level that both ramps can be used for most of the time, I note that should boats be able to be launched onto the lake, then the low lake levels may increase the risk of boats stranding. I note that this potential safety risk is critical given it could be fatal. I will expand on these points shortly.

92. I wish to highlight here that I am not clear whether anglers could fish Lake Onslow when it is at its lowest level (5.2m below crest). Angling occurs on the lake at all levels currently (under Scenario A); however, the lowest lake level under Scenario A has been 3.3m below crest. Under both Scenario B and C, the lowest lake level would be 5.2m below crest. I have made the assumption that it is possible to fish the lake at this level (irrespective of the difficulty in doing so).

93. I note that the modelling predicts no change (from Scenario B to C) in lake level fluctuations within a 7-day period and slight increase in lake fluctuations over one year especially at lower lake levels. Also that the rate of drop is unknown but there is

projected to be more days in a 7-day period when the lake is dropping. I highlight these points because they are pertinent to foot access across mudflats – if mudflats have less time to dry out, walking across the mudflats may become more difficult compared with traversing dry, hard mud. Conversely, travel will be easier across mud that has hardened owing to a longer period of drying out. I have not formed any views on this matter with respect to effects from the proposal (that is, change from Scenario B to C).

94. Locations of greatest impact would vary around the lake, as some areas of lakebed are known to be muddy while others are rocky (pers. comm. John Preedy and Graeme Rae, Teviot Angling Club, 4.4.22).
95. The extent of the access issue is illustrated by data provided by the Applicant:
- a. approximately 80 percent of Lake Onslow is very shallow, so a small change in depth produces a relatively large change in shoreline and exposure of lake bed surface;
 - b. approximately 60 percent of the lake shoreline is soft, deep mud at lake levels of 3.0m below dam crest (LandPro 2021b);
 - c. the extent of the mudflats as the lake level drops is vast (shown in Table 3); and
 - d. the distance from dry land to the water varies as the lake recedes (owing to the variable lakebed morphology) with water receding from the shoreline by an estimated 8m - 540m when the lake level drops from full to 3m below dam crest (Dungey 2017:10).

Table 3: Areal extent of mudflats at Lake Onslow for different lake levels (based on Dungey 2017:12 with mudflats area calculations added by me)

Water level (m) (below dam crest)	Lake area (ha)	Mudflats area (ha) (from: 10,940 ha - Lake area)
0	10,940	0
-0.5	10,150	790
-1.0	9,355	1,585
-1.5	8,563	2,377
-2.0	7,770	3,170
-2.5	6,978	3,962
-3.0	6,185	4,755
-3.5	5,393	5,547

Water level (m) (below dam crest)	Lake area (ha)	Mudflats area (ha) (from: 10,940 ha - Lake area)
-4.0	4,600	6,340
-4.5	3,808	7,132
-5.0	3,015	7,925

Ability to use both boat ramps may be severely restricted

96. As described at paragraph 75(b), both the concrete boat ramp and the schist ramp would not be able to be used most of the time given the lake would have receded below their operable level. As discussed at paragraph 75(c), this would change the nature of angling activity at Lake Onslow as much of the fishing activity is boat dependent. Possible responses from anglers include switching to smaller craft (launchable from the shoreline), opting to fish with their boat elsewhere (that is, be displaced away from Lake Onslow) or switching to foot-based angling.
97. I note that boats are used to access fishing locations across the lake. Access by foot only would mean a reduction in the fishing locations, or fishable water, on Lake Onslow.
98. At paragraph 122 I identify a potential mitigation measure of extending the concrete boat ramp so it can be used at all lake levels. Given this possibility, I now turn to the situation of boats on the lake at low lake levels (that is, assuming launching difficulties are overcome).

The risk of boat stranding may be increased

99. I am particularly concerned about boaties being stranded. Given the nature of the terrain and weather conditions, boat stranding could be life threatening. I note strandings already occur on the lake and that a boat-based angler drowned on Lake Onslow in 2009.
100. At lower lake levels, there is a higher risk of stranding, and retrieval or recovery of boats is made more difficult by deep mud (pers. comm. John Preedy and Graeme Rae, Teviot Angling Club, 4.4.22). The variability of the lakebed morphology means that boaties may run aground on mudbanks or rocks; a risk exacerbated as the water level drops. This effect is material because the proposal will result in the lake remaining lower for longer.
101. There is also a risk to boaties associated with changes to the lake level while they are on the water. Most pertinent is short-term changes to lake levels, that is, changes over

minutes to hours when a boatie may be on the lake. I understand that the proposal will not change the short-term variability in lake level (that is, there is no change from Scenario B to Scenario C) and, therefore, the consequent risk of stranding from this phenomenon does not change.

Effects on the fishery have been assessed as low to negligible

102. I rely on the evidence of Ms Annabelle Coates of Babbage Consultants. She concludes that the proposal will have negligible to low effect on ecological values within Lake Onslow, including for the trout sport fishery.

Visual amenity value may be reduced

103. The Applicant relies on its assessment that the proposal will not alter the surrounding landscape or the aesthetics of the lake (or the Teviot River) and, for this reason, no experiential or visual effects associated with the proposal are expected.

104. I consider effects upon visual amenity to be less material than effects upon recreational access. Nonetheless, the setting is an important dimension of the angler's experience and viewing mudflats rather than lake will likely impinge adversely upon that experience.

Effects on recreational use of the Teviot River likely to be negligible to low

105. The Applicant states that the proposed change will result in higher flows down the Teviot River during a period of the year that it is typically dry. It states that this is advantageous to aquatic biota and, in this way, to angling opportunity.

106. I defer to Annabelle Coates of Babbage Consultants with respect to the effect upon the ecology of the Teviot River, including trout. Her assessment is that the proposal may result in more habitat being available for aquatic biota during the late summer when the Applicant has stated the increased drawdown will be exercised. Overall, she considers the effects on the Teviot River to be negligible to low, with the potential for positive outcomes during the summers when the increased drawdown rate is exercised.

107. I note that submitters do not raise any issues associated with angling on the Teviot River.

RESPONSE TO ISSUES RAISED BY SUBMITTERS

108. I have reviewed the submissions received from Fish & Game and the Teviot Angling Club. My comments refer to the Fish & Game submission, given the Teviot Angling Club adopts that submission and its own submission is very brief. In this section I will provide my opinion on recreation-related matters in the submission and then summarise key points of difference between the submitter and the Applicant.
109. I agree with the following points raised in the submission:
- a. That the adverse effects upon angling arising from the altered operating regime cannot be determined from the information provided (submission paragraph 95);
 - b. That the primary adverse effects upon angling (based on the assumption that the lake may be drawn down to lower levels and more frequently and/or for a greater duration) are likely to be:
 - i. Increased extent of mud flats between the shore and the water, creating access difficulty and safety hazards for anglers [correction made to the original submission], whether they access the lake on foot or by boat; and
 - ii. Increased safety risks while boating, as mudflats are exposed in lower water levels (submission paragraph 7).
 - c. That “anglers appreciate and gain utility from being in beautiful settings” and I agree that any adverse effects upon visual amenity values will impact negatively upon the angling experience (submission paragraph 37);
 - d. That anglers are “very sensitive to lower lake levels because of the impact to recreational amenity and danger they pose” (submission paragraph 38); and
 - e. With Fish & Game’s cautious note that the scale of adverse effects will be influenced by the large scale of use (estimated as thousands of annual angler days) and the potential increase to the risk of injury or death (even if this increase was small, given it might be fatal) (submission paragraph 79).
110. I found the following points noteworthy, but I am unable to make comment given I have not undertaken a recreation assessment:

- a. That Fish & Game present information about Lake Onslow's recreational use patterns (submission paragraph 13-21);
- b. That the section titled 'Impacts of low lake levels on anglers' (submission paragraph 29-38) provides an indication of the sort of information that a recreation assessment would provide, including the photographic evidence of how mud impedes anglers' access by foot and boat. With respect to this information, I make the following observations:
 - i. Fish & Game reinforces my concern about safety – "Mud flats detract from the angling experience, can restrict angling opportunities and can pose a life-threatening hazard, particularly for the very old, very young or unfit anglers" (submission paragraph 30);
 - ii. Fish & Game provides evidence about the difficulty caused by exposed mudflats to anglers seeking to disembark from their boat safely (submission paragraph 33-34).

111. One matter raised in the submission requires clarification from me, that is, my definition of 'land-based recreational activities' in my Audit Report (Booth 2021:9). Fish & Game interprets this term to mean "angling when accessing the lake via foot" (submission paragraph 72 and subsequent discussion). I was referring to activities other than angling (such as 4WDing, mountain biking and camping). I consider all angling to be water-based (whether accessed by foot or boat).

112. I will now discuss two key points of contention where the submitter does not agree with the Applicant. Both relate to the angling experience at Lake Onslow. My responses are provided to each but are limited by the absence of an adequate assessment of effects for recreation.

Areas where access is most sensitive

113. A point of difference exists with respect to the geographical extent of access difficulty arising from mudflats.

114. Fish & Game (at submission paragraphs 32-33) describes the point of disagreement:

“The applicant has suggested that access to the southern, eastern and northern shores of the lake will be less sensitive to the appearance of mud flats, as they are often accessed by boat. In Fish and Game’s experience, this is incorrect as anglers still seek to disembark and walk the shoreline. While doing so, they must also traverse the mud flats.

In addition, at low lake levels anglers in boats can have difficulty finding a place to disembark safely. If the mud is deep and soft, jumping out of the boat can cause a person to get stuck. Access to sections of the lake may become difficult or impossible if no safe landing point can be found nearby.” [An account is given of the difficulty in landing and disembarking a boat safely in a mudflat].

115. I am not able to provide any further clarification on this matter.

Whether anglers move into deeper waters in late summer

116. The Applicant argues that in late summer (when the Applicant indicates they will exercise the proposal) anglers move to deeper waters (following the trout which congregate there) and do not tend to use the shallow waters of the lake, that is, those areas potentially most adversely affected by the proposal. The Applicant’s planning consultant states: “As such, most of the fishing at this time of the year would be away from the shallower areas of the lake, meaning the areas where the “effects” may be most pronounced would tend to be low-use from a recreational perspective.” (LandPro 2021b:8).

