ORC NOTIFICATION RECOMMENDATION REPORT

ID Ref: A1080110
Application No: RM18.004
Prepared For: Staff Consents Panel
Prepared By: Natasha Pritchard, Principal Consents Officer
Date: 1 November 2021

Subject: **Notification recommendation for Application RM18.004 by Pioneer Energy Limited to vary Water Permit 2001.475 and Water Permit 2001.476.V3**

---

1. Purpose

To report and make recommendations under sections 95A-G of the Resource Management Act 1991 (the Act) on the notification decision for the above application.

2. Background Information

Applicant: Pioneer Energy Limited

Applicant's Agent: LandPro Limited

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 and unknown management.

Map reference of Lake Onslow dam: NZTM2000 E1333973 N4950253

Consents to be amended / varied: Water Permit (damming) 2001.475 and Water Permit (take) 2001.476.V3

2.2 Summary

Pioneer Energy Limited ("**the Applicant"**) is seeking to vary their existing water permits associated with Lake Onslow for the damming and the taking and using of water. The key change proposed in an increase to the seven-day draw down rate from 0.2 metres to 0.4 metres.

The key values of Lake Onslow and the Teviot River are:

- Trout habitat (adult, juvenile and spawning grounds); being Schedule 1A values of Lake Onslow and the Teviot River.
- Regionally significant trout fishery and angling location.
- Mahika kai being trout and waikōura. There is uncertainty on the extent of any mahika kai gathering currently.
- Nationally critical species (galaxiids) in tributaries of Lake Onslow.
- Regionally Significant Wetlands in the headwaters of Lake Onslow.

The proposed change will have the following potential changes to the lake and river:

- Lake Onslow levels will drop quicker in a seven day period then consent conditions currently authorise. This will result in a faster exposure of muddy shoreline.
- Potential for increased fluctuations in lake levels over a season although this is dependent on rainfall inputs to the lake

- Potential that the lake is at a lower lake level for longer although this is considered to be unlikely and limited by the Applicant.
  There may be changes in the pattern of taking from Lake Onslow within a seven-day period. The average weekly take/discharge will increase.
- There will be a higher average discharge to the Teviot River in a seven-day period when the draw down rate increase is employed.

The following environmental effects of the proposed change are assessed to be less than minor:

- Altered food supply for fish species due to disturbance of invertebrates.
- Loss of lake habitat for trout and waikoura species on a weekly basis.
- Changes to the flow regime in the Teviot River affecting habitat for aquatic species and erosion and sedimentation effects.
- Effects to galaxiid and upland bullies migration or habitat in waterbodies connected to Lake Onslow.
- Effects to hydrology, ecology, amenity values and water quality of Regionally Significant Wetlands and natural inland wetlands.
- Game bird/waterfowl hunting and land-based recreation.
- Effects on the natural character of Lake Onslow and the Teviot River.
- Effects on existing lawful consented and permitted users of Lake Onslow and the Teviot River.

The following environmental effects of the proposed change are assessed to be minor:

- Range of pest plants and macrophyte habitat unlikely to be affected but limited by current understanding.
- Effects on water quality in Lake Onslow and the Teviot River.
- Public access to the lake for angling and other water-based recreation and potential for increased boat stranding.
- Dust effects.
- Effects on cultural values, being the activity of mahika kai gathering and waahi taoka due to uncertainty on use.

I recommend the application is processed on a **limited notified** basis.

This is because:

- The adverse effects on the environment from the proposed activity will be no more than minor; and
- There will be minor environmental effects on the following parties: Otago Fish and Game Council, Aukaha, the Teviot Angling Club, and the Director General of Conservation.

3. Description of Proposed Variation

Pioneer Energy Limited ("**the Applicant"**) currently holds various consents for the operation of the Lake Onslow hydroelectric power generation scheme on the Teviot River in Central Otago. The Applicant is seeking to vary 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 at 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 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** [1]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, the minimum operating level of the lake or the existing residual flows.

3.1 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).

> ***Definitions***
> *In these conditions,*
> - ***Year**, or any reference to a specific year, means a calendar year (unless otherwise stated).*
> - *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**);*

[1] The original variation application was for 0.5 m/week. An amendment to the Application on 21 June 2021 formally changed this to 0.4 m/week.

*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 B1[2]
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 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 have been proposed by the Applicant as an amendment ("**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 support the 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 potentially affected 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 amendment 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

[2] *Note this is the same condition as proposed to be varied originally. It is added sequentially into the scheme of new conditions proposed.*

been included as there is currently no requirement under the existing consents to monitor lake levels.

3.2 Further Information

The Application lodged included an AEE that was supported by a technical report[3] prepared by Ross Dungey. Further information was provided on the following dates in respect of the general details summarised below:

- 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.
- 5 April 2018: supplementary information from Ross Dungey 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.
- 17 August 2018: supplementary information from Ross Dungey 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.
- 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.
- 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.
- 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.
- 13 September, 21 September, 23 September and 24 September 2021: clarification and technical advice on the operational effects of the proposed change.

4. Status of the Application

This application to vary the consent conditions of an existing permit is pursuant to Section 127 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[4] 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[5]. The Council must compare any difference in adverse effects likely to follow

[3] *Lake Onslow Lake Bed Profile and Invertebrate Survey*, Ross Dungey (September 2017)
[4] *Body Corporate v Auckland City Council* [2000] 6 ELRNZ 183
[5] *Body Corporate 97010 v Auckland City Council* [2000] 3 NZLR 513

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 the Lake Onslow storage lake, namely the rate of draw down. The effects associated with the change are not materially different from those considered when the original application was considered, and it is not for a fundamentally different activity. While the change could be considered an expansion of the original activity, as per the assessment in Section 7 below, although the proposed variation has the potential to increase some adverse effects, 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.

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 considering the application, the Council 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) is not up for reconsideration. The Council may grant or decline the application and, if granted, may impose conditions under Section 108 of the Act.

Section 127(4) provides that for the purposes of determining who is adversely affected by the change, the Council must consider, in particular, every person who make a submission on the original application and may be affected by the change.

4.1 Other Activities

There are Regionally Significant Wetlands located adjacent to Lake Onslow. The Applicant has queried whether these wetlands meet the definition for 'natural inland wetlands' in the NPS-FM 2020 noting 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'**).

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 no further consents are required.

5. Background

5.1 Description of the Teviot River Scheme

The Teviot River Scheme is a combined hydroelectric power generation and irrigation scheme located on the Teviot River, east of Roxburgh. Lake Onslow is a man-made lake located at the head of the river and was created in 1890 by damming an area of land called Dismal Swamp. The original purpose was to supply water for gold mining operations on the lower river.

The first irrigation and power scheme was built on the river in 1924. In 1982 a new dam was constructed at Lake Onslow downstream of the original structure (the damming authorised by Water Permit 2001.475). This increased the storage level of the lake by 5 metres and drowned the original dam (**"old dam"**). The reservoir area increased from 367 hectares (ha) to 830 ha.

The hydroelectric power scheme uses approximately 300 metres (m) of fall of the Teviot River and operates a total of five turbines. Lake Onslow operates as a storage dam with a regulated discharge that flows approximately 29 kilometres (km) down the Teviot River to the Clutha River/Mata-Au. The flow is diverted at the Marslin Dam and TIC Intake Weir on the lower section of the river where it is used for irrigation, electricity generation or both purposes.

5.2 Operation of the Teviot Power Scheme and Teviot Irrigation Scheme

The Pioneer hydroelectric and Teviot irrigation schemes rely on the storage of Lake Onslow to provide a supply of water throughout the year. Water demand for these purposes varies throughout the year and annually. The Application notes that the lake is generally operated so that the lake is full (70-90%) for most of the year with the storage being most valuable in late summer to supplement low flows in the Teviot River when irrigation demand is highest and when there can also be high electricity demand. This means there is annual variability in use of the storage. This operating regime maximises the value of the water available from storage. The Applicant has stated that they have no intention of changing this operating regime.

The rate of draw down of the lake is currently restricted to 0.2 m over any seven-day period. The draw down rate is variable throughout the year and annually and is currently influenced by irrigation, electricity demand and rainfall. The Applicant has noted that the current draw down rate limits use of storage from 1 m below the crest as the average rate ('sustained' rate) of take in a seven day period is constrained. The increased draw down rate sought is to provide the Applicant with more flexibility to react to relatively short periods of high demand. This is often when the lake is at lower levels, which tends to coincide with late summer/autumn. The Application notes that sporadic increases in draw down are often followed by steady periods where natural inflows will increase lake levels again.

Further information from the applicant outlines that a draw down exceedance of 0.2 m/seven day period will not occur every week of the year. It is estimated by the Applicant that it would occur an estimated 2 in every 5 years for up to 10 weeks (approximately 2-3 months) and is most likely to occur during low rainfall years. The Applicant outlines that a worst-case scenario is one where there may be up to 8 weeks of draw down at 0.25 m/seven day period, with an additional 2 weeks of draw down at 0.3 m/seven day period. They have calculated that this results in a maximum total additional draw down of 0.6 m. The Applicant has confirmed that a draw down rate of 0.4 m/seven day period is being sought as there is a possibility that when the lake is very low this draw down could be reached. It is therefore understood that the increased draw down rate is most consequential/beneficial for the Applicant at lower lake levels when the surface area of the lake is reduced, which limits what can be taken/discharged from the lake.

The minimum operating level of Lake Onslow is 679.9 masl with a consented operating range of 5 m below the crest of the dam and a usual operative range of 2.5-3 m. The Applicant has indicated that low lake levels (i.e. close to 5 m below the crest) are experienced about once every decade.

The discharge from Lake Onslow into the Teviot River is regulated within the present storage range. The dam discharge varies from 1.4 cubic metres per second (m^3/s) during the summer months up to 5.7 m^3/s during the winter. As noted in their previous Application, factors that the Applicant considers when formulating the daily and seasonal operating regime for the existing scheme include irrigation demand, current generating plant status, electricity demand and market value, available daily storage, and the lag time for flows to pass down the river from Lake Onslow to the intakes at Horseshoe Bend and Marslin Dam. The Applicant has indicated that most of the time significantly less than 6 m^3/s is taken; firstly due to the downstream infrastructure in the Teviot River being limited to 6 m^3/s and because of the natural inflow between the Onslow dam and generation infrastructure (approximately 1/3 of the total catchment) and secondly as if the maximum rate of take was exercised for part of a seven day period then a reduced flow would be required for the remainder of that period so as not to exceed the maximum weekly drawdown limit. Apart from the main discharge, a small flow passes through a turbine attached to the dam. The turbine provides power for charging the batteries that operate the discharge valves.

The Applicant supplies power to the local Aurora Energy Limited network. At times, available generation exceeds local demand and, in this situation, energy is fed into the national grid via the Transpower Clyde Grid Exit Point (GXP).

5.3 Compliance with Current Consent

The Council's Compliance Unit has audited the consents to be varied. The Compliance review notes that all performance monitoring requirements have been met for the consent conditions that require the supply of water meter data. Both consents were assigned Grade 3 (Non- compliant with no actual effects) due to the overdue supply of performance monitoring documents. These have now been provided.