117. Fish & Game (at submission paragraphs 63-64) disputes this:

“Mr Dungey states that angling pressure moves off the flats of the lake in late summer. Fish and Game’s experience is that this is incorrect. Anglers still fish shallow waters during late summer – albeit with increasing difficulty and hazard. Mr Dungey’s observation of people fishing deeper water where mud flats are not prominent may instead be a sign of anglers being forced out of shallow water due to the emergence of mud flats. Furthermore, Mr Dungey’s comment is not relevant to years when low lake levels occur in early or mid-summer, when angling use is highest.”

118. I further note that the Council’s section 95 Notification Recommendation Report (Pritchard 2021:42) states that: “Dr Booth agrees that most of the fishing at this time of year would be away from the shallower areas of the lake”. This is incorrect. I was

expressing (perhaps ambiguously) a statement made by the Applicant, rather than providing my opinion.

119. Ms Annabelle Coates of Babbage Consultants addresses this point in her evidence. She states that in summer trout will be limited to shallower lake margins only during the night, early morning and evening. As temperatures warm, trout will seek deeper water or areas of shade. I note that anglers commonly target early mornings and evenings for their activity.
120. I am not able to provide any further clarification on this matter.

POTENTIAL CONSENT CONDITIONS

121. The Applicant has not proposed any mitigation for recreation effects and recreation is not part of the proposed Monitoring Programme.
122. It is difficult to make recommendations for consent conditions to mitigate effects of the proposal in the absence of an adequate recreation assessment. Nonetheless, some matters warrant consideration:
- a. Avoid deleterious lake level changes (that is, changes that impact on cicada hatch success or angler access) during the peak angling months of December to March;
 - b. Extend the concrete boat ramp so that it may be used when the lake is lower than approximately 3.2m below dam crest. Consider the benefit of providing a more formal boat ramp on the northern shore (effectively providing an alternative to the schist ramp which is inoperable at lower lake levels);
 - c. Expand the monitoring regime to include recreation values (I note that the Applicant and Aquatic Environmental Sciences (2018) both identify this opportunity). Potential metrics could include, for example:
 - i. Counts of anglers at specified peak times;
 - ii. Measures of angler satisfaction, especially with respect to the ease of access and the availability of fishing locations, but also more generally;
 - iii. Records of boat ramp usability (when the lake is lower than approximately 3.2m below dam crest);

- iv. Formalised reporting of boat strandings (for example, via self-reporting or the Teviot Angling Club); and
- d. Provide warnings to users about the risk of lake level drop. I note that signage “to warn the public of safety and navigation risks associated with the lake” is an existing requirement (consent no. 2001.475), which may be considered adequate.

CONCLUSIONS

Recreational significance

- 123. I conclude that Lake Onslow is of regional significance for angling under Scenario A. The lake is particularly popular with anglers during the cicada hatch in late January to late February. I have outlined the basis for this conclusion at paragraph 30.
- 124. If the existing consents were exercised to their fullest extent (Scenario B), I believe the level of angling activity would be lower. I am not sure whether this would be sufficient to reduce the significance rating for the angling value of Lake Onslow.
- 125. If the proposed consents were exercised to their fullest extent (Scenario C), I believe the recreational value of Lake Onslow would be lower than offered under Scenario B. I am not sure whether the erosion of recreation value may result in Lake Onslow reaching a ‘tipping point’ for angling activity whereby access is ‘too hard too often’ and Lake Onslow loses its popularity amongst anglers.
- 126. For all other recreational activities, I cannot draw any conclusions because there is insufficient information. However, I note that:
 - a. Angling attracts more use than other recreational activities that take place there. I make this statement on the basis of my review of publicly available information;
 - b. Recreational significance is influenced both by demand (user numbers and origin) and also by supply considerations (the availability of substitute opportunities). I have not examined the demand or supply of recreation opportunity for other activities; and
 - c. Some activities are ancillary to angling, such as boating, 4WDing and camping, that is, undertaken as an integral part of a fishing trip.

Recreational effects

127. The most material concern I have relates to lake access for anglers (by boat and foot) whereby the proposal may exacerbate access difficulties by lengthening the period the contributing conditions occur. While it is unlikely that the proposal will prevent angling activity on Lake Onslow *in toto*, the quality of the angling experience is likely to be diminished and the amount of angling activity may decline.
128. The safety of boaties associated with the potential for an increased risk of boat stranding is of particular concern because the outcome could be fatal.



Kay Booth
3 June 2022

REFERENCES

- Aquatic Environmental Sciences (2018). *Review of Pioneer Energy Ltd amendment to consent for Lake Onslow*. Prepared for Otago Regional Council by Aquatic Environmental Sciences Limited. Revised 28 August 2018.
- Augspurger, J. (2017). *Memorandum to Natasha Pritchard: RSU Information assessment of RM18.004*. ORC, dated 11 January 2017. 4p.
- Booth, K. (2021). *Pioneer Energy Limited consent amendment for Lake Onslow: Audit of the application with respect to amenity values*. Prepared for Otago Regional Council.
- Booth, K.L. and Lynch, P.M. (2010). *Outdoor Recreation Research Stocktake: Synthesis*. Prepared for Sport and Recreation New Zealand by Lindis Consulting, Christchurch.
- Booth, K.L., Lynch, P.M. and Lizamore, C.A. (2010). *Outdoor Recreation Research Stocktake: Bibliography*. Prepared for Sport and Recreation New Zealand by Lindis Consulting, Christchurch.
- New Zealand Conservation Authority (2011). *Protecting New Zealand's Rivers*. New Zealand Conservation Authority, Wellington.

Dungey, R. (2017). *Lake Onslow Lake Bed Profile and Invertebrate survey*. Prepared by Ross Dungey Consulting for Pioneer Energy Limited. Attachment A of PEL 2018 resource consent application.

Dungey, R. (2018a). *Lake Onslow. Supplementary Information*. Prepared by Ross Dungey Consulting. March 2018.

Dungey, R. (2018b). *Onslow Consent. Supplementary Questions; ORC*. Prepared by Ross Dungey Consulting. July 2018.

Dungey, R. (2021a). *File Note, Onslow tributaries and fish passage*. Prepared by Ross Dungey Consulting. May 2021.

Dungey, R. (2021b). *Lake Onslow Monitoring Proposal*. Prepared by Ross Dungey Consulting. May 2021.

Dungey, R. (2021c). *Draft Interim Lake Onslow Amenity Report: Lake Onslow Recreation Values*. Prepared by Ross Dungey Consulting. August 2021. Appendix A of LandPro 2021b.

Fish & Game New Zealand (2015). *Sports Fish and Game Management Plan for Otago Fish and Game Region 2015-2025*. Published by the Otago Fish & Game Council, Dunedin.

Kent, J. (2009). *South Island Trout Fishing Guide*. Penguin Books, New Zealand.

Landpro Limited (2021a). *Letter to Otago Regional Council titled 'Re: Request for further information under Section 92(1) of the Resource Management Act 1991 – application to amend water permits 2001.475 & 2001.476'*. Dated 29 July 2021. 44p.

LandPro Limited (2021b). *Letter to Otago Regional Council titled 'Re: Request for further information under Section 92(1) of the Resource Management Act 1991 – application to amend water permits 2001.475 & 2001.476'*. Dated 2 September 2021. 20p.

LandPro Limited (2021c). *Email from Will Nicolson to Natasha Pritchard (ORC) titled 'RE: Pioneer Energy Limited - audit of further information - RM18.004'*. Dated 9 September 2021.

Pioneer Energy Limited (2018). *Resource consent application to Otago Regional Council to amend Water Permit (Dam) 2001.475 and Water Permit 2001.476.V1*. Prepared for Pioneer Energy Limited by LandPro Limited.

Pritchard, N. (2021). *ORC Notification Recommendation report*. Prepared for Staff Consents Panel by N. Pritchard, Otago Regional Council. Report dated 1 November 2021 and titled 'Subject: Notification recommendation for Application RM18.004 by Pioneer Energy Limited to vary Water Permit 2001.475 and Water Permit 2001.476.V3'.

Pritchard, N. (2022). *Notes from site visit to Lake Onslow on 4 April 2022 (Job RM18.004)*.

Unwin, M.J. (2016). *Angler Usage of New Zealand Lake and River Fisheries: Results from the 2014/15 National Angling Survey*. Prepared for Fish & Game New Zealand by NIWA.

Water Safety New Zealand (2022). *Email from Felicity Fozard to Kay Booth titled 'Drowning statistics for Lake Onslow, Otago'*. Dated 6 April 2022.

Appendix 4: Site Visit Notes from 4 April 2022

Site Visit for RM18.004 – 4 April 2022

Job number: RM18.004

Date: Monday 4 April 2022. At site from 11.15 am to 2.15 pm

Weather conditions: Fine and clear with blue skies, light breeze, approximately 20°C

Who attended site visit:

Tony Jack (Pioneer Energy Limited), Kay Booth (ORC amenity technical expert), Nigel Paragreen (Otago Fish and Game Council), Ian Hadland (Otago Fish and Game Council), John Preedy and Graeme Rae (Teviot Angling Club), Natasha Pritchard (ORC planner).

Other people at the site: One local farmer at north bay undertaking farm work, one homebuilt motorhome travelling to the lake with dingy and bikes on drive out. No one at the site fishing.

Sites visited: (shown by coloured stars on map)



Key points from visit:

- **Lake level at time of visit:** 2.7 m below the crest – confirmed by Tony
- **Lake level drop in last 7 days:** estimated to be between 180-200 mm (Tony)
- **Lake bed ownership:** Tony indicated that Pioneer Energy Limited typically holds title for the lake bed between the high water mark to the old Lake Onslow shoreline. There is marginal strip from the high water mark upwards

managed by DoC. This means that at low lake levels, the public generally have to access the lake water via land owned by Pioneer.