Compliance have recommended that a consent condition is imposed that requires the lake levels to be monitored and reported on to enable the draw down condition to be monitored. It is noted that the Applicant's Amendment includes Condition C which provides for lake level monitoring.

Compliance have also recommended that telemetry be installed and continuous records of the take for Water Permit 2001.476 provided.

6. Description of the Environment

6.1 Receiving Environment 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 127(3) confirms that the same process is to be followed in respect of an application for a change of condition of an existing resource consent. Section 95A(8) and section 104(1)(a) each require an assessment of the adverse effects or actual and potential effects on the environment, respectively, in order to make a decision on notification as well as make the substantive decision whether to grant or to refuse a consent.

The receiving environment beyond the subject site includes permitted activities under the relevant plans, lawfully established activities (via existing use rights or resource consent), and any unimplemented resource consents that are likely to be implemented[6]. For resource consents issued by regional councils that are of limited duration, case law has confirmed that for activities that are seeking to be reconsented, the activities subject to those consents should not form part of the receiving

[6] *Queenstown Lakes District Council v Hawthorn Estate Limited* [2006] NZRMA 424.

environment as it cannot be assumed that existing consents with finite terms will be replaced or replaced on the same conditions[7]. Similarly, the consent term of resource consents for lawfully established activities needs to be considered when assessing the effects of the proposed activity on them. Further consideration of these activities (permitted and consented) is given in Section 3.4.6 below.

In the case of structures in riverbeds, such as dams, where the structure is not being reconsented, whether the structure forms part of the existing environment depends on whether consent is also required under section 14 for the damming or diversion. In this case, the Applicant is seeking to vary rather than replace the water permits for damming and taking and the dam structure is otherwise lawfully authorised. Section 127(3) provides that when assessing an application for a change of consent conditions, it is only the effects of the change of the condition that are relevant to the Council's assessment. Therefore, the structure, damming and take do form part of the receiving environment and the changes proposed are assessed on this basis.

6.2 Land Ownership

The ownership of the bed of Lake Onslow is relatively difficult to determine, which is potentially a consequence of the increase in lakebed after the new dam was created in 1982. The Applicant has summarised land ownership in the further information request dated 28 July 2021. New impounded areas are in reference to the additional lakebed that was created after the dam establishment in 1982. The current lakebed at maximum impoundment is owned and/or managed by the following parties (Table 1):

Table 1: Land ownership of the Lake Onslow lakebed (Source: Further information 28 July 2021)

Appellation	Owner/Manager	Notes
Various, as shown in Figure 1 below	Pioneer Energy Limited (Applicant)	Land parcels generally occupy 'new' impounded areas between the old Lake Onslow shoreline (pre 1982) and the new shoreline at maximum impoundment (post 1982).
Sec 37 SO 22593 Sec 38 SO 22593	Central Electric Limited (former company name of Pioneer Energy Limited)	The land parcels occupy 'new' impounded areas between the old Lake Onslow shoreline (pre 1982) and the new shoreline at maximum impoundment (post 1982).
Sec 32 SO 22593 Sec 34 SO 22593	Beaumont Station Limited but surrendered as per Record of Titles. Current ownership uncertain. Potentially Crown Land. No clearly designated manager	Instrument No. 788865.3 of Record of Title OT338/21 states that Sections 32 and 34 SO 22593 were surrendered from within the Lease in 1991
Crown Land (Marginal Strip)	Crown Land, managed by Department of Conservation (DoC)	LINZ have advised the Applicant that they do not manage this land and that it is most likely DoC administered land.
Original Lake Onslow lakebed	Unknown, potentially the Crown. No clearly designated manager.	No designated parcel. Council LINZ layer shows as 'Original Lake Onslow'.

[7] *Ngāti Rangi Trust v Manawatu-Whanganui Regional Council* [2016] NZHC 2948

An audit in relation to the Council's GIS system (LINZ layers) and a review of the Records of Title confirm that the information above is generally reflective of the current land ownership and management of the Lake Onslow lakebed up to full impoundment. It is recognised that there are other parties who own or manage land close to the lakebed including Minzion Station Limited, Beaumont Station Limited, Andrew Hore, Greg Pannett and Central Otago District Council (as shown in Figures 1 and 2 below). The environmental effects of the proposed change on parties who are not the applicant are considered in sections 5 and 6 of this report.

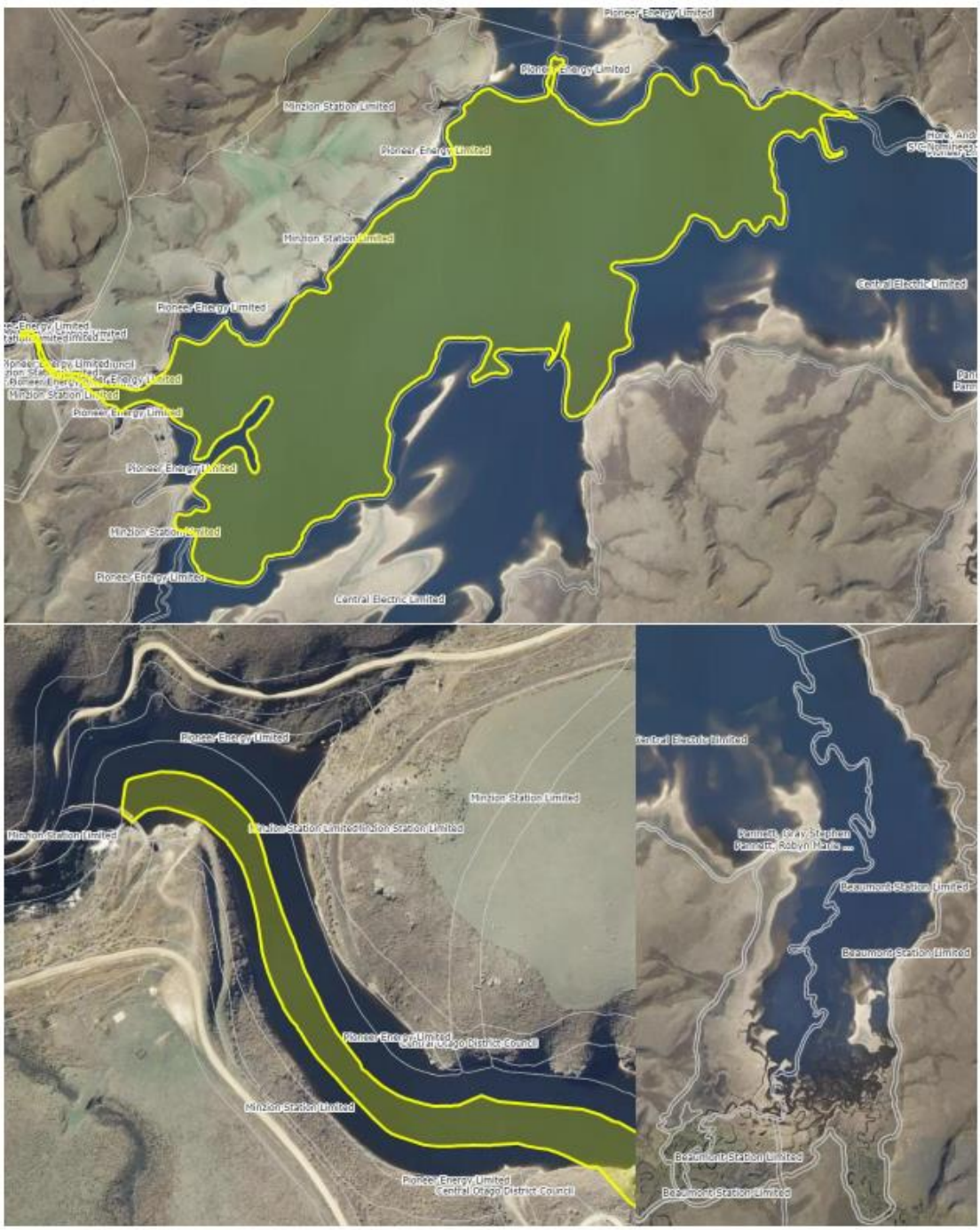

Figure 1: Land ownership in relation to Lake Onslow. Top image – highlighted yellow parcel is the original Lake Onslow parcel. Bottom left image – the parcels either side of the yellow parcel are Crown Land (marginal strip).

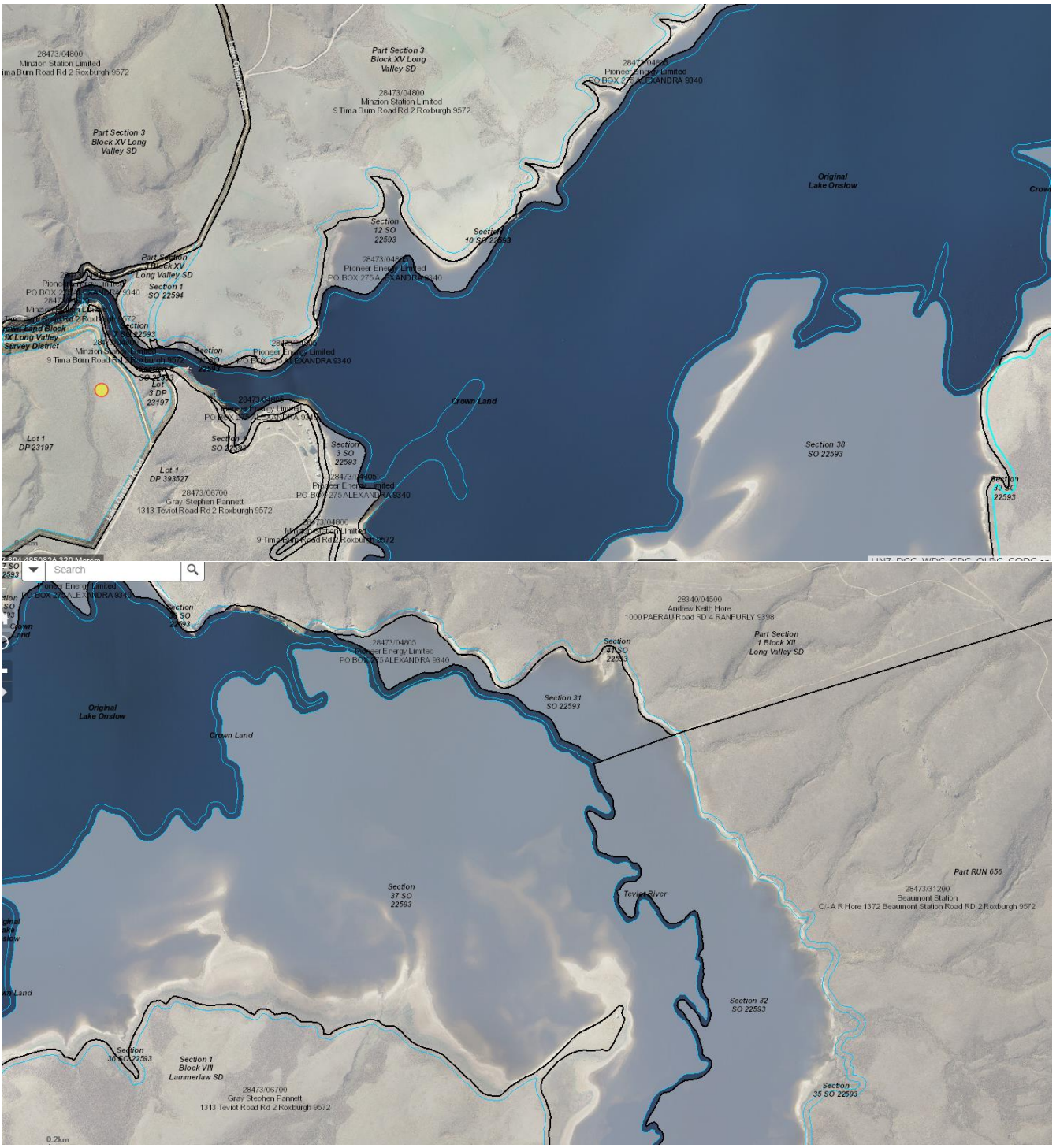

Figure 2: Land Ownership around Lake Onslow (Source: Council GIS)

6.3 Location and Climate

Lake Onslow is situated 38 km from Roxburgh, between the Lammerlaw and Knobby Ranges, at an altitude of 684 masl. A summary of Lake Onslow is provided in the Otago Regional Council report titled Otago Lakes Trophic Status, 2009. The lake has a catchment area of 126 km^2 with rainfall of up to 1,600 mm per year.

Vegetation in the catchment is largely tussock grassland and land use is mainly extensive grazing. However, in recent years there has been an increase in forestry development and more intensive agricultural methods.

The Teviot River flows east to west. The confluence with the Clutha River/Mata-Au is located northeast of Roxburgh. From Lake Onslow to the Clutha River/Mata-Au, there is an altitude difference of approximately 584 metres, with an average gradient of 1 in 20. This 29-kilometre section of the Teviot River flows through a series of steep gorges and is deeply entrenched in bedrock with no meanders or braided sections but rather a series of cascades, small waterfalls, and deep pools with occasional swift boulder runs.

No specific climate information was provided with the Application. The following are key statistics taken from GrowOtago (Table 2). Lake Onslow is a high altitude lake in Central Otago. It generally has cool temperatures, low rainfall in late summer and autumn and higher than average winds.

Table 2: Key climate statistics for Lake Onslow and surrounds (Source: Grow Otago)

Parameter	Value
Median annual air temperature	8.6-9.0 °C
Median autumn air temperature	5.6-6.0 °C
Annual number of days with air temperature above 25 °C	3-4 days
Median annual rainfall	601-650 mm
Median Jan-Feb rainfall	101-140 mm
Median March-April rainfall	81-90 mm
Average annual wind speed	8-14 km/hr
Average annual maximum wind speed	70-80 km/hr

6.4 Ecological and Natural Values

6.4.1 Fish

The Application lodged does not explicitly identify all the ecological and natural values associated with the lake and Teviot River. It recognises the ecological values in the operative RPW schedules only, as detailed in section 3.4.7 of this report. Those natural values relate to trout habitat including for trout spawning. The primary assessment of effects for the application focuses on the effects of the activity on invertebrate production and consequential effects on trout.

The Application includes the Lake Onslow Lake Bed Profile and Invertebrate Survey study 2017 ('**Invertebrate Study'**) prepared by Ross Dungey. The Invertebrate Study does not specifically identify fish species present in the lake but does show that kick samples found the presence of common bullies.

Despite the Invertebrate Study not providing a full list of species present in the lake, in assessing this application the Council has considered all species that (based on the information it holds) are likely to be present. The previous consent application (lodged in 2001) and s42A report does identify the following species as being present in Lake Onslow and/or the Teviot River and/or there are New Zealand Freshwater Fish database (NZFFD) results of these species present in these waterbodies:

- **Brown trout** (*Salmo trutta*) –This species is present in both the lake and the river. It has a significant sports fishery value in the lake, supporting a large angling effort.
- **Waikōura (waikōura)/Freshwater crayfish** (*Paranephrops zealandicus*) – Condition 16 of Water Permit 2001.475 required the Consent Holder to undertake a survey of the waikōura population in Lake Onslow. This survey was undertaken by Ross Dungey Consulting in February 2008[8]. This showed that

[8] Lake Onslow Crayfish survey, Ross Dungey Consulting, October 2008.

Lake Onslow supports a population of waikōura that are widespread throughout the lake in all habitats but primarily in the zones of deeper water and boulder/bedrock lakebed (the key limitations to habitat being trout predation). The report concludes that the Lake Onslow supports a limited crayfish population making it more susceptible to over harvest than if habitat was abundant. It is understood there is commercial waikōura harvesting from the lake.

- **Common Bully** (*Gobiomorphus cotidianus*) – NZFFD record in Lake Onslow. Common bullies are found throughout New Zealand, they inhabit a diverse range of habitats ranging from lake and wetland margins to gravely rivers.
- **Upland Bully** (*Gobiomorphus breviceps*) - In 1993 a study by Otago Fish and Game Council found seven upland bullies in a tributary that flows into Lake Onslow. Upland bullies are found throughout New Zealand, they inhabit a diverse range of habitats ranging from lake and wetland margins to gravelly rivers, usually in gentle flows. They are considered solitary, territorial and largely secretive. As such, it is possible that upland bullies are also present in Lake Onslow
- **Teviot Flathead Galaxiid** *(galaxias, Galaxias 'Teviot')* – (Nationally critical). Present in small headwater tributaries of the Teviot River. Spawn in spring (October to November) laying during flood flows in streamside vegetation or small 'caves' in stream banks[9].
- **Rainbow trout** (*Oncorhynchus mykiss*) - No rainbow trout were surveyed for the previous application. However, there is a past record of their presence within the catchment.
- **Roundhead galaxiids** (*Gallaxias anomalus*) - The roundhead galaxiid is restricted to locations in the South Island south of the Waitaki River. They are often found in low-gradient shingly creeks and springs, within substrate or amongst marginal vegetation or other cover. Kai Tahu classifies these fish as a taonga species. Mr Dungey in further information dated 28 July 2021 states that no galaxiids have been found in the lake but there are records in a few tributaries of the lake and tributaries of the Teviot River downstream of the dam.
- **Longfinned Eel/koikoiwaha** (*Anguilla dieffenbachia*) – likely only in the Teviot River. Mr Dungey in further information dated 28 July 2021 stated that there are no eels present in the majority of the Teviot River given the steep terrain downstream of the dam and the natural barriers that exist. He further notes that almost all of the Teviot River is inaccessible to eels except for the last kilometre between the powerhouse and the Clutha River/Mata-Au.

6.4.2 Macro invertebrates

Macro invertebrates identified in the Invertebrate Study included annelids, caddis, chironomids, bivalves and snails (refer Table 3). The study notes that invertebrate abundance for Lake Onslow is similar to lakes surveyed in a Lake Coleridge survey; these being lakes at a similar altitude and with similar freezing winter temperatures.

Table 3: Relative abundance and distribution of main taxa in Lake Onslow over three survey periods (Source: Invertebrate Study)

[9] Galaxiids – Otago's unique freshwater fish – Teviot flathead galaxias. Department of Conservation brochure. Galaxiids - Otago's unique freshwater fish: Teviot flathead galaxias (doc.govt.nz)

Species	1993	2016	2017
Annelid	mid zone	Decline with depth	Increase with depth
Chironomid	> shallow & mid	> in shallow	> @ mid depth
Caddis	Few in shallow	~ all depths	> @ mid depth
Snail	mid & deep	Shallow only	> @ mid depth
Bivalve	Very Rare	shallow	> @ mid depth

The further information dated 5 April 2018 summarised existing studies on the aquatic ecology (1998-2018) and concluded that habitat in Lake Onslow and the Teviot River is stable or improving. It notes that under the current regime surveys have shown:

- A significant increase in winter invertebrate density;
- Variable summer invertebrate density but within the established range;
- Elevated MCI scores for both summer and winter since the scheme was commissioned; and
- A small but steady increase in mean fish (trout) length.

6.4.3 Plants

The Application did not identify any specific aquatic plants associated with Lake Onslow, including the presence of pest plants. Further information provided on 28 July 2021 confirmed that a previous study did not identify any pest plants in the lake. Future monitoring as part of the LOMP is proposed to establish baseline data on lake plant species.

6.4.4 Water Quality

Land modification and intensification for agriculture has occurred in the Lake Onslow and Teviot River catchment over the last 10-15 years. This appears to have resulted in variations in nitrogen and phosphorus concentrations in the headwaters of the lake with associated effects on water quality. The trophic state of the Lake is assessed as eutrophic based on phosphorus and mesotrophic based on nitrogen and phytoplankton biomass[10]. In 2009 it was concluded that the lake was in a relatively stable state from a water quality perspective.

Lake Onslow at Boat Ramp is a water quality monitoring site used by ORC. There are currently measures of total phosphorus, total nitrogen, ammonia and chlorophyll-a. The state is represented by comparison to the National Objectives Framework (NOF) and the trend shows how the quality of water is changing over time. Figure 3 is a snapshot of the current state and trends at this monitoring site as at June 2021. Overall, the current state of water quality is assessed to be average.