- **Boat ramp:** There is an existing boat ramp near the huts. This is a concrete ramp that extends until the lake levels is approximately 3.2 m below the dam crest. There does not appear to be a ramp beyond this. Currently, the boat ramp section for the lake level 2.7-3.2 m below crest is covered in silt/mud. The boat ramp was extended by the Teviot Angling Club in 1980's after the new dam was constructed with funds to supply materials provided by Pioneer Energy Limited (Graeme). Graeme said he may be able to find more specific details on when the boat ramp was last extended/confirm the above.
- **Alternative access:** Small dingy boats may be able to be pushed into the water when boat ramp is not available but mud may prohibit this. Foot access can also be used. There is a schist boat ramp near the causeway at north bay (at the yellow star in site plan above) but this is only useful for boats when the lake is high (higher than 2.5 m below crest approximately).
- **Draw down impacts on use of the lake:** Tony explained that Pioneer view Lake Onslow primarily as a storage facility for water so that water can be used most efficiently when required. He explained that the draw down rate limits what can be taken/discharged when the lake level is at lower lake levels i.e. 2.5 or greater below the crest. He noted that this means that often less is taken early in the season to enable a higher discharge to occur in autumn when the lake level is lowering. Nigel queried whether this meant that if the change was implemented there could potentially be lake level drops earlier in the season then currently occurs as there would be less restriction later in the season. Tony noted that this was a possibility. This would mean that the lake could be lower for longer than currently (subject to rainfall inflows) and reach a lower level more frequently.
- **Huts:** Teviot Angling Club (TAC) has two huts and John and Graeme also have a private hut that they use. There are approximately 12 huts in the cluster near the red star on the site map and another approximately 6 huts located on private land around the lake. The 12 hut cluster is located on land held by a local farmer and the hut owners do not legally own the land that they are sited on (i.e they are there at the discretion of the landowner). The huts are occupied by private individuals and the TAC. Fishing is the primary reason for using the huts with hunting as the most common secondary use.
- **Lake use/key fishing times:** Brown trout fishing is popular throughout the year, most commonly from spring through to end of autumn. Different types of fishing are more popular at different times of the year. Worm fishing in the spring. Cicada hatch fly fishing in summer, and various other fishing methods throughout the year. It was mentioned that captured fish are typically larger in size in autumn before the breeding season (i.e. between March – May). John mentioned that he visited the lake last weekend (2-3 April) and there were 8-10 boats on the lake. Weekends and fine weather likely to attract more people than other times but fisherman do come throughout the year and in all conditions (Graeme). Nigel surmised whether the impacts of the change will be exacerbated by this – years with more rain are when the lake level is likely to be higher but lesser use and years where there is limited rain and more likely lower lake levels is when there is typically more angling use.



- **Cicada hatch period:** Attracts anglers from Otago and Southland wide. Fly fishing activity. The success of the cicada hatch is dependent on the soil temperature. Cicadas once hatched take flight and a proportion land on the water. The trout gorge themselves on the cicadas. This makes them easy to target with imitation flies. This is an annual event on all high-country lakes surrounded by tussocks. Typically occurs between 20 Jan to 20 Feb (around 3 – 4 weeks). Nigel questioned whether it mattered how far there was between the tussocks and the water on the success of this annual event (i.e. did the lake being at a lower level have an impact on cicada behaviour). Graeme and John didn't think so.
- **Best fishing locations:** variable and dependent on the individual. John mentioned that many walk around from the huts to the SW bay (willow) and fish from the bank. Graeme considers the north arm to be a very productive fishery. John's preferred spot was near the causeway where the north branch of the Teviot River enters the lake (yellow star). The fish were said to be often in the first 2-3 metres of water from the shore (Graeme).
- **Lake events:** There is a yearly Teviot Anglers Club calendar. In early December there is the Society Cup. Normally attracts 10-20 people. Only 3 people last year due to poor weather conditions. Bushy Creek fishing competition on the Teviot River is held annually by Pioneer Energy Limited in the approximately only 3 km section of river that has suitable angler access.
- **Boat stranding:** Uncommon currently (John and Graeme) but does happen from time to time. There are sand bars and the lake morphology is highly variable. It is generally well known that the lake is navigationally challenging. At lower lake levels it was noted that there is higher risk of stranding. Retrieval or recovery of boats is made more difficult by deep mud
- **Mudflats:** Are a feature of the lake, especially as the lake level drops. There are known areas where this is more problematic (John and Graeme). There are other locations around the lake with rocky beds that can be used for offthe shore fishing at these times (Graeme). There is a concern that if the lake level drops more quickly there will be more wet mud with less time for it to dry out and a greater margin of mud to walk across to access the lake (Nigel). The extent of mudflats at given levels was not well understood (Nigel).
- **Adaptability of fishing habits:** John and Graeme noted that as the lake drops and there is more mudflats and more navigational challenges the behaviour of the angler changes. They stated that fishing can always occur. They are not sure if the low lake levels would stop people from coming to the lake. Nigel noted that the range of fishing opportunities (i.e. where they can fish, especially on foot) and quality of the fishing experience decreases at lower lake levels. Tony stated that he was only aware of one complaint (about mud) in his time with Pioneer.
- **Lake Onslow fishery:** Recognised by all parties as an easily accessible high country lake with plentiful brown trout. Characterised as a fishery with a high catch rate and high bag limit but with smaller fish. The scenic high country setting and accessibility are also key features. Lake Onslow is the only Otago lake with a 10 bag limit for trout (Ian). Many of the fish are small to medium in size (John and Graeme). The multiple spawning creeks that flow into the lake



create this great fishery (e.g. North Branch and South Branch) (Ian). The food source for trout is also important. Productivity is driven by the macrophytes and the invertebrates that depend on them. These occupy a shallow 2-3 m band (Nigel). Nigel is concerned that regular changes to lake levels will impact the ability of these plants to provide habitat.

- **Waikoura harvesting:** Often occurs currently as a side activity. John said that he put out a pot two weekends ago. He caught a couple. Often an activity for kids while adults are fishing. Often pots are placed in similar spots to fishing. Waikoura are often found in deep water near rocky outcrops such as around the dam (John and Graeme). The waikoura are an important contributor for the health of the trout fishery (Ian). The larger fish can digest waikoura and this leads to increased growth rates.
- **Other activities:** Nigel pointed out a maimai. The lake is used for limited duck hunting as there are better sites and it is not a primary use. Duck hunting at the lake has decreased over the past 10 years (Ian). 4WDs and mountain bikes are common on the surrounding gravel roads (and increasing). There is some game hunting (deer, pig) in the local area.
- **Other local angling options:** Poolburn but limited (and bigger) fish; Upper Manorburn has rainbow trout (not brown trout); Loganburn is similar in size but has a 2 bag limit.

Photos:



Photo 1: Private fishing hut (John and Graeme's hut)



Photo 2: Teviot Angling Club fishing huts



Photo 3: Boat ramp below fishing huts – looking towards dam



Photo 4: Boat ramp at lake water intersection



Photo 5: Close up of boat ramp



Photo 6: Point where boat ramp ends – shown by pipe



Photo 7: Point where boat ramp ends



Photo 8: Mud and lake intersection



Photo 9: Lake Onslow looking north from fishing huts



Photo 10: Lake Onslow looking southeast from fishing huts towards willow in mid distance



Photo 11: Fish and Game and Minister of Fisheries signs on fishing seasons and daily limits



Photo 12: Lake Onslow looking south from north branch



Photo 13: Schist boat ramp at north branch



Photo 14: Graeme showing where water level was when John launched his dingy here 5 weeks previous (late Feb)



Photo 15: Lake bed and mud flats at north branch site



Photo 16: Looking north from north branch towards the north branch of the Teviot River (John's preferred fishing spot)



Photo 17: Weir under causeway at north branch that holds water levels up as lake level drops



Photo 18: Land and water interface at north branch looking south from the causeway



Photo 19: Close-up of the above



Photo 20: Lake Onslow looking towards southeast bay



Photo 21: Teviot River immediately downstream of Lake Onslow at road bridge (looking downstream)



Photo 22: Teviot River immediately downstream of Lake Onslow looking upstream towards dam at road bridge



Photo 23: Lake Onslow immediately above dam



Photo 24: Discharge from Lake Onslow to Teviot River



Photo 25: Teviot River immediately downstream of dam looking towards road bridge (site of photos 21 and 22)

**Appendix 5: Technical Evidence (Legal advice) by Michelle Mehlhopt and Kate Dickson
(Wynn Williams)**

MEMORANDUM

Date: 13 May 2022
To: Joanna Gilroy, Natasha Pritchard
From: Michelle Mehlhopt and Kate Dickson

RM18.004 – Pioneer Energy Lake Onslow application – legal questions

1. Pioneer Energy Ltd has applied to the Otago Regional Council (**Council**) to vary its existing water permits in respect of Lake Onslow, under section 127 of the Resource Management Act 1991 (**RMA**).
2. The application seeks to increase the rate of draw down allowed by the conditions, to enable increased electricity to be generated from Lake Onslow.
3. You have asked us to consider:
 - a. What is the existing environment when processing an application under section 127 of the RMA – the consented baseline of effects, or what has historically been occurring since the consent(s) were implemented?
 - i. If it is the historic use, then what limitations or considerations would be relevant?
 - b. How much weight can be placed on the original consent decision in terms of baseline effects that were considered acceptable, including the effects that arise if the consent conditions are implemented to their fullest extent?
 - i. Is this influenced by the level of detail in the original decision on the consent, for example whether there was any discussion as to why the specific conditions were imposed?
 - ii. Does the original decision, by virtue of granting consent on the specific conditions, mean that the effects of the activity within the parameters of those conditions were understood at the time of granting consent?
 - c. Do the origins and status of a waterbody have any bearing on the considerations of a decision-maker e.g. does it make any difference that an application is for an artificial and managed/controlled lake as compared to a natural lake?
 - i. Is direction primarily taken from the relevant statutory documents and the definitions within when determining the relevance of this for the decision?
 - d. Is there any change based on recent decisions (e.g. Lindis High Court case) on how effects on trout should be considered when assessing an application? Should primary direction on this be taken from Policy 10 of the NPS-FM and Policy 3.1.1 of the partially operative Otago RPS?

Executive summary

4. When processing an application under section 127 to change the conditions of a resource consent, the usual resource consent process applies, except that the only relevant effects are the effects of the change or cancellation of the condition. Therefore, the existing condition is used as a starting point.