[10] Otago Lakes' Trophic Status, Otago Regional Council, 2009

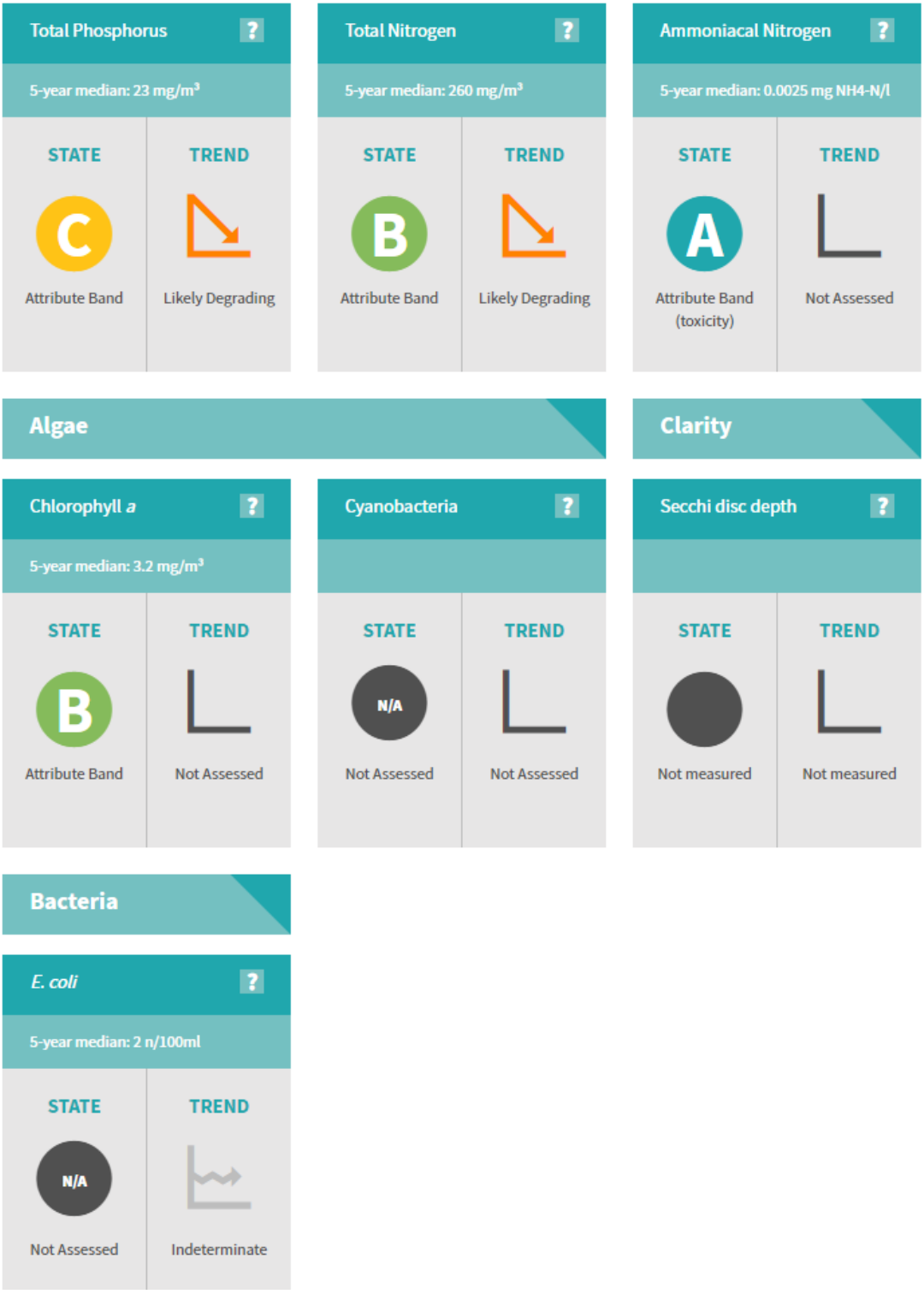

Figure 3: Current state and trends for water quality in Lake Onslow (Source: LAWA, October 2021)

In terms of sediment, Mr Dungey notes in the further information dated 5 April 2018, that a study on sediment accumulation at the head of the Horseshoe Bend impoundment was undertaken in 2013. Sediment sources were identified as being in the fine category (mud and silt) and these sources moved through the river to the Clutha River/Mata-Au.

6.5 Amenity/Recreational Values

The key amenity values associated with Lake Onslow include fishing and boating. The Applicant provided a summary of recreational uses and their prevalence in and around the lake in the further information dated September 2021 (Draft Lake Onslow Recreation Values). The report writer has also reviewed fishing websites to understand the nature of the fishing resource.

6.5.1 Fishing/Angling

There are a number of resources to indicate that the lake is highly valued as a fishing resource for trout. Fishing is popular year-round, and it is stated as being extremely good during the late January/early February cicada hatch. The Lake is said to contain a large population of small to medium-sized brown trout.

NZFishing.com states the following about Lake Onslow:

> *"Lake Onslow is one of Otago's best lake fisheries for brown trout offering excellent fishing for all skill levels and all methods".*
>
> *"In the warm weather with a light wind it offers top quality fishing and is suitable for all methods. Fish rise freely during these warmer months providing excellent dry fly fishing. Many fish can be spotted cruising the shoreline so long casting either with a spinner or fly is unnecessary. Trolling is also very popular".*

Fish and Game New Zealand have the following information on their website regarding Lake Onslow.

> *Lake Onslow carries a large population of brown trout averaging around 1 – 1.5kg, although fish of over 3kg are not uncommon. The fish population is self-sustaining due to excellent spawning habitats in the lake's major tributaries. Set in high tussock grasslands, Lake Onslow is a great place to fish if you love the wideopen spaces and natural beauty of Central Otago.*
>
> *There is good access to the lake edge in several places. A boat ramp is also present near the main huts. A boat is an advantage if you really want to explore Lake Onslow but is not essential to angling success. Most of the access routes are private roads made available for public use by permission of the landowner.*
>
> *All methods can be used. Trolling and spin fishing appear to give the best results, but worm and fly-fishing are also both popular and successful.*

Figure 4 is a map from the Fish and Game *Guide to Lake Onslow*[11] that shows access ways, huts, boat ramp and fishing locations and Figure 5 is an image showing the boat ramp and some of the fishing huts.

[11] Lake-Onslow (1).pdf

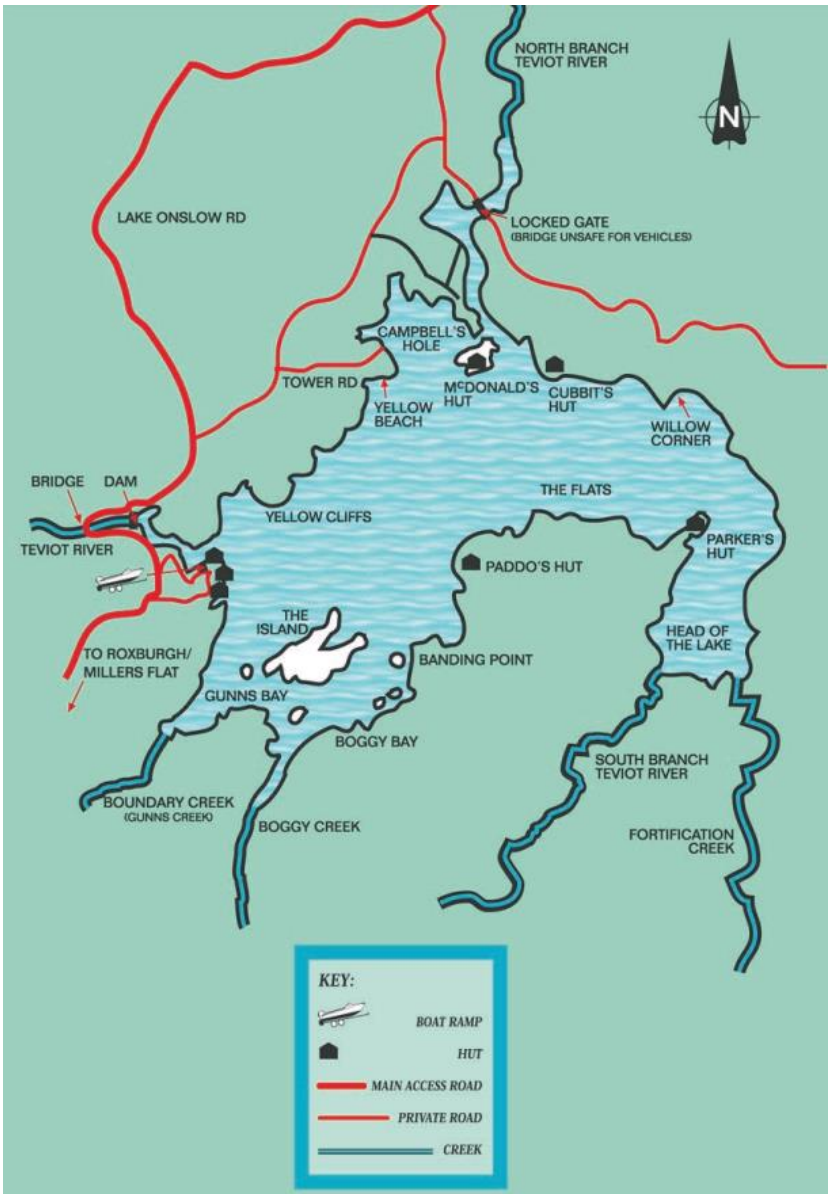

Figure 4: Lake Onslow fishing map (Source: Fish and Game Otago guide to Lake Onslow)

Figure 5: Fishing huts, access tracks and Lake Onslow (Source: Further information)

The Applicant's Recreational report notes that angling occurs throughout the whole lake for brown trout only. Most anglers access the lake from the boat ramp and either fish from the boat (primarily trolling) or use the boat to access otherwise inaccessible shoreline that is then fished on foot. It is noted there is some foot access along the western and northwest shoreline across private land but that 75-80% of the lake is directly inaccessible (from land) due to a lack of public access. Figure 8 below shows the location of the boat ramp and huts and areas of accessibility.

There are no specific high use areas within the lake itself, but effort is spread across the whole lake according to season, fish activity, water temperature and preferred angling method. Angling activity is often greatest at the cicada hatch time. Fishing is experienced by all age demographics and includes locals as well as domestic and international tourists. The huts are owned by anglers and fishing clubs.

The Recreation report confirms that there is a small recreational lobster fishery. Fishing for lobster is via a baited trap and lobsters are most common around the rocky shoreline.

6.5.2 Other Recreation

The Recreation Report provides some details on other recreational users of the lake. Recreation is often associated with the primary fishing activity e.g., boating/sailing, camping, swimming and kayaking but also includes bird watching and game bird hunting with mountain biking and trail biking on 4WD tracks around parts of the lake.

The Applicant understands that most or all boats at Lake Onslow are launched at the boat ramp. The location of various recreational activities associated with Lake Onslow is shown in Figure 6 below. It is recognised that there are limitations in relation to access (variable quality dirt road) and location (including altitude and climate) with more

desirable swimming and boating locations located at lower altitude and closer to main residential areas.

Figure 6: Recreational activities in and around Lake Onslow: Source: Applicant Further Information dated 3 September 2021

Overall, the area has natural scenic beauty that epitomises the Central Otago landscape and the location receives domestic and international visitors, primarily for fishing but also to appreciate the local aesthetics.

6.6 Cultural Values

Lake Onslow is located within the Clutha River/Mata-Au catchment on the north side of the Clutha River. The iwi that has mana whenua relationship with this locality include Te Rūnanga o Moeraki, Kāti Huirapa Rūnaka ki Puketeraki and Te Rūnanga o Ōtākou.

Schedule 1D (Section 3.4.6 below) provides some guidance on the Kai Tahu values associated with Lake Onslow and the Teviot River. Namely these relate to mahika kai and waahi taoka. The Kai Tahu ki Otago Natural Resource Management Plan 2005 (NRMP) expands on these values as they relate to the activity of damming and/or the Clutha River/Mata-Au catchment.

In terms of mahika kai, the Clutha River/Mata-Au was part of a mahika kai trail that led inland. Mahika kai sourced from the catchment includes indigenous fish and manu (bird) such as: tuna, kanakana, kōkōpu, moa, ïnaka and weka. Mahika kai trails were used by Ōtākou hapū. The Mata-Au/Clutha River gave access to wide inland forest clad plains, and to the lakes and mountains beyond. Eels in particular were valued and played a significant part in the social order of Kā Papatipu Rūnaka.

The NRMP notes that the availability of mahika kai and the experience of collecting mahika kai has been affected by modifications in the Clutha/Mata-au Catchments. Daily and seasonal fluctuating flows in the main stem and in tributaries adversely affect mahika kai availability and raise safety issues for people collecting mahika kai.

In terms of mahika kai, the Applicant has reviewed Jill Hamel's *The Archaeology of Otago* (2001) and notes that the Lake Onslow area is likely to have provided mahika

kai historically in the form of moa hunting. This being supported by the presence of Māori ovens and moa bones. The presence of waikōura (freshwater crayfish) is also recognised as a potential mahika kai species by the Applicant.

The Applicant has provided some consideration of waahi taoka. They note that they are not aware of any sites of special significance to iwi that may be affected by the proposal and that there are no sites of significance identified in the Ngai Tahu Atlas[12]. The Applicant has identified that there are 5 sites in or near Lake Onslow of archaeological interest as shown on Archsite[13] (Figure 7). The details of each of these sites is unknown except for the site in the middle of the lake. The Applicant has explained that the lake site is recognised for the presence of a freshwater mussel (*Hyridella menziesii*) being the only mollusc utilised by Māori. An Archsite search was also done for the Teviot River. This showed 3 potential sites on the lower Teviot River with a high concentration around Roxburgh. The Applicant is not aware of the nature of significance of these sites. The Applicant does consider the freshwater mussel as also being an historic and/or current mahika kai species.

Figure 7: Archsite listed archaeological sites for Lake Onslow: Source: Archsite

It is further noted that a cultural impact assessment report (CIA) was prepared by Kai Tahu ki Otago Limited in 2006[14] for the processing of the existing permits that are sought to be varied. This describes the scheme and environment at that date and identifies mahika kai species. The following is noted from the report:

- No fish were observed in the Teviot River when the site was visited but a fisherman was spoken to who had caught trout with waikōura in its stomach.
- Common bully were observed in abundance along the Lake Onslow shoreline.

[12] Atlas — Cultural Mapping Project — Te Rūnanga o Ngāi Tahu (kahurumanu.co.nz)
[13] ArchSite - Archaeological site recording scheme - NZ Archaeological Association (nzarchaeology.org)
[14] Cultural Impact Assessment of Pioneer Generation's Hydro Electricity Power Schemes in Central Otago, New Zealand, Kai Tahu ki Otago Limited (2006)

- Signs of waikōura burrows were very common in Lake Onslow.
- Waikōura are likely to have benefited from the lake habitat and natural barriers to eel movement upstream.
- Flow controls in the Teviot River were considered to have a potentially moderating effect that may increase the productivity of mahika kai.
- Waikōura and brown trout were considered the most important mahika kai species in the catchment. A waikōura survey was recommended. As previously noted, Mr Dungey undertook this survey in 2008 (section 3.4.4).
- A desktop review identified the potential for extensive waahi taoka sites related to mahika kai gathering and collection of orthoquartzite. An archaeological survey was recommended. It is unclear whether this was undertaken.

It is recognised that this CIA reflects a point in time and may not reflect the current cultural landscape.

6.7 Existing Users

Existing users of Lake Onslow and the Teviot River, in addition to those who use the lake and river for recreation purposes, include any permitted activity users (e.g., water takes, gravel takes), and consented users.

Besides from the consents held for the continued operation of the Lake Onslow main dam and 'old' dam, there are no other consented activities associated with Lake Onslow (refer to Figure 8 below). It is noted that the consents associated with the old dam are held by Teviot Irrigation Company Limited and that this dam is located upstream of the current dam. The Applicant has stated that Pioneer Energy Limited operate the Teviot Irrigation Company (TIC) consents on Lake Onslow and the Teviot River under an agreement.

The Applicant has confirmed that they are not aware of any permitted activities associated with Lake Onslow or the Teviot River. The Council is aware of any permitted activities being exercised but is limited in confirming this due to limited collection of information on permitted activities.

There are no registered drinking water supplies at Lake Onslow or on the Teviot River.

Based on the above, the Lake Onslow damming activity and the consented activities/structures associated with the operation of the hydroelectric and irrigation scheme are part of the existing environment, for the purposes of assessing these proposed variation to the resource consent conditions..

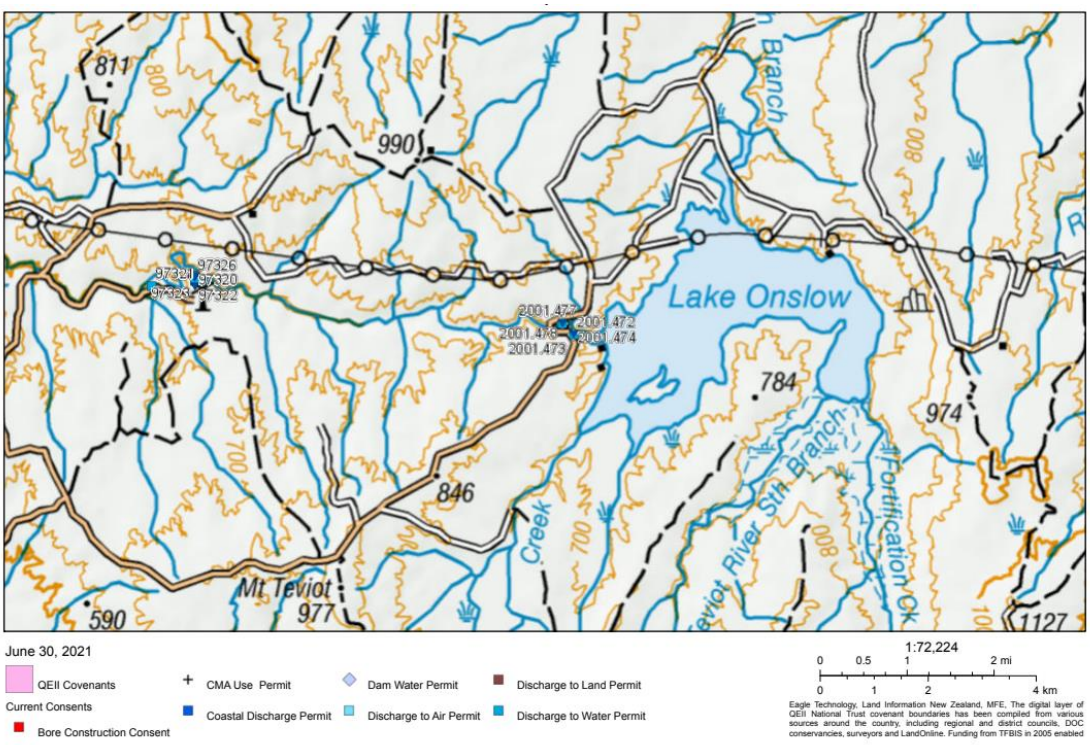

Figure 8: Location of Lake Onslow showing current consented activities (Source: Otago Maps)

6.8 Schedule 1 of the RPW

Lake Onslow is listed in Schedule 1A of the Regional Plan: Water (RPW) as having the following natural values:

- Riparian vegetation of significance to aquatic habitats
- Significant area for development of juvenile trout
- Significant spawning area for trout
- Significant presence of trout

Schedule 1D (schedule of spiritual and cultural beliefs, values and uses of significance to Kai Tahu) lists Lake Onslow as having value for waahi taoka (treasured resource, values, sites and resources that are valued and reinforce the special relationship Kai Tahu have with Otago's water resources), and for mahika kai (places where food is procured or produced). This may include eels, whitebait, kanakana (lamprey), kokopu (galaxiid species), waikōura (fresh water crayfish), fresh water mussels, indigenous waterfowl, watercress and raupo. The specific mahika kai values for this site are unknown but are surmised in Section 3.4.6 above.

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
- The 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
- Significant presence of trout

Schedule 1D (schedule of spiritual and cultural beliefs, values and uses of significance to Kai Tahu) lists the Teviot River as having value for mahika kai.

There are no Schedule 1B (Water Supply Values) or 1C (Registered Historic Places) values associated with Lake Onslow or the Teviot River. The Heritage New Zealand Pouhere Taonga Act 2014 recognises archaeological sites as any place in New Zealand, including any building or structure, that was associated with human activity that occurred before 1900 and provides or may provide, through investigation by archaeological methods, evidence relating to the history of New Zealand. The original dam structure (currently flooded) may meet this definition.

6.9 Schedule 9 of the RPW

Schedule 9 identifies Regionally Significant Wetlands in the Otago Region. Regionally Significant Wetlands are:

- Habitat for nationally or internationally rare or threatened species or communities
- Critical habitat for the life cycles of indigenous fauna which are dependent on wetlands
- High diversity of wetland habitat types
- High degree of naturalness
- Wetland scarce in Otago in terms of its ecological or physical character
- Wetland which is highly valued by Kai Tahu for cultural and spiritual beliefs, values and uses, including waahi taoka and mahika kai
- High diversity of indigenous flora and fauna
- Regionally significant wetland habitat of waterfowl
- Significant hydrological values including maintaining water quality or low flows, or reducing flood flows

The Fortification Creek Wetland Management Area and Middle Swamp are two Regionally Significant Wetlands located near to Lake Onslow. It is noted that any wetland above 800 masl is a Regionally Significant Wetland under the operative RPW. Lake Onslow including its banks are located at 680-700 masl.

The Fortification Creek Wetland Management Area is an extensive wetland area covering the slow-moving meandering lower reaches of Fortification Stream and the Teviot River. It also includes swamps at the inlets to Lake Onslow. The recorded values are shown in Table 3. It is also listed as an Area of Significant Indigenous Vegetation, Habitats of Indigenous Fauna and Wetlands in the Central Otago District Plan.

Table 3: Recorded values of Fortification Creek Wetland Management Area (Source: ORC website)

Value	Description
A1	Habitat for nationally or internationally rare or threatened species or communities. Habitat for threatened Banded Dotterel (*Charadrius bicinctus bicinctus*). The threatened plant species *Cardamine* sp. and *Ranunculus ternatifolius* also present. [1, 22]
A4	High degree of wetland naturalness. [2]
A5	Scarce in Otago in terms of its ecological or physical character. Scarce wetland type. One of the last remaining relatively uniform areas of red tussock (*Chionochloa rubra*) wetland combined with meandering streams. [1]
A8	Regionally significant wetland habitat for waterfowl. [1]
A2, A3, A6, A7, A9	No relevant information is currently held by the ORC.

Middle Swamp is located on the southern margin of Lake Onslow. It is recognised for having a high degree of wetland naturalness. There is no other information on the other regionally significant wetland values of this wetland.

It is noted that there may be other areas above or adjacent to the Lake that are classified as natural inland wetlands under the definition in the NPS-FM.