5. Where a resource consent (in particular a water permit) has already been implemented, whether or not to its fullest extent as permitted by the conditions, it also exists as part of the environment. The water has been allocated to that permit, and cannot be reallocated to anyone else for the term of the consent. The water permit could be used to its fullest extent at any point.
6. This approach has been confirmed by both the Environment Court and High Court. To require the Council to consider actual use in terms of rates and volumes of water taken, rather than what has been allocated, would leave the Council with an impossible task in respect of water management.
7. While there may be reasons outside the consent conditions as to why the resource consent is not or will not be exercised to its fullest extent, we consider that the assessment must still be completed based on the change to the conditions, as these circumstances could also change over the life of the consent and mean that it could then be exercised to its fullest extent.
8. We consider that the correct approach in this case is for the Council to consider the effects of the full scale of the consented activity (within the scope of its application, i.e. the application may limit the full drawdown to only occurring at certain times of the year) as part of the existing environment, when assessing the section 127 application.
9. Given the statutory test for a change in conditions is based on the effects of the change from the consented conditions to the proposed conditions, the decision will naturally carry relatively significant weight in respect of the existing condition. However, case law has recently noted that a council is not bound by its previous decision, and can consider whether a change in circumstances (or lack thereof) has led to the requirement to change conditions.
10. The original decision will largely stand on its own, given that the RMA directs the consideration of the existing condition effectively as the starting point. A lack of detail in the original consent decision as to the acceptability (or otherwise) of the effects is not required. However, if the original decision contains some detail which may assist the Council (for example, if the applicant applied for a more lenient condition and this was subsequently narrowed by the decision), then that may assist the Council in assessing any potential effects of the change.
11. We have not identified any provision in the RMA or National Policy Statement for Freshwater Management 2020 (**NPS-FM**) that differentiates between artificial and natural lakes. The definition of "lake" in the RMA includes both artificial and natural lakes, meaning there is no difference in assessment under the RMA or the NPS-FM (other than if directed or defined otherwise in a planning document).
12. While the RMA and NPS-FM do not differentiate in their treatment of artificial and natural lakes, whether a lake is artificial or natural may affect the values present in the particular lake. This will be for the Council to determine when undertaking its assessment of effects.
13. The High Court's findings in *Otago Fish & Game Council v Otago Regional Council*, together with the NPS-FM, provide a type of hierarchy when assessing effects on trout (as compared to indigenous fish). While the protection of significant habitats of indigenous fauna is a matter of national importance in section 6 (which councils must provide for), the protection of the habitat of trout and salmon is a matter which the Council must have particular regard to under section 7.
14. This regime is reflected in the NPS-FM, which now requires that the habitat of trout and salmon is protected, insofar as this is consistent with the protection of habitats of

indigenous freshwater species.¹ This inherently creates a hierarchy whereby indigenous species will be prioritised if the protection of the habitat of trout and salmon would infringe on the protection of indigenous species' habitat. The provisions of the partially operative Otago Regional Policy Statement reflect a similar approach.

15. The decision-maker will be required to weigh the effects on trout, in line with the direction provided in the NPS-FM and relevant planning documents.
16. Our detailed advice follows.

Existing environment when processing section 127 application

17. You have asked us:
 - a. What is the existing environment when processing an application under section 127 of the RMA – the consented baseline of effects, or what has historically been occurring since the consent(s) were implemented?
 - i. If it is the historic use, then what limitations or considerations would be relevant?
18. When processing a section 127 application to change the conditions of a resource consent, sections 88 to 121 of the RMA apply with all necessary modifications, as if:²
 - a. The application were an application for a discretionary activity; and
 - b. The references to a resource consent and to the activity were references only to the change or cancellation of a condition and the effects of the change or cancellation respectively.
19. Therefore, when considering the effects of the activity on the environment under section 104 of the RMA, it is only the effects of the change of the condition that are relevant.
20. As the Court of Appeal determined in *Queenstown Lakes District Council v Hawthorn*:³

the word “environment” embraces the future state of the environment as it might be modified by the utilisation of rights to carry out permitted activity under a district plan. It also includes the environment as it might be modified by the implementation of resource consents which have been granted at the time a particular application is considered, where it appears likely that those resource consents will be implemented.
21. It has been held that the method set out in *Hawthorn* should be applied with a “real world” approach, rather than an artificial approach, to what the future environment will be.⁴ The consent authority must not minimise the effects of the proposed activity, either by comparing it with an unrealistic possibility allowed by the relevant plan, or by ignoring its effects on what it, or undoubtedly will be, part of the environment in which the activity will take place.⁵

¹ NPS-FM, Policies 9 and 10.

² RMA, s 127(4).

³ *Queenstown District Lakes District Council v Hawthorn Estate Ltd* [2006] NZRMA 424 (CA).

⁴ *Speargrass Holdings Limited v Queenstown Lakes District Council* [2018] NZHC 1009 at [64]; *Queenstown Central Ltd v Queenstown Lakes District Council* [2013] NZHC 815, (2013) 17 ELRNZ 585 at [85]; *Royal Forest and Bird Protection Society of New Zealand Inc v Buller District Council* [2013] NZHC 1324.

⁵ *Speargrass Holdings Limited v Queenstown Lakes District Council* [2018] NZHC 1009 at [64].

22. Court of Appeal case law has confirmed that unimplemented consents on the site subject to the application form part of the environment, where it is considered they are likely to be implemented.⁶
23. There is a difference of approach in terms of activities consented under regional plans, on the basis that there is no certainty that they will continue as they expire after a finite term.⁷ However, as the activity being considered is an amendment to the existing consent, rather than seeking to re-consent the activity, this difference in approach is of no relevance here.
24. Given the direction in section 127 to consider only the effects of the change of the condition on the environment, the scope of the existing consent will be relevant in terms of the environment on which those effects are considered. The question is whether that environment is one which includes the full scale of the consented activity, or one based on its actual level of use.
25. We consider that the assessment should be based on the full scale of the consented activity, regardless of the actual level of use. This is on the basis that a water permit is allocative in nature, and could (but for any intervening external circumstances) be used to its full scale at any time over its term.
26. The water allocated to Pioneer under the existing consent cannot be re-allocated to anyone else for the term of the existing consent. Once the resource is allocated, it is up to the consent holder to do with it what they choose, within the terms of the consent. The Council is unable to re-allocate that water to any other user, as a “subsequent grant would negate or frustrate both the purpose and effect of the provisions designed to ensure the effective allocation of resources”.⁸
27. A consent is implemented once it is given effect to, such that it cannot lapse under section 125 of the RMA. Once a consent has been put into effect, “it becomes a physical reality as well as a legal right.”⁹ The consent is therefore valid for its term, and can be exercised (in accordance with the conditions) for the entirety of its term. Where consents have been implemented in the past (irrespective of whether they are currently being implemented), they form part of the existing environment.
28. This approach has been confirmed by the Environment Court in *Smith v Marlborough District Council* where Judge Kenderdine stated:¹⁰

My preliminary view is that Mr Smith is correct. That means that when the Court comes to consider the application for consent, it would consider the effects of the application on an environment that already includes the effects caused by full implementation of the consents. I come to that preliminary view because, in line with the reasoning in *Arrigato*, the consents (if still valid) should be considered as already affecting the environment. Mr Smith could use the consent to its fullest extent tomorrow, and then reapply. Neither the Council nor the Court could stop him doing so. At that point, the effects would be a part of the existing environment. It would seem to be artificial to say that because he is not currently using his consents to the fullest extent possible, only the effects of the current level of activity can be considered as part of the existing environment.

⁶ *Far North District Council v Te Runanga-a-Iwi o Ngati Kahu* [2013] NZCA 221, at [93].

⁷ *Ngati Rangi Trust v Manawatu-Whanganui Regional Council* [2016] NZHC 2948.

⁸ *Aoraki Water Trust v Meridian Energy Ltd* [2005] 2 NZLR 268 (HC), at [46].

⁹ *Auckland Council v 184 Maraetai Road Ltd* (2015) 19 ELRNZ 98 (HC), at [17], citing *Biodiversity Defence Society Inc v Solid Energy New Zealand Ltd* [2013] NZEnvC 195.

¹⁰ *Smith v Marlborough District Council* Environment Court, Wellington, W098/06, 9 November 2006, at [12].

29. This is the approach confirmed recently in the High Court decision of *Aotearoa Water Action v Canterbury Regional Council*, where Justice Nation stated:¹¹

[196] I accept the submission for the Council that the key factor in this case is that the existing consents had already been granted and implemented and so could be used to the full extent possible.

...

[200] I accept the submission from the Council that the level to which the consents have been used in the past, or are currently used, is not relevant to the assessment of the environment. For the purposes of determining the existing environment, the Council is required to consider the effects caused by the full implementation of consented activities. This is consistent with the allocative nature of water permits.

30. To apply any other approach would leave councils with an impossible task in terms of managing the water resource and assessing the effects of new applications.¹²
31. Generally, counting all existing resource consents within an allocation and as part of the environment is precautionary. It ensures a council does not discount consented abstraction (for example, when assessing a new application and allocation within the catchment) on the basis it currently is not occurring when that abstraction might at any time be reinstated. To apply a different approach to a change in conditions would lead to inconsistent results.
32. While there may be reasons outside the consent conditions as to why the resource consent is not or will not be exercised to its fullest extent, we consider that the assessment must still be completed based on the change to the conditions, as these circumstances could also change over the life of the consent and mean that it could then be exercised to its fullest extent.
33. For these reasons, and in line with the existing case law, we consider that the correct approach is for the Council to consider the effects of the full scale of the consented activity (within the scope of its application, i.e. the application may limit the full drawdown to only occurring at certain times of the year) as part of the existing environment, when assessing the section 127 application. This is also what is anticipated by section 127 itself (noting that it refers to the effects of the change of condition).

If it is historic use – what limitations / considerations would be relevant?

34. Given our conclusions above, that the analysis should be undertaken based on what is permitted by the consent conditions, it is not necessary to answer this question.

Weight placed on original decision in respect of assessment of effects

35. You have asked us to consider:
- a. How much weight can be placed on the original consent decision in terms of baseline effects that were considered acceptable including the effects that arise if the consent conditions are implemented to their fullest extent?
 - i. Is this influenced by the level of detail in the original decision on the consent, for example whether there was any discussion as to why the specific conditions were imposed?

¹¹ *Aotearoa Water Action Inc v Canterbury Regional Council* [2020] NZHC 1625, at [196] – [200]. It is noted that this decision is under appeal, with a judgment expected from the Court of Appeal in May 2022.

¹² *Aotearoa Water Action Inc v Canterbury Regional Council* [2020] NZHC 1625, at [201].