6.10 Summary of Existing Environment and Natural and Human Use Values

Table 4 below summarises the key values associated with Lake Onslow and the Teviot River,

Table 4: Summary of key values associated with Lake Onslow and the Teviot River

	Lake Onslow	Teviot River	Other
Natural features	Man made, large inland lake, provides 1/3 of catchment water supply	Modified river system (hydroelectric and irrigation infrastructure), 29 km reach to confluence with Clutha River/Mata-Au from Lake Onslow	Lake Onslow and Teviot River catchment land use changes in recent years from tussock lands/extensive pastoral to more intensive farming, forestry
Climate	High altitude lake with freezing winter temperatures, low autumn rainfall. High winds at times.		
Ecological			
Fish	Trout (including spawning and juveniles), common bullies, waikōura	Trout (including spawning and juveniles) and potentially waikōura	Low potential for upland bully in lake and eels in the Teviot River. Galaxiids and upland bully in

			tributaries to the lake and river
Invertebrates	Standard species	Not stated	
Plants	No pest species (Applicant), Riparian Vegetation (Schedule 1)	Not stated. Riparian vegetation in Schedule 1. No pest species in Schedule 1.	Potential for algae in Teviot River
Water Quality	Average, phosphorus increasing	No specific information for river but assumed to be similar to lake water quality	
Wetlands			Fortification Creek and Middle Swamp in headwaters of lake and potentially other natural inland wetlands
Amenity	Angling (primary), boating, swimming, walking, game bird hunting, bird watching (secondary)	Not stated but potentially fishing	
Cultural	Mahika kai (moa, freshwater mussels waikōura, trout) and waahi toaka (freshwater mussels)	Mahika kai (unknown) but potentially waikōura and trout	
Existing Users	Applicant including Teviot Irrigation Company. No known permitted activities	Applicant including Teviot Irrigation Company. No known permitted activities.	
Historical	5 sites in Archsite. 1 site with information (freshwater mussels) Old dam structure.	3 sites in Archsite. No details.	

7. Assessment of Environmental Effects

The Applicant's proposal is to increase the rate at which the lake is drawn down in Lake Onslow from 0.2 m over any 7-day period to a maximum of 0.4 m. The Applicant has also proposed an adaptive management regime to monitor the ecological effects of this change during years when there are low lake levels. This will occur in the short to medium term. The results from this would establish a long term (until the consent expiry in 2041) draw down regime for the lake. It is noted that the monitoring, as proposed by the Draft Lake Onslow Monitoring Plan (**"LOMP"**), is restricted to monitoring the ecological effects of the change with a focus on weed bed monitoring, invertebrate sampling, electric fishing of bullies and trout angler records.

An increase in the rate that the lake is drawn down allows for lake levels to drop more quickly than what is currently authorised to occur over a seven-day period. This effect is primarily likely to occur at lower lake levels where the draw down rate can have a material effect. There may also be more fluctuations in lake levels than what currently can occur although this is dependent on natural inflows refilling the lake and successive draw downs occurring in a season. The change may result in an extended duration where the lake is at lower levels than what would be enabled under the current authorised conditions. The likelihood of this is considered low by the Applicant. The increase to the draw down rate will enable more water to be taken and ultimately discharged from the dam than can currently occur at certain times of the year as there will be a change to the average seven-day flow. This could alter the existing flow regime in the Teviot River.

The main effect assessed in the Application lodged was the stranding of invertebrates in the shallow areas of the lake and consequential effects to trout. This effect is considered below and the wider environmental effects of the proposed change on the ecological values, amenity values, natural character values cultural values and human use values of Lake Onslow, the Teviot River and connected waterbodies. It is noted that Objective 6.3.7 and Policy 6.5.2 and 6.5.3 of the operative RPW (detailed below) establish the primary framework for considering adverse effects associated with operating levels within any controlled lake. There is a key focus on avoiding and mitigating adverse effects on natural and human use values associated with the lake that is a result of the rate of change in lake levels whilst recognising the purpose for the lake level being controlled.

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 drawdown 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

7.1 Effects on the operating regime

The current consents held by the Applicant for Lake Onslow limit and constrain the current management of the Lake. The interplay of the proposed change with other consent conditions that regulate how the lake is managed (e.g. minimum lake level, maximum discharge rate) is necessary to understand what effects this change will have on the operating regime and consequentially on changes to the Lake, Teviot River and associated water bodies. The changes proposed are considered in relation to the below, which is my current understanding of the scheme's operating regime, the proposal and consequential changes to lake levels and river flows.

1. The proposed change is to increase the draw down rate from 0.2 m per seven-days to a maximum of 0.4 m per seven-days (1.2 mm/hr to 2.38 mm/hr on average during a seven-day period). While 0.4 m/seven days is being sought, it is likely that this draw down rate will rarely occur unless the lake levels are very low. It is more likely that an increased drawdown rate of around 0.25 m/week (0.05 m above what is currently consented) would be utilised, in order to respond to electricity market demand.
2. No change is proposed to the lake's maximum operating range (a maximum of 5 m below the crest of the dam[15]). There are statements in the Application that the scheme typically operates between a 1.5-3 m range with lows (i.e. close to 5 m below the crest) experienced once a decade. At 2.5 m below the crest the lake is approximately 51% full.
3. The Applicant manages draw down to provide for electricity demand/market demand with having a full lake to provide for irrigation.
4. The frequency of use of the proposed draw down rate will be a factor of market demand and rainfall (natural inputs) in refilling the dam.
5. The use of the increased rate of draw down is most likely to be in late summer and autumn (March to June) when rainfall inputs are low (low rainfall years) and there is high demand. This period typically has low lake levels.
6. Key to the assessments provided by Mr Dungey in support of the Application is that the increased rate of draw down is not an annual event and will be for a discrete period in late summer in some years only (approximately 2 out of 5) with natural inflows refilling the lake. However, the Applicant has not proposed any restrictions on the frequency of use. There is uncertainty on exactly when the greater draw down rate will be required and future forecasting may be impossible. The extent of environmental effects will be a function of the frequency of use.

[15] *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

7. The maximum rate of take (and discharge[16]) from Lake Onslow is restricted to 6 cumecs[17]. No changes to the maximum rate of take are sought. 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 period[18]. A change to the draw down rate will enable the average ('sustained') rate of take over a seven-day period to increase.
8. The instantaneous draw down rate will not change. The instantaneous draw down rate at any point in time is a factor of the lake level at the time of draw down. The applicant has provided examples of what this could be at a maximum discharge of 6 m^3/s[19]. This is considered to be conservative as this maximum discharge is unable to be sustained for a seven-day period. Changes in lake level are said to be uniformly gradual and immediate.[20]
9. The above suggests that if there is no change to the instantaneous rate the length of time in a seven day period that the lake will continue to drop when the draw down rate increase is employed may be longer.
10. The Applicant states that the take/discharge within a seven-day period varies currently but generally (but not always) has a diurnal pattern. There will be periods of higher take/discharge and periods of lower take/discharge. If the average seven-day rate of take/discharge increases this will result in a change in take/discharge behaviour within the seven-day period. There are no current consent conditions that limit how water is taken/discharged within a seven-day period. There is uncertainty on whether the change will result in short term variability in lake levels and the extent of this effect, if any.
11. The Applicant states that the proposed increased drawdown rate does not directly equate to more fluctuations in lake level in a season. It is simply that water could be taken/discharged more quickly on occasion over a seven-day period. The lake will need to be recharged by rainfall and this will limit how often the faster drawdown can be implemented.
12. The lowest lake level will be reached more quickly than can currently occur as a result of the increased rate of draw down but no additional lake level will be exposed. The duration of the lower lakes level is controlled by rainfall inputs and could theoretically be longer[21]. The Applicant states there is a low likelihood this impact will occur and any extended duration will be minimal.
13. The proposed variation will enable the Applicant to maintain higher average seven-day flows in the Teviot River in dry years when the increased draw down is employed by reducing the restriction on the amount of water that can be discharged in a seven-day period as the reservoir level lowers.

---

[16] *Ipso facto*

[17] *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

[18] 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 dated 9 August 2021 and email dated 13 September 2021.

[19]

- When the lake is full and the outflow is 6m^3/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 400mm will be 8.8d days at a maximum rate of 45.5mm/day.
- When the lake is down 1 m and the outflow is 6m^3/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 2 m and the outflow is 6m^3/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

[20] Clarification email from Applicant dated 9 September 2021

[21] Further information 5 April 2018

14. The worst case scenario is one where the increased draw down rate occurs at any time of the year, multiple times during the year and is employed every year with the lake held at low levels. It is understood that this is very unlikely, given the other constraints that the Applicant is working under. Significant weight has been given to the proposed regime of use as outlined above, being that use of the increased draw down rate will occur 2 out of 5 years during the summer to autumn period.
15. Figures 9-11 below are contextual and show the Lake at different levels and the extent of exposed lakebed.

Figure 9: Lake Onslow dam at high lake levels (left) and with lake level 4.350 m below the crest (right). (Source: Further information)

Figure 10: Lake Onslow dam at high lake levels (left) and with lake level 2-2.5 m below the crest. (Source: Further information)

Figure 11: Lake Onslow boat ramp with moderately high lake levels (left) and moderately low lake levels (right) (Source: Further information)

7.2 Effects on Ecological Values

The change in the rate of draw down could have potential adverse environmental effects to the Lake Onslow ecological community and the downstream Teviot River ecology, including potential effects on plant, invertebrate and fish populations. The Council engaged Mark James from Aquatic Environmental Sciences Limited (**'AES'**) to technically audit the effects on **Lake Onslow ecology** and Babbage Consulting Limited ('**Babbage**') to technically audit the **ecological effects on the Teviot River and other waterbodies** (including the **Regionally Significant Wetlands**).

The existing environment in relation to fauna and flora in Lake Onslow and the Teviot River is described in Section 3 above. The lake primarily provides habitat for trout, common bullies and waikōura and has populations of invertebrates and macrophytes that support these fish species. The Teviot River mainly provides habitat for trout and invertebrates with the presence of algae being noted, at times, and the likely presence of waikōura. The operational constraints of the lake and likely changes the proposal may have on the hydrology of the Teviot River are outlined in the summary points above and are considered below.

7.1.1 Effects to the Ecology of Lake Onslow

Current threats to fish habitat in the lake and the Teviot River are identified by Mr Dungey in further information dated 5 April 2018. This includes:

- land development in the catchment and stock access to riparian margins affecting water quality;
- forestry development in the catchment changing hydrological processes;
- commercial harvesting of waikōura, which is considered to be a potential limiting factor on fish size; and
- the operation of the hydroelectric scheme downstream, notably the Horseshoe bend section, which may result in some residual reaches where there has been a loss of trout habitat.

These wider threats need to be kept in mind when considering whether the changes in ecology are the result of the Applicant's proposal. This will be most relevant when the results of the monitoring proposed by the Applicant (via the LOMP) are being analysed.

<u>Lake Hydrology</u>

Changes to the rate of draw down may result in the lake levels dropping quicker over a seven-day period than what currently occurs and more of the lakebed being exposed in this time period. This may result in less habitat being available on a weekly basis. These changes to available habitat may result in the premature death of invertebrates

and plants. This could have consequential effects on the higher order species (e.g. trout, common bullies and waikōura) that rely on these for habitat and food supply. There is also the potential for increased fluctuations in lake levels over a season and for the lake to be at a lower lake level for longer than currently. Both of these reduce/alter habitat for invertebrates, plants and fish. These potential effects are considered below.