- ii. Does the original decision, by virtue of granting consent on the specific conditions, mean that the effects of the activity within the parameters of those conditions were understood at the time of granting consent?
36. As noted above, the assessment when considering an application for a change in consent conditions is based on the effects of the change of the condition. Therefore, the original decision and the consent conditions landed on as part of that decision carries some weight in the current assessment.
 37. The test for varying conditions of consent has changed over time. Previously, an application could only be made at a time specified for that purpose in the consent, or because a change in circumstances had caused the condition to become unnecessary or inappropriate.
 38. While that test has been removed from the legislation, a similar approach has been applied in respect of consent notices (for which the test for removal relates back to an assessment under section 127), where the High Court noted:¹³

I am reluctant to lay down a firm rule for the process of consent notice variation applications. But... I agree with Mr Putt... that good planning practice should require an examination of the purpose of the consent notice and an inquiry into whether some change of circumstances has rendered the consent notice of no further value.
 39. This approach was also applied in respect of a variation of conditions by the Environment Court:¹⁴

[59] While *Green* was concerned with a variation of a consent notice I consider that the same approach should be taken to applications for variation generally. The consent authority is not bound to follow its earlier decision if there is not a change in circumstances but the lack of a change in circumstances may be a relevant factor. I consider that the converse also applies: if there is a change in circumstances then that is relevant and may be given the weight considered appropriate.
 40. Therefore, while the approach is no longer as strict as the previous legislation provided for, any change in circumstances (or lack thereof) from the previous decision will likely be a relevant factor to consider.
 41. This could include, for example, new information that has come to light since the original decision (in terms of the potential effects of the consented proposal). Therefore, there is some consideration of the previous decision-making process inherent in the assessment.
 42. However, the focus must be on the conditions themselves and the effects of the proposed change in conditions, so any assessment of external factors must be done through that lens.

Influence of level of detail in original decision

43. Any lack of detail in the original decision regarding the reasons for imposing specific conditions will not directly influence the assessment for this application (given that the assessment is based on the effects of the change of the conditions themselves), but any specific reasoning may influence the Council's decision as to whether the change proposed in this instance would be acceptable.
44. The conditions must stand on their own. Once they have been included in the consent conditions as part of a decision to grant consent, then they are a part of that

¹³ *Green v Auckland Council* (2013) 17 ELRNZ 737 (HC), at [129].

¹⁴ *Flax Trust v Queenstown Lakes District Council* [2020] NZEnvC 84, at [59].

consent, regardless of their fundamental importance (or otherwise) to the decision's reasoning. The Council then undertakes its assessment of the proposed change to the conditions based on the potential effects of the proposed change (from what is already consented to the proposed change).

45. However, if there is specific reasoning in the decision as to the condition, and why it was imposed (for example if the applicant had sought a higher drawdown limit in the application and was only granted a lower one), then that may assist the Council in its consideration of the current application.

Original decision means that level of consented effects considered acceptable

46. As discussed above, a condition is part of a resource consent, and an already granted resource consent should be considered part of the existing environment when assessing an application to change that consent.
47. As the assessment required under section 127 considers only the effects of the change in condition, then to some extent the original decision is taken as it stands having authorised the consented level of effects.
48. However, any new information as to a potential change in circumstances, or whether the original effects authorised were in fact acceptable may go to the Council's consideration of whether a change to a condition to make it even more permissible is acceptable.
49. As noted above, the Council is not bound by its previous decision, but the lack of a change in circumstances may be a relevant factor.¹⁵ This indicates that relatively significant weight is placed on the original decision when determining an application to change conditions, in line with the statutory test.

Does the type of water body have any bearing on relevant considerations?

50. You have asked us to consider:
- a. Do the origins and status of a waterbody have any bearing on the considerations of a decision-maker e.g. does it make any difference that an application is for an artificial and managed/controlled lake as compared to a natural lake?
- i. Is direction primarily taken from the relevant statutory documents and the definitions within when determining the relevance of this for the decision?

51. Lake is defined by the RMA as:¹⁶

a body of fresh water which is entirely or nearly surrounded by land.

52. It is noted that the RMA defines the terms "water" and "fresh water" broadly, as follows:¹⁷

Water—

- (a) Means water in all its physical forms whether flowing or not and whether over or under the ground:
- (b) Includes fresh water, coastal water, and geothermal water:

¹⁵ *Flax Trust v Queenstown Lakes District Council* [2020] NZEnvC 84, at [59].

¹⁶ RMA, s 2 "lake".

¹⁷ RMA, s 2 "water" and "freshwater".

(c) Does not include water in any form while in any pipe, tank, or cistern:

Freshwater or fresh water means all water except costal water and geothermal water:

53. Given the RMA does not distinguish artificial lakes and natural lakes, both are included within the definition of lake for the purposes of the RMA. This contrasts with the definition of “river” under the Act, which includes a modified watercourse but expressly excludes an artificial watercourse.¹⁸
54. There is no carve out of artificial or modified lakes in the NPS-FM provisions, only the term “lake” is used and it is not qualified by “artificial”, “modified” or “natural”. This contrasts with the NPS-FM’s treatment of wetlands, which introduces the term “natural wetland”, which expressly excludes wetlands constructed by artificial means.¹⁹
55. The objective of the NPS-FM prioritises first the health and well-being of water bodies and freshwater ecosystems. “Water bodies” is not further defined by the NPS-FM meaning the RMA definition applies,²⁰ which captures artificial and natural lakes.
56. Policy 8 of the NPSFM 2020 requires that significant values of outstanding water bodies are protected. “Outstanding water body” is defined by the NPS-FM as “means a water body, or part of a water body, identified in a regional policy statement, a regional plan, or a water conservation order as having one or more outstanding values”.
57. Therefore, a lake, whether it is artificial or modified, may warrant further consideration due to additional objective or policy direction in a regional policy statement or regional plan (or water conservation order) if it is classified as an “outstanding natural waterbody”. There is no requirement in the NPS-FM that outstanding water bodies are natural.
58. When it comes to the effects assessment under section 104 of the RMA, there is nothing in the NPS-FM or the RMA that differentiates between an artificial or natural lake. When considering an effect on the “environment”, section 2 of the RMA defines the “environment” as including:
 - a) ecosystems and their constituent parts, including people and communities; and
 - b) all natural and physical resources; and
 - c) amenity values; and
 - d) the social, economic, aesthetic, and cultural conditions which affect the matters stated in paragraphs (a) to (c) or which are affected by those matters.
59. “Natural and physical resources” includes land, water, air, soil, minerals, and energy, all forms of plants and animals (whether native to New Zealand or introduced), and all structures.
60. “Amenity values” means “those natural or physical qualities and characteristics of an area that contribute to people’s appreciation of its pleasantness, aesthetic coherence, and cultural and recreational attributes”.

¹⁸ RMA, s 2 “river”.

¹⁹ NPSFM 2020, clause 3.21.

²⁰ RMA, s 2 – defines water body as “fresh water or geothermal water in a river, lake, stream, pond, wetland, or aquifer, or any part thereof, that is not located within the coastal marine area”.

61. A lake, whether natural or artificial, is part of the environment. Whether or not it is a natural or artificial lake may influence the values that a lake holds. A decision-maker will need to determine the relevant effects based on the values of that particular lake, irrespective of whether or not it is natural.

Approach to assessing effects on trout

62. You have asked us to consider:
- a. Is there any change based on recent decisions (e.g. Lindis High Court case) on how effects on trout should be considered when assessing an application? Should primary direction on this be taken from Policy 10 of the NPS-FM and Policy 3.1.1 of the partially operative Otago RPS?
63. The recent High Court decision in *Otago Fish and Game Council v Otago Regional Council* provides some commentary on the correct approach for the consideration of effects on trout, particularly compared to effects on indigenous fish.²¹
64. This case related to a plan change concerning the minimum flow in the Lindis River, and the primary allocation of water from the Lindis. This plan change came about as a result of some reaches of the river running dry during the irrigation season, impacting the ability for the river to sustain a trout habitat over the summer.
65. In its consideration of the various alleged errors of law, the High Court determined:
- a. Although trout are an introduced species, they are afforded special status under section 7(h) of the RMA. However, this does not require the decision-maker to ensure the protection of the habitat of trout (as in section 6), but to have particular regard to it. There is a priority under sections 6 and 7 of the RMA given to indigenous fish species.²²
 - b. The Environment Court's conclusions that introduced species were "not directly safeguarded" and "have less importance under the NPS-FM [2014]" were not erroneous.²³ However, the NPS-FM 2014 has now been replaced by the NPS-FM 2020, which expressly protects the habitat of trout under policy 10.
 - c. In the context of a plan change, the Environment Court correctly gave genuine attention and thought to the habitat of trout and salmon (as required by section 7(h) of the RMA), by reviewing the evidence,²⁴ which included comparing habitat reductions under different flow regimes, evidence on the effects on trout spawning and juvenile habitat, and evidence on the ability of trout to move through the crossing reach during low flow.
66. While this decision provides some background as to how to assess the effects on trout and other introduced species, it will still be a matter for the decision-maker to weigh any potential effects in each case. Notably, the NPS-FM now specifically provides for the consideration of trout and salmon, which it has not previously (and did not in the relevant version of the NPS-FM for the *Otago Fish and Game* case).
67. The NPS-FM now requires that the habitat of trout and salmon is protected, insofar as this is consistent with the protection of habitats of indigenous freshwater

²¹ *Otago Fish & Game Council v Otago Regional Council* [2021] NZHC 3258.

²² *Otago Fish & Game Council v Otago Regional Council* [2021] NZHC 3258, at [99].

²³ *Otago Fish & Game Council v Otago Regional Council* [2021] NZHC 3258, at [115].

²⁴ *Otago Fish & Game Council v Otago Regional Council* [2021] NZHC 3258, at [127].

species.²⁵ This inherently creates a hierarchy whereby indigenous species will be prioritised if the protection of the habitat of trout and salmon would infringe on the protection of indigenous species' habitat.

68. The partially operative Otago Regional Policy Statement contains a similar direction to the NPS-FM, requiring the Council to safeguard the life-supporting capacity of fresh water and manage fresh water to maintain or enhance, as far as practicable, the habitat of trout and salmon unless detrimental to indigenous biological diversity.²⁶ Policy 3.1.9 requires a similar consideration in respect of managing ecosystems.
69. The Proposed Otago Regional Policy Statement is also a relevant consideration under section 104. It contains less explicit reference to trout and salmon habitat, focusing more strongly on the habitats of native fish and their ability to migrate. It does have policies referring to providing for fish passage more generally (for example LF-FW-P14 and ECO-P10). The lack of specific mention does not exclude the habitats of trout and salmon from consideration, as they are specifically mentioned in the NPS-FM Policy 10, but just emphasises that they are of a lower importance than native species. Further, policies in the Land and Freshwater chapter prioritising the health and well-being of waterbodies will indirectly have benefits for the habitats of trout and salmon as a result of generally maintaining or improving the health and well-being of waterbodies.
70. The general direction from these documents and case law is that effects on trout and salmon are a relevant consideration, and are a matter required to have particular regard to, but not at the expense of effects on indigenous species or habitat.

Conclusion

71. We trust that our advice assists. Please do let us know if you would like to discuss or have any further questions.

Wynn Williams

²⁵ NPS-FM, Policies 9 and 10.

²⁶ Partially Operative Otago Regional Policy Statement, policy 3.1.1.

Appendix 6: Technical Evidence (Peer review of lake levels model) by Tiago Teixeira and Lobo Coutinho Babbage Consulting Limited

TO: Natasha Pritchard – Otago Regional Council
COPY TO: Annabelle Coates
FROM: Tiago Teixeira and Lobo Coutinho

Date: 10 June 2022
Job No: 64189#BEE19

ORC REVIEW – PIONEER ENERGY – RM 18.004

Pioneer Energy Limited (Pioneer) have applied to Otago Regional Council (ORC) to change the conditions of their existing consent (2001.475 and 2001.463.V3) to increase the maximum rate of drawdown of Lake Onslow (the “Lake”). The assessment of effects of the application includes a hydrological numerical model (the “Model”) to assess the variations in the Lake Onslow levels.

ORC has asked Babbage Consultants Limited (Babbage) to review the S127 consent variation application, responding to several questions posed by ORC. Our response to each question is outlined below. Our review has been limited to associated documents provided in the folder “*Pioneer – Model documents*” available by OneDrive link provided by Natasha Pritchard (from ORC) on 23 May 2022, and the excel spreadsheet “*Onslow level with inflows (Taieri synthetic) (ID 40368).xlsx*” (the “Spreadsheet”) also provided by Natasha Pritchard via email on 25 May 2022.

Background

Council is currently processing an application by Pioneer Energy Limited (the applicant) to change the consented draw down rate of Lake Onslow. The current consents have a condition that limits the drawdown rate to 0.2 m per 7-day period. The applicant is seeking to increase this to 0.4 m per 7-day period.

The applicant has prepared the Model, which compares measured lake level data to what the effects on the Lake levels would have been if the current consents had been exercised to their fullest extent (0.2 m drawdown rate and conditions) and to the proposed change (0.4 m drawdown rate and conditions). The Model is based on the consent limits of maximum take (6 cubic metres per second), maximum operating level (5.2 m below the crest), and drawdown rate. The Model also uses data extending from June 2007, and lake level measurement data from 2012.

To our understanding, Lake Onslow does not have a direct measurement of inflows, therefore the inflow data hydrograph has been based off the flow recorded in the Taieri River at Canadian Flat.



ORC Questions

QA - Provide a peer review of the method, the model and the analysis and inference drawn from model (i.e the answers to the questions in the email dated 24 May 2022 and questions 4 and 5 in the email with the model dated 23 March 2022). Are the assumptions appropriate. Is the output expected? Are the inferences accurate?

The Spreadsheet provided, which contains the Model, was reviewed, along with descriptions of the Model assumptions and calculations. The method used by the Model is a mass balance approach where the lake level variation depends only on one inflow stream (the catchment runoff mean daily - MBIE data) and one outflow stream (the water take determined by drawdown limit or maximum outflow). No other data, such as precipitation, evaporation, and groundwater flows, seem to be directly used.

The Model checks for the weekly drawdown limits on a daily basis (i.e. 200 mm per week is used as 28.57 mm per day). Although, the maximum outflow volume ($6 \text{ m}^3/\text{s}$) can result in a daily drawdown of 70 mm). Therefore, it is possible in theory that after a period of no drawdown (high inflow), the Model would underestimate the potential initial drawdown by limiting the weekly drawdown condition to a daily average. For instance, after 6 days of no drawdown due to high inflow, on the 7th day there would be potential for 70 mm of drawdown (maximum outflow volume and no inflow), but the Model seems to limit the daily drawdown to 28.57 mm for the 200 mm scenario and 57.14 mm for the 400 mm scenario.

The model applies both daily inflow and outflow to the initial volume of the lake at each daily step, and compares the new volume to a lookup table for the new lake level. As the minimum level in the lookup table is -5,197, the Model does not consider any drawdown below this level. The effect of this is that in times where the modelled level reaches the minimum (-5,197), the level will only rise again when the daily inflow is greater than the outflow. It is unclear if this is intended due to the design of the Lake and spillways, or if the Model is overestimating the time the Lake stays at the minimum level by disregarding cumulative daily inflows when the Lake is at the lowest level.

The model does not use any meteorological or hydrogeological data, only taking into consideration the inflow from the catchment, based on Taieri River flows. No direct rainfall and evaporation at the lake, or groundwater flows have been taken into consideration. Therefore, the reliability of the Model is heavily dependent on the accuracy of the single inflow data used, and how well it represents overall inflows (runoff from the catchment, direct precipitation, groundwater) and outflows (evaporation, groundwater leakage) to the Lake.

As there is no scenario for the actual discharges over the modelled years, it is not possible to fully calibrate the Model inputs (inflow data). If discharge flows from the lake were available in any form, they could be used to compare the modelled levels (using the Taieri River data) to the measured levels and calibrate the Model to best represent the inflows to the Lake. Without this, it is not possible to fully validate the modelled results for the other scenarios.

The applicant, in the document “Inference Questions for Lake Onslow lake levels model” sent on 26 May 2022 (Attached) proposes a validation of the inflows using the period of 01/06/2013 to 01/08/2013, to which the daily lake outflow is estimated in 2.5 m³/s. Using this period to calibrate the inflow data shows that the Model overestimates the inflow, as it calculates a rise in lake volume of 33,533,494 m³, while the calculated increase in volume (from measured lake levels) was of 18,992,630 m³. Measured levels against modelled levels (using the Model inflow and estimated outflow for the period) are shown in Figure 1.

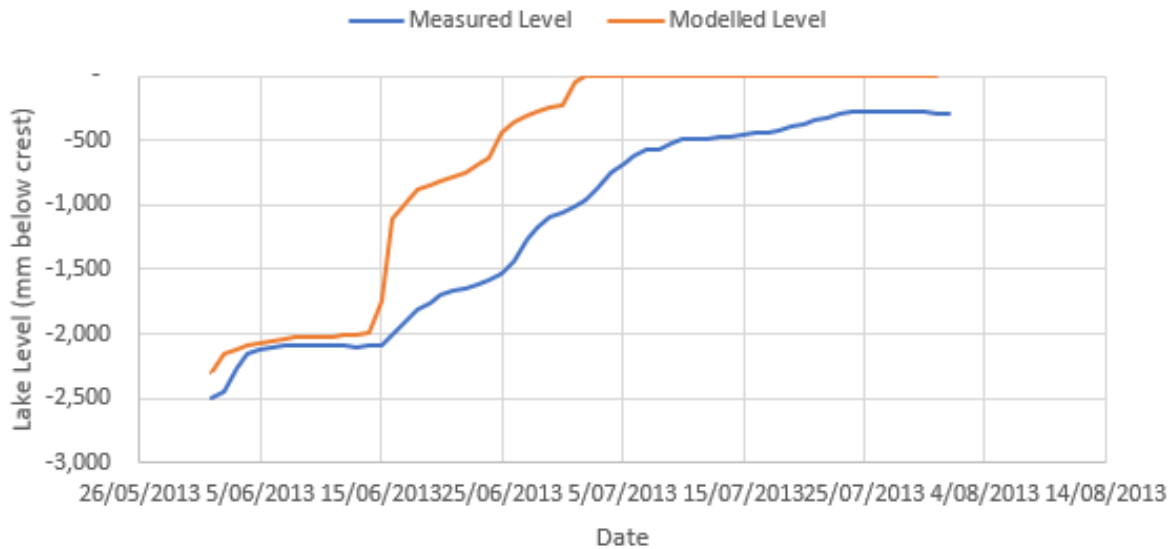


Figure 1: Measured and Modelled lake levels for the calibration period.

Using the same period for calibration, and applying a correction factor of 0.688 to the inflow data, results in a better approximation, as shown in Figure 2. Even then, the graph shows that actual inflows to the Lake appears to be more delayed (smoother rise in level) than the Model calculates.

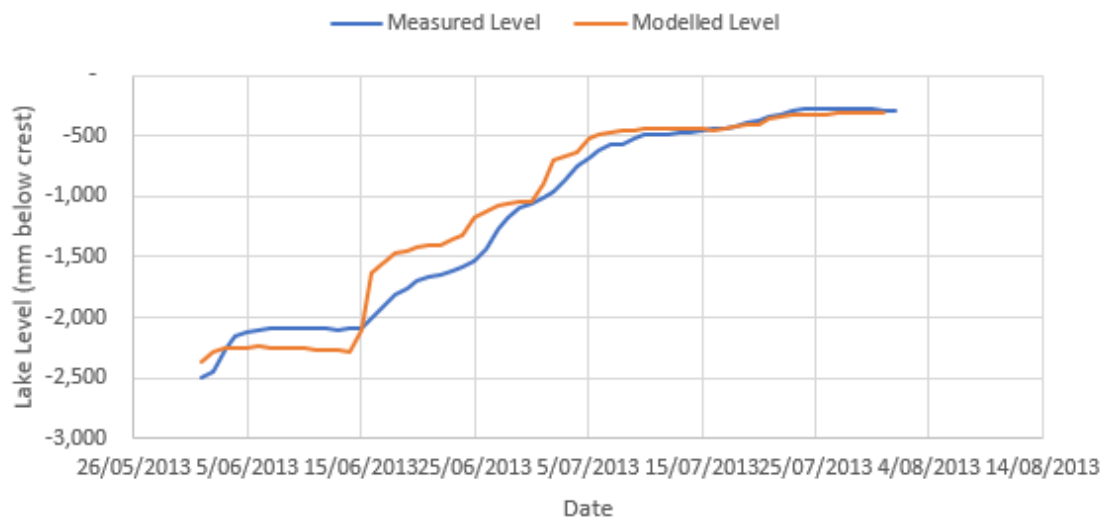


Figure 2: Measured and Modelled lake levels for the calibration period using a 0.688 correction factor to the inflow data.