Fish and Invertebrates in Lake Onslow

Policy 5.4.2 of the operative RPW requires priority to be given to avoiding adverse effects on natural values identified in Schedule 1A. For Lake Onslow these primarily relate to trout; being the significant presence of trout in the lake, the provision of spawning areas for trout in the lake and as an area for the development of juvenile trout. The effects assessment has been appropriately focused on how the proposal will change any adverse effects on trout habitat and production.

The Invertebrate Study considers and assesses the effects of an increased rate of draw down on the invertebrate populations in Lake Onslow. Conclusions were made after samples were collected in 2017 at multiple locations and depths around the lake and compared to samples taken in 2016 and 1993. A literature search on lake level draw down and recovery processes of different species groups was also undertaken. The Study suggests that the disturbance created by the draw down is important in creating new habitat and potentially would increase macroinvertebrate habitat and food for trout. Adverse effects would be less than those that would occur as a result of natural variability.

AES, on behalf of the Council, supports the suggestion that variability in lake level can enhance macroinvertebrate productivity. Some variability is important for macroinvertebrate communities as it leads to greater diversity. AES also agrees that natural variability in physical and biological processes between years will obscure any effects of the proposal. This is further supported by Babbage who note that macroinvertebrates have a rapid recolonisation and reproduction rate and recover quickly following habitat disturbance.

Mr Dungey considers that the loss of fish habitat, specifically for trout, because of lower lake levels and the reaching of these levels faster than currently can occur is mitigated through trout seeking cooler waters. It is recognised that angler behaviour may need to change to seek these species out at these times. This effect is assessed in section 7.2 of this report below. Mr Dungey also considers that fish disturbance from the increased rate of draw down should be minimal as the fish will naturally seek out the deeper channels in summer when the draw down is most likely to occur.

In terms of effects on other species that inhabit the lake, in a further information response dated 17 August 2018, Mr Dungey considers effects on invertebrates and common bullies. Mr Dungey concludes that as there is no change to total available habitat under the current consented regime (i.e. there is no change to the lowest lake level), no change to these populations is anticipated. Mr Dungey recognises that the populations have adapted to the variations in lake levels that currently occur. It is noted that losses that may result from the lowering of lake levels faster than they currently occur are mitigated by the return of habitat as lake levels increase (as a result of rainfall). Mr Dungey concludes that no significant adverse effect on invertebrates and bully communities is anticipated or expected. The AES and Babbage audits for Council support these conclusions.

In respect of waikōura, the Applicant has considered the known population information and the habitat preferences of waikōura in Lake Onslow (i.e. it is most common in deep water areas). Mr Dungey notes that their mobility and habitat preferences minimises

the risk of stranding as lake level falls and the increased draw down rate is unlikely to increase their risk of stranding. He does not anticipate any adverse effect from the proposal on this species.

In summary, the food supply for trout, common bully and waikōura is unlikely to be significantly affected by the proposed changes and the fish species will adapt to the changes in habitat that will result from a faster draw down rate. Ecological effects on fish and invertebrates in Lake Onslow are assessed to be less than minor.

Plants in Lake Onslow

The current plant community is limited within the lake. It is possible that this could be attributed to the current and historic lake level fluctuations. Mt Dungey confirmed in further information dated 28 July 2021 that no formal surveys have been undertaken to assess the plant community in Lake Onslow other than to establish that there are no pest plant species in the lake. Mr Dungey has noted that the main emergent species he has so far identified are *Myriophylum* and *Potamogeton*. He further explains that a comprehensive list of plant species will be collated next summer as part of the LOMP to establish the current baseline for effects to be assessed against.

The potential for the proposal to increase the range and extent of pest plant species, provided that these previous surveys are reflective of the current situation, is limited and the effects of the proposal on exacerbating the effects of invasive species in the lake is assessed to be less than minor.

Mr Dungey provided some advice in further information dated 17 August 2018 regarding the presence of macrophytes and the potential for the change to the draw down rate to affect their habitat. Mr Dungey anticipates that the change in rate of draw down should not have any effect on the macrophyte communities including their distribution as the lowest lake level is not changing. Mr Dungey further notes that macrophytes are limited by both wave action and water depth and occupy a narrow band in the lake.

Given this, it is considered that if the change in rate of draw down will occur over a limited and short period it is unlikely to alter the current range of the macrophytes. This includes their expansion into deeper water as there would be an insufficient exposure period for this colonisation to occur. It is noted that this conclusion is limited to the low lake levels being for a limited period and on a biennial or less frequent basis. This conclusion is considered reasonable in this instance.

Overall, effects on lake plants from the proposal are assessed to be minor. This is recognising there are some limitations to our current understanding but sufficient information to make an assessment.

7.1.2 Effects to the Ecology of the Teviot River

Ecological Values of the Teviot River

It is acknowledged in the further information dated 5 April 2018, that the proposal will alter the existing flow regime of the Teviot River. It is understood that although the current consent specifies a maximum rate of take (i.e. discharge) of 6 cumecs and no change to this is proposed, the average weekly discharge of water from Lake Onslow to the Teviot River is currently constrained by the rate of draw down when the lake is 1 m or more below the crest level. The change to the draw down rate does then have a consequential environmental effect on the hydrology and potentially ecology of the Teviot River and this environmental effect is a relevant consideration when assessing

the proposal as a discretionary activity[22]. Greater volumes of water than those currently authorised will not be discharged (the maximum discharge limits are not changing) but the average weekly flows are enabled by the change to increase. The range of flows may reduce in the late summer period for the years when the increased draw down rate is implemented[23]. This may result in some flat lining[24] of the river flows in late summer/autumn which could impact trout and waikōura habitat. The effects of flat lining will be contingent on the period of time that the river is held at a certain flow and the flow the river is held out. In this case, the flow is likely to be held at a higher flow than would naturally occur in the river in the late summer/autumn season. The duration of any flat lining is unknown as it dependent on how the take/discharge is operated, which as previously noted, is a function of market demand/irrigation demand and other factors. Alternatively, the operation of the drawdown could result in increased short term fluctuations in flows. Both of these are considered below. Mr Dungey notes that the range of flows (upper and lower extent) over the entire season is not likely to change.

Policy 6.5.4 of the operative RPW provides some direction around the assessment of effects associated with managed flows. There is a requirement to have regard to the natural and human use values of the water body, the natural character of the water body and the amenity values of the water body; the periodic release of sufficient quantities of water at appropriate flow rates where necessary to remove excess algal growth or an accumulation of sediment downstream of the dam; and the existing needs of consumptive users. The focus in this section is on how the changes in the flow regime may affect the natural values of the Teviot River including agal and sediment changes. Sections below will address the effects of the flow regime change on human use values and natural character.

Aquatic Habitat

The Schedule 1 natural values associated with the Teviot River include that the river provides significant habitat for trout, juvenile trout as well as spawning areas. The river is also recognised as having bounder substrata that is important for resident biota. The other Schedule 1 natural values[25] will not be affected in any manner by the proposal. The timing of the increased average weekly flows is seen to be a positive effect of the proposal on aquatic populations in the Teviot River by Mr Dungey. This is because it will provide more water in the river (i.e. potential fish habitat) at a time when low flow stressors (reduced wetted area, temperature) are likely to limit aquatic species. Mr Dungey does recognise that fluctuating flows could impact aquatic species but considers these effects to be minimal due to the shape of the Teviot River bed ('u' shape) and other limiting factors (existing maximum discharge rate and residual flows on damming/takes on the river). Babbage also note that as trout prefer cooler water they avoid shallow benthic areas that will be affected by any fluctuations. Given the nature of the river bed and the period when flows are likely to be higher (typically during the low flow period and outside the trout spawning season being May to October), effects on fish species (notably trout but also potentially waikōura) and invertebrates are considered to be less than minor. Effects of sedimentation, including on trout spawning areas, are considered below.

[22] *Beadle v Minister of Corrections* EnvC Auckland A074/2002, 8 April 2002, at [88] and Te Rūnanga o Ngāti Awa v Bay of Plenty Regional Council [2019] NZEnvC 196 at [41] — [66].
[23] Further information 5 April 2018
[24] Artificially holding flows at a constant flow rate for an extended period of time such that flows do not reflect natural variability.
[25] Free of aquatic pests identified in the Pest Management Strategy for the Otago Region; The upper reaches are free of Crack Willow; Riparian vegetation of significance to aquatic habitats

Erosion and Sedimentation

Policy 5.4.2 of the operative RPW in the management of any activity involving surface water prioritises the avoidance of causing or exacerbating flooding, erosion, land instability, sedimentation or property damage. This is expanded by Policy 8.4.1 that directs that when managing activities on the bed (such as damming) to give priority to avoiding changes in the nature of flow and sediment processes in those water bodies, where those changes will cause adverse effects including those arising from associated erosion or sedimentation of the bed or margin of any lake, or land instability.

The potential for increased erosion of the Teviot River bed as a result of the higher average weekly discharges has been assessed by Mr Dungey[26]. Figure 12 below shows the discharge from Lake Onslow into the Teviot River. Mr Dungey has considered and compared the discharges to recent flood flows and flushing flows required by other consents[27] held by the Applicant. In those scenarios, gravel movement was limited and river bed scouring unnoticeable. On that basis, the temporarily increased rates of discharge, which are less than flood flows and comparable to flushing flows, are not anticipated to adversely affect any downstream habitat including spawning habitat. It is noted that flood flows are a natural occurrence and erosion and sedimentation that results from that process will occur regardless of the management of the river (noting that the management of the lake discharge will have some impact on the magnitude of a flood event). It is accepted that this evidence supports that the change to discharge regime is unlikely to erode or alter habitat downstream and any effects on flooding, erosion, land instability or property damage from the proposed change are considered less than minor.

There are a number of existing sediment sources to the Teviot River and connected waterbodies (e.g. Clutha River/Mata-Au). These include flood flows and flushing flows and animal impacts on riparian zones. The proposal is potentially adding another opportunity for sediment discharges to the Teviot River with more water being discharged to the river in a seven-day period than can currently occur most specifically when the Lake is at lower lake levels. The sediment sources from Lake Onslow are recognised as fine sediment, which, when it drops out of the water column, can have adverse effects on aquatic habitat. The Teviot River is recognised in Schedule 1 for its trout spawning values. Mr Dungey has concluded that the change in the draw down rate is unlikely to increase sediment load in the lake and the reasons for this are agreed to by Babbage. Therefore, the contaminant concentration in the discharge is not anticipated to change. He also notes that as the sediment sources are fine they are typically 'washed through the system' and do no settle out. The increased discharge volumes (as a result of a faster draw down) may facilitate this. On that basis, the flows discharged from Lake Onslow and any sediment entrained within them are likely to end up in the Clutha River/Mata-Au rather than the Teviot River spawning grounds. Given the flows in the Clutha River/Mata-Au any effects on the values of this water body are considered less than minor. Babbage also note that as the river will be subject to periodic inputs of high sediment the biota in the river will be adapted to this. The increased discharge will have minor effects on the aquatic values including trout spawning values and water quality of the Teviot River. It is noted that no specific monitoring of the Teviot River is proposed in relation to sediment.