This limited calibration seems to indicate that the Model is overestimating inflows to the Lake, or that outflows during the period were higher than the 2.5 m³/s reported. Therefore, the Model could be overestimating the Lake levels if a correction factor is not applied to the inflow data. It is important to point out that this calibration is very limited (short period) and further calibration could be investigated using other periods (particularly other seasons) where the Lake discharge is known or can be estimated.

The questions and answers to the emails dated 24 May 2022 and 23 March 2022 were summarized in the document “Inference Questions for Lake Onslow lake levels model” sent on 27 May 2022 (Attached). The questions, applicant’s response and our comments are presented below.

1- *The percentage of time that the Lake Onslow water level would have been below 2.5 m below crest and below 3 m below crest (i.e. between 2.5/3 m and 5.2 m) for Scenarios B and C since the 2001.475 and 2001.476.V3 consents were exercised (It is understood that data commences from June 2007).*

Applicant’s response: The inflow data has been provided by NIWA, courtesy of MBIE. This data has been calculated to support the NZ Battery Project. It is our understanding that the data is based on a scaled time series data set for the Taieri River at Canadian Flat. For sensitivity in calculating the relative levels I have included responses for 2 scenarios: Taieri-derived base inflows as received, +10% within the model inflow can be scaled by adjusting cell B5 in tab “Specific flow”

Percentage of Time level below -2.5m & -3.0m

	Base inflow	+10%
-2.5m @200mm	92%	81%
-2.5m @400mm	95%	90%
Change	3%	9%
-3m @200mm	84%	66%
-3m @400mm	85%	77%
Change	1%	11%

Babbage: The applicant’s response is generally in accordance with the Model results, except for the “-3m @400mm” line. Based on the Spreadsheet provided, the Model shows that the lake would be 91% (instead of 85%) of the time below 3 m under the crest.

Further to that, if we apply the correction factor to the inflow, based on the proposed calibration period, the results show that, for both scenarios, the lake would be 100% of the time under 2.5 m below crest and 99% of the time under 3 m below crest.

2- The percentage of time that the Lake Onslow water level would have been at the lowest lake level (i.e. 5.2 m below crest) for Scenarios B and C since the consent was implemented (June 2007).

Applicant's response: In exercising of consents 2001.475 and 2001.476.V3 Lake Onslow would not be drawn below 5.2m as this is below the minimum operating limit. A more practical approach is to analyse the percentage of time that the lake would theoretically be drawn below 5.19m.

Percentage of time lake at lowest levels

	Base inflow	+10%
% below 5m @200mm	14%	8%
% below 5m @400mm	39%	30%
Change	25%	24%

Babbage: The applicant's response is consistent with the Model.

Although, if we apply the correction factor (0.688) to the inflow data, based on the proposed calibration period, the Model outputs indicate that the Lake would be at (or below) the minimum level 49 % of the time for the 200 mm drawdown scenario, and 69 % of the time for the 400 mm drawdown scenario.

3- The average and maximum time (days) that the lake would have been held at the lowest lake level (i.e. 5.2 m below crest) for Scenarios B and C since the consent was implemented (June 2007) for:

- a. Maximum for total time period (June 2007 until June 2021)

Applicant's Response: Theoretical maximum continuous days held at below 5.19m

	Base inflow	+10%
Max days empty @200mm	92	54
Max days empty @400mm	93	80

Babbage: The applicant's response is consistent with the Model.

Although, if we apply the correction factor (0.688) to the inflow data, based on the proposed calibration period, the Model outputs indicate that the Lake would be at (or below) the minimum level for 154 days for the 200 mm drawdown scenario, and for 167 days for the 400 mm drawdown scenario.

- b. Average duration for total time period (June 2007 until June 2021)

Applicant's response: This is difficult to calculate with the modelling tools used

Babbage: One way to calculate this is to extend the “Lake Level <Xm Count” used in the Spreadsheet (columns T and U of the 200mm and 400 tabs/sheets), adding two more columns for each. On the first column you sum the value of the “Count”, if not 0, to the previous value. In the second column you return 0 except if the following cell of the preceding column is 0, in which case you return the value of the preceding column. With this you will have a column with all the number of days of each period, at the end of that period, the level was below the threshold, and to obtain the average duration you average all values on that column that are not 0.

The result of the suggested methodology shows that the Lake would be at or below the 5.19 m threshold for an average of 18 days for the 200 mm scenario and 21 days for the 400 mm scenario. Again, if we use the correction factor to the inflow data, these averages change to 26 and 27 days respectively.

- c. Maximum duration within each year (i.e what was the maximum duration within each year that the lake was held at 5.2 below crest).

Applicant's response: See below

Babbage: See below.

- d. Average duration within each year (i.e what was the average duration for each year that the lake was held at 5.2 m below crest)

Applicant's response: The table below shows the calculated theoretical days each calander year that the lake would have been at the minimum operating level under Scenario B & C

Babbage: The applicant's response seems to show the total number of days in each year that the Model calculates that the Lake level would be below 5.19 m under the crest, not the requested maximum and average duration for each year. To obtain the requested values, we suggest a methodology as described above on item b.

4- A comparison of the frequency of lake level fluctuations between Scenario B and C. Would Scenario C have more fluctuations in lake levels then Scenario B and, if so, can this be quantified and described (i.e. at what lake level do these occur).

Applicant's Response: There is no simple means of calculating lake level fluctuations. I believe it is fair to say that the lake tends to either trend upwards or downwards over a period of days to months.

Increase in lake level is associated with increase in inflows which is a function of weather, i.e. rainfall or snow melt.

Babbage: In the Model, lake level variations are dependent on the inflow data and outflow conditions. As mentioned earlier, the Model applies both inflow and outflow in a single calculation step before checking for changes in lake level (and drawdown conditions). Based on that, and as it can be seen on the chart with Model results (attached), modelled lake levels will have more fluctuation on Scenario B (200 mm drawdown limit), as the inflow overcomes the maximum drawdown condition in minimum lake levels more often. Meanwhile, Scenario C (400 mm drawdown limit) presents stronger modelled fluctuations due to the higher drawdown limit. In summary, Scenario B raises the lake level from the bottom limit more often, while Scenario C drops the lake level to the bottom limit quicker.

5- Explanation for why graph is to 5.2 m below crest.

Applicant's Response: 5.2 m because that is the operating range of the lake. The spillway is 685.115m and the minimum is 679.9m. (5.215m range)

Babbage: The Model seems to limit the Lake level to 5,197 mm below crest. Any change in volume that would result in the level going lower is disregarded by the model step that associates the new volume (initial volume +inflow -discharge) to the lake level (lookup table). As the lowest value in the lookup table is 5,197, this is the lowest level returned by the Model for each day.

6- The calendar years since the consent was implemented where the lake was between 2.5 m and 5.2 m below crest for the entire year for Scenarios B and C.

Applicant's Response:

	Base Flow	+10%
-2.5m @200mm	2007, 2008, 2009, 2014, 2019, 2020	2007, 2008,
-2.5m @400mm	2007, 2008, 2009, 2010, 2011, 2012, 2014, 2017, 2019, 2020	2007, 2008, 2009, 2019, 2020

Babbage: The applicant's response is consistent with the Model. Although, as mentioned earlier and according to the calibration (Note on inflow confidence), the Model seems to overestimate the inflows to

the Lake. If the correction factor of 0.688 is applied to the inflow data, the Model shows that the lake levels would be under 2.5 m below crest for the entire year every year (i.e. 100 % of the time).

7- The calendar years since the consent was implemented where the lake was between 3 m and 5.2 m below crest for the entire year for Scenarios B and C.

Applicant's Response:

	Base Flow	+10%
-3.0m @200mm	2008	Nil
-3.0m @400mm	2007, 2008, 2009, 2012, 2017, 2019, 2020	Nil

Babbage: The applicant's response is consistent with the Model. Although, as mentioned earlier and according to the calibration (Note on inflow confidence), the Model seems to overestimate the inflows to the Lake. If the correction factor of 0.688 is applied to the inflow data, the Model shows that the lake levels would be under 3 m below crest for the entire year every year except for 2015 for both scenarios.

8- The months in the year where there are the highest lake levels (i.e. between 0 and 3 m below crest) in Scenarios B and C

Applicant's Response: Theoretical lake levels under scenarios B & C appear to follow the actual recorded lake levels recorded over the period. The actual record for each year and the long term average is provided in the chart below.

Babbage: Although modelled lake levels do not seem follow the actual recorded lake levels (as shown in the chart with the Model results, attached), higher lake levels for Scenarios B and C are modelled to occur on winter and spring. This is consistent with the expected higher inflows from the wet season, despite some high levels shown in early summer (likely due to de-icing inflows).

Although, if the correction factor of 0.688 is applied to the inflow data, the Model shows that the lake level would only be above 3 m below crest on June and September 2015.

9- A description of the discharge from the dam to the Teviot River when Lake Onslow is at 5.2 m below the crest. Would the discharge be limited to the residual flow of 345 L/s, required by Condition 4 of 2001.476.V3?

Applicant's Response: At the minimum level the outflows would be the lesser of 345l/s or the actual inflows.

Babbage: The applicant's response is consistent with the Model.

10- The average and maximum difference in speed at which Lake Onslow would reach 5.2 m below crest between Scenarios B and C (e.g. in the description to the model on 23 March 2022 – question 4 - it was stated that the lowest lake level would be reached approximately 3 weeks sooner under Scenario C)

Applicant's Response: Theoretically it will take 26 weeks to draw the Lake down from full to 5.2m below crest under a 200mm/wk operating regime assuming. At 400m/wk that would reduce to 13 weeks.

However, under Scenarios B & C the lake seldom fills and will have a different “starting” depth an each change from a filling period to a draining period. The difference in time taken to drain the lake to minimum levels is proportional to the “starting” depth. Therefore, it is not possible to state the relative time to empty as there is not a common starting point, without making some fairly large assumptions

Babbage: The applicant's response is consistent with the Model.

QB- Are there any other matters that appear relevant to you that have not been included? Or is additional information needed? Please specify what additional info you require and why [please explain]

The “specific flow” (runoff data) has a major role in the model. Based on the proposed calibration period (document “Inference Questions for Lake Onslow lake levels model” sent on 27 May 2022 - Attached) the Model overestimates the inflows to the Lake. This is based only on a small period used for calibration, and further calibrations could be looked into.

As mentioned earlier, meteorological data (precipitation and evaporation) could be added to the model. This data can be obtained from NIWA for the Lake location using interpolation of nearby stations. Adding this data could reduce the dependency on the inflow data and improve Model calibration. This is particularly significant if the Lake has a large surface area and low depth.

Furthermore, as the Model checks for the weekly drawdown limits on a daily basis (i.e. 200 mm per week is used as 28.57 mm per day), it is possible that after a period of no drawdown (high inflow), the Model would underestimate the potential drawdown by limiting the weekly drawdown condition to a daily average. For instance, after 6 days of no drawdown due to high inflow, on the 7th day there would be potential for 70 mm of drawdown (maximum outflow volume and no inflow), but the Model would limit the daily drawdown to 28.57 mm for the 200 mm scenario and 57.14 mm for the 400 mm scenario. The model should limit drawdown on a rolling 7 days total against the consent limit instead of a daily average of that value.

QC- Do you have any comment on the quality of the data used. Is there any verification /qualification on the inputs used in the model?

The inflow data is the main input used. As mentioned earlier, the most viable way to verify the input is by comparing measured lake levels to modelled levels for a period that the discharge is known or can be estimated. The applicant proposed verification using the period of 01/06/2013 to 01/08/2013 for when the outflow was estimated in 2.5 m³/s (as described on “Note on inflow confidence” in the document “Inference Questions for Lake Onslow lake levels model” sent on 27 May 2022 - Attached). Based on this period and the estimated outflow, the Model overestimates the inflows to the Lake.

Further periods where the outflow is known or can be estimated should be used to further calibrate the Model.

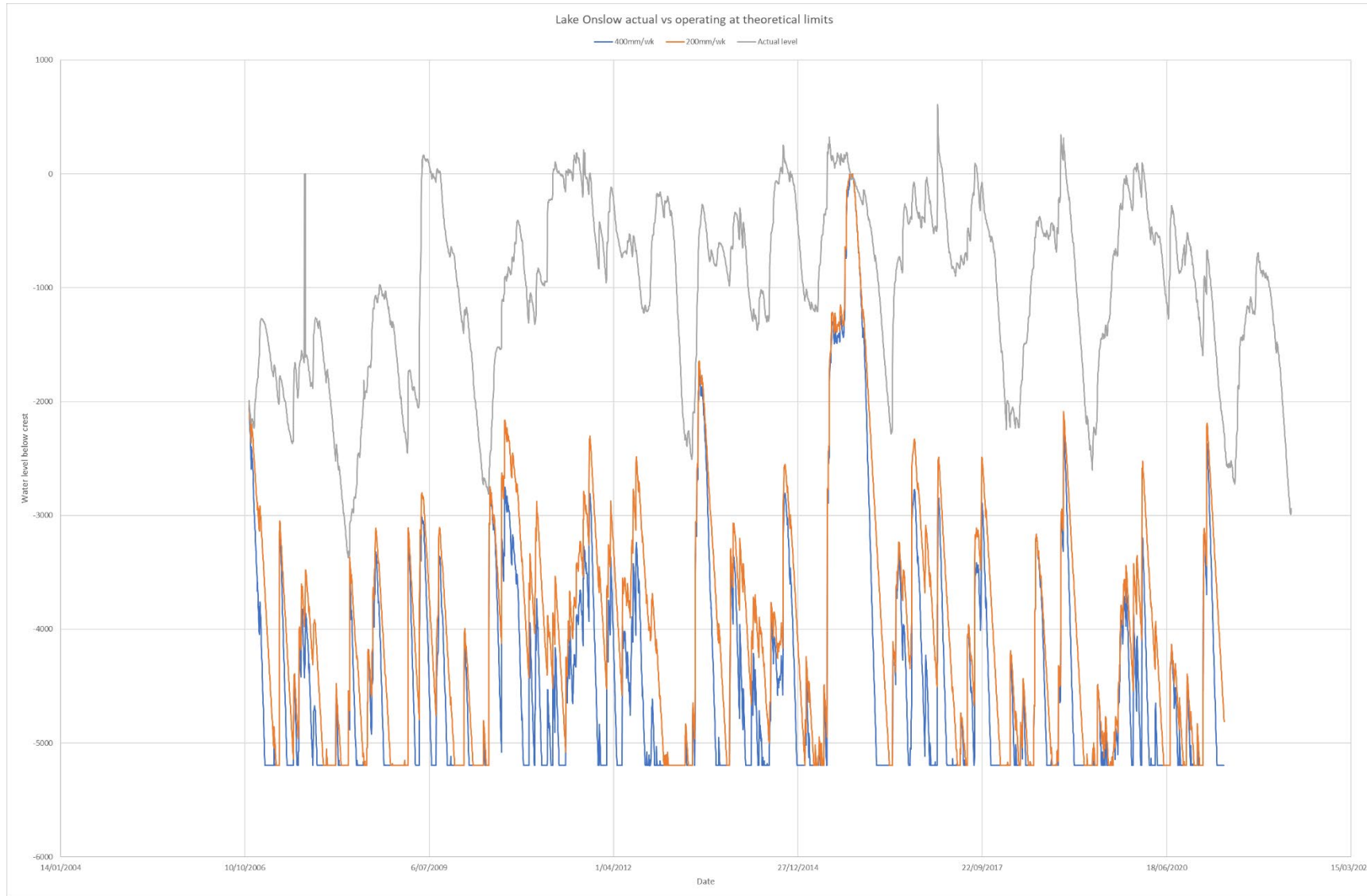
QD-What is the margin of error and key areas of uncertainty in the model?

As mentioned earlier the key area of uncertainty is the accuracy of the inflow data.

Based only on the proposed calibration period of 01/06/2013 to 01/08/2013 (as mentioned above), the model would have a high margin of error (shown in Figure 1) and a correction factor of 0.688 should be applied to the inflow data (as shown in Figure 2). Nonetheless, actual inflows to the Lake appears to be more delayed (smoother level rises) than the Model calculates.

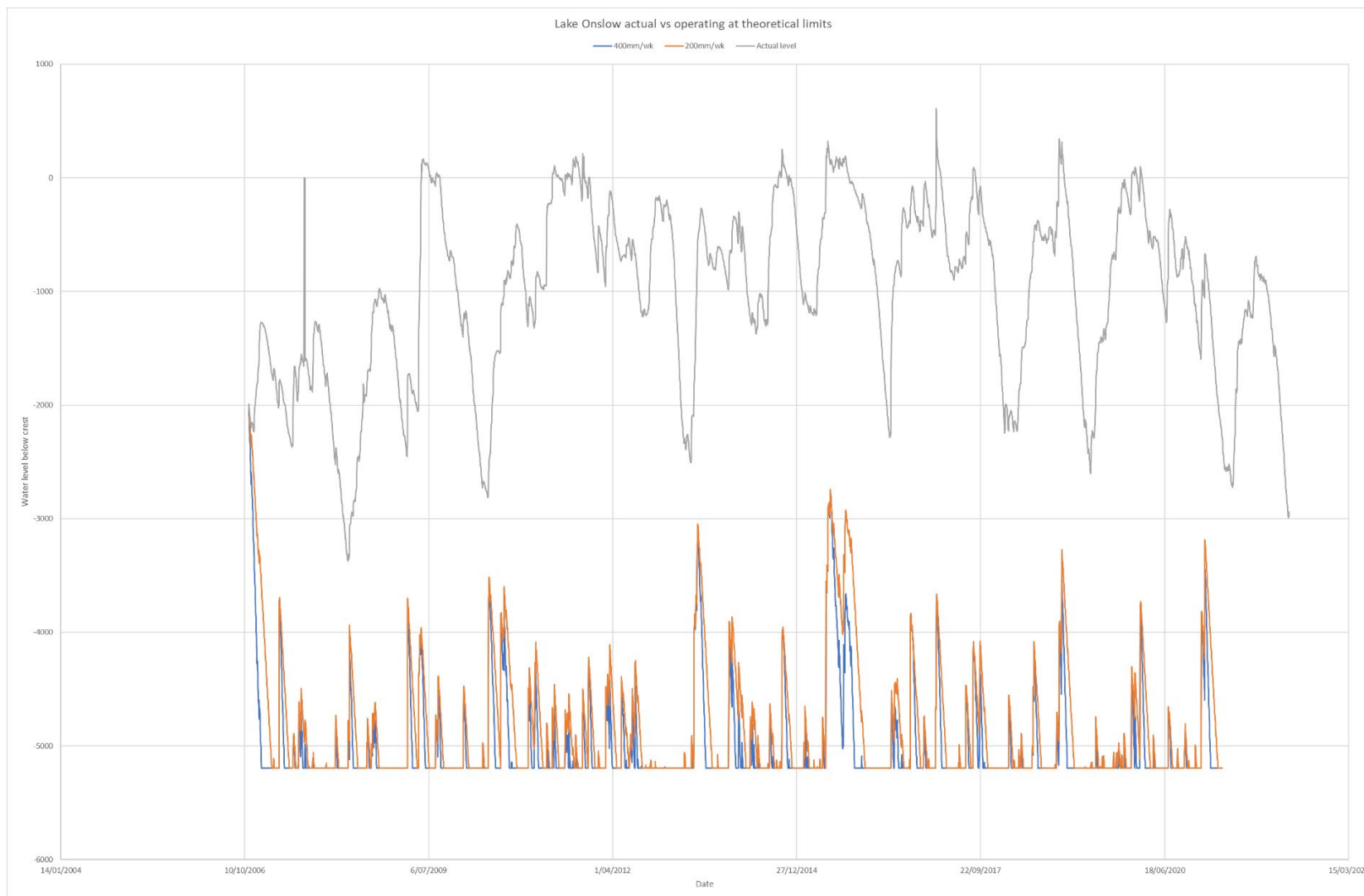
QE- Do you consider that any sensitivity testing is necessary/possible?

A sensitivity analysis would require more inputs into the model. If further inputs (such as rainfall and evaporation) can be used, and a scenario with estimated flows can be created, then a Sensitivity analysis could be recommended to improve the model validation.



Model Result as presented by the Applicant on the Spreadsheet





Model Result with correction factor of 0.688 applied to inflow data