[26] Further information 5 April 2018
[27] Condition 2 and 3 of Discharge Permit 2001.477

Figure 12: Lake Onslow dam with discharge into the Teviot River (Source: Further information)

Algal Growth and Plants

Mr Dungey has considered and assessed effects of the altered discharge regime on algal growth in the Teviot River. Condition 2 of Discharge Permit 2001.477 held by the Applicant requires flushing flows to be provided if certain triggers are met[28]. These have not been implemented to date due to flood flow events providing this service. Mr Dungey recognises that the change to draw down rates will not change the frequency and effects of large flood events. However, the change to the draw down rate resulting in more stable flows during late summer and the potential for flat lining could create conditions that are favourable for algal growth[29]. Mr Dungey concludes that as these draw down activities are only anticipated to occur occasionally (not every year) this effect is limited. I note that the Applicant has not proposed any additional measures to monitor and manage algal growth but that the existing conditions on Discharge Permit 2001.477 (as discussed above) will still apply. These will mitigate the adverse effects, if they do arise, from the proposed change.

Macrophytes, or water plants, in the Teviot River have not been discussed in the Application. Babbage note that they are highly unlikely to be present in the Teviot River due to the modified flow regime and they do not consider specific assessment is required.

Summary

[28] *Condition 2: Monitoring of the Teviot River for algae build up, between Lake Onslow Dam and the Marslin Dam, shall be undertaken at representative monitoring locations by a suitably qualified freshwater biologist. The monitoring locations shall be determined in consultation with the Otago Fish and Game Council. If there is a dispute over the location of the monitoring sites, the Consent Authority shall determine the monitoring sites. The monitoring shall be undertaken five times each year at regular intervals between late December and early March, or as otherwise agreed with the Consent Authority. After each monitoring event the consent holder shall provide a biologist's report to the Consent Authority and the Otago Fish and Game Council on the presence of algae and periphyton and an assessment of whether a flushing flow is required to reduce its occurrence.*
Condition 3: If a report required in condition 2 states that a flushing flow is required, the consent holder shall having consulted with the Otago Fish and Game Council and the Consent Authority, release a 5 cubic metres per second pulse of water from Lake Onslow for a period of two hours prior to the next monitoring event, unless an alternative timeframe is otherwise agreed with the Consent Authority.

[29] Further information 5 April 2018

Babbage have audited the information provided by the Applicant and although they have noted that the Application was deficient in providing some base level information on the Teviot River and upstream watercourses, they have not identified any areas of concern in terms of the assessment undertaken and its conclusions.

Overall, I consider effects on aquatic species in the Teviot River from the proposed change to be less than minor.

7.1.3 Effects to other Waterbodies

Connected Waterbodies

The North Branch and South Branch of the Teviot River and other tributaries (e.g. Boggy Creek, Fortification Creek) are the key water sources of Lake Onslow. The Applicant has provided some commentary on upstream connected waterbodies in the Amendment documents (File note from Ross Dungey – Lake Onslow Tributary Fish Passage) specifically around the effects low lake levels may have on fish migration to and from spawning grounds. It is noted that the Teviot flathead galaxiid (nationally critical) does inhabit some of these tributaries. The file note outlines that a river walk of the Teviot river upstream of Lake Onslow did not identify any restrictions to fish passage to spawning grounds at low lake levels. The report further notes that any restrictions to fish passage are likely to be upstream of the lake confluence and are a consequence of factors not related to lake level.

Mr Dungey expanded in further information dated 28 July 2021 around effects on species that occupy tributaries of Lake Onslow (e.g. upland bullies and galaxiids) noting that their upstream location means they will not be directly affected by the change. The proposal will also not result in any changes to existing natural barriers (i.e. those that prevent trout migration into the tributaries.

The Babbage review notes that the proposal will not change the flow of water entering the upstream tributaries and that the Teviot Flathead galaxiid will not be affected by the proposal.

Overall, the proposal is anticipated to have less than minor effects on any upstream connected waterbodies of Lake Onslow.

Wetlands

Objectives 10.3.1 and 10.3.2. of the operative RPW seek to maintain and enhance the individual and collective values of Otago's wetlands and to recognise and sustain Regionally Significant Wetlands and their values. The policies identify what regionally significant wetland values and Regionally Significant Wetlands are. Policy 10.4.2 requires the avoidance of adverse effects except for specific clear exceptions[30]. The direction in the proposed RPS 2021 is that Otago's natural wetlands are protected or restored including no reduction in ecosystem health, hydrological functioning, amenity values, extent or water quality.

As previously identified, there are two Regionally Significant Wetlands located adjacent to Lake Onslow and there could be other natural inland wetlands located adjacent to the lake. Ross Dungey for the Applicant has considered the effects of the proposal on these wetlands in further information dated 28 July 2021. He has concluded that there are not considered to be any adverse effects on the wetlands for the following reasons:

[30] The activity is lawfully established; is nationally or regionally important infrastructure, and has specific locational constraints; or has the purpose of maintaining or enhancing a Regionally Significant Wetland or regionally significant wetland value.

- The wetlands are located upstream of the Lake and will not be subject to any direct impacts from changes in flows downstream of the lake or any new inundation effects.
- There are deeply incised meandering channels between the wetlands and the lake and as lake levels fall this connection still remains.
- The hydraulic controls that determine the water flow relationship between the wetlands and lake are not affected by the change in the draw down rate. Mr Dungey notes that it is not draw down rate that controls inflows.
- Based on the above known hydraulic relationship it is not considered that the change will have adverse effects on the known regionally significant wetland values.
- Refilling of the lake is a factor of rain events and not a function of the draw down rate or operating regime so recharge of the wetlands and streams are independent of the draw down rate.

Babbage have audited the wetlands assessment on behalf of the Council and concluded that the effects from the proposed change on the wetlands has been appropriately assessed and the hydrological conclusions are accurate. They additionally note that the hydraulics of the wetlands are controlled by rainfall and upstream inflows and not the lake level itself and that for the wetlands to be affected by the lake water levels would need to rise significantly, which does not form part of this proposal.

Given the location of the wetlands and their hydraulic relationship with Lake Onslow, it is considered that any effects of the proposal on the Regionally Significant Wetlands or any natural inland wetlands located above Lake Onslow and their values are less than minor.

7.1.4 Effects to Water Quality

Objective 7.A.1 seeks to maintain water quality in Otago lakes and rivers and enhance it where it is degraded. Policy 7.B.1 establishes Schedule 15 of the RPW for describing, setting limits and targets, and maintaining 'good quality water'. Lake Onslow is in Receiving Water Group 4 and the Teviot River is in Receiving Water Group 2 with the current limits (Table 5):

Table 5: Receiving water numerical limits and targets for achieving good water quality in the Teviot River and Lake Onslow

	Nitrate-nitrogen	Dissolved reactive phosphorus	Ammoniacal nitrogen	*Escherichia coli*	Turbidity
Teviot River (Clutha/Mata-Au and any unlisted tributary from Luggate to mouth)	0.075 mg/L (31 March 2025)	0.01 mg/L (31 March 2012)	0.1 mg/L (31 March 2012)	260 cfu/100 mls (31 March 2012)	5 NTU (31 March 2025)
Lake Onslow	0.55 mg/L 31 March 2012)	0.033 mg/L (31 March 2025)	0.1 mg/L (31 March 2012)	126 cfu/100mls (31 March 2012)	5 NTU (31 March 2025)

As noted in Section 6 above, the water quality of Lake Onslow is monitored in accordance with the NOF framework and current water quality data is available via LAWA. Some of the Schedule 15 parameters are measured and they show that

ammoniacal nitrogen and *E.coli* are less than the above limits. There are no monitoring sites on the Teviot River.

The key potential effect to water quality from the proposal is a change to turbidity and sedimentation, as a result of changes to erosion of the lakebed. Erosion of the lake bank can be exacerbated by large fluctuations in lake levels or due to rapid draw down of the lake. The fluctuations of Lake Onslow have been traditionally low. To date no significant erosion has been identified by the Applicant. However, it should be noted, that no specific study has been undertaken. Mr Dungey in clarification to further information dated 9 August 2021 explained that when the lake level was raised in 1981 there would have been wave action erosion at the new level but that the consistent operating regime in recent decades will have limited erosion. Mr Dungey does recognise a few sites near the huts where erosion has occurred with no obvious cause. The proposed change is not anticipated to create any additional shoreline from being exposed to wave action or any new shoreline but may result in an increased area of shoreline being exposed over a weekly period. This is likely to be during late summer. Erosion effects are anticipated to be limited.

Mr Dungey has identified and assessed the potential water quality effects of the proposal on both Lake Onslow and the Teviot River[31]. He has assessed the potential for increased sediment load to the lake and Teviot River downstream of the dam because of the change in the rate of draw down. He considers this potential effect to be unlikely and concludes that the proposal could alternatively reduce sediment and nutrient inputs. This conclusion is based on a reduced period of lakebed exposure to shallower water being worked by wind and wave action due to a faster draw down rate. However, he later notes that the change could alter how sediments (and nutrients in sediments) are entrained in the lake water and this rate of entrainment could result in different water quality effects to those currently in the Teviot River. He considers that water quality monitoring of the Teviot River could occur but that baseline monitoring would need to be established first. It is noted that the LOMP does include consideration of lake water quality but that this will be limited to the LAWA data (Lake Onslow data collected by Council) and that the Applicant is not proposing any specific water quality monitoring of the Teviot River. Babbage have reviewed the application and are in general agreement with the Applicant.

The 2009 trophic status report recognises that Lake Onslow is a man-made, relatively shallow lake in an undeveloped high country catchment but that recent catchment land use change has occurred. As the trophic state of a lake is largely determined by nutrient inputs from the surrounding catchment there is the possibility that the trophic state of Lake Onslow may change with agricultural intensification[32]. It is recognised that this needs to be kept in mind when considering future changes to water quality and the ability to distinguish effects of the proposed change from other changes in the catchment that affect water quality.

Overall, there are not anticipated to be any significant effects on water quality, including cumulative effects. Effects on water quality are considered to be minor.

7.1.5 Summary

AES and Babbage's review of the Application supports the statements that variability in lake level can enhance macroinvertebrate productivity and that any changes as a result of the proposal will be less than the natural variability that occurs between years. AES concludes, after reviewing the Application and supporting information, that the change

[31] Further information dated 5 April 2021
[32] Otago lakes's trophic status, Otago Regional Council 2009

in the draw down rate[33] will not have a more than minor effect on the ecological values of the lake and its ability to support a valued fishery. AES did note that a monitoring regime should be considered if the lake is valued as a fishery and for mahika kai. AES audited and provided input into the LOMP that has been proposed. Otago Fish and Game Council and Aukaha, on behalf of local runanga, have been consulted about the LOMP and associated conditions but it is understood that they have additional monitoring that they would like included (namely amenity and cultural effects monitoring). The LOMP requires specific ecological monitoring of weed beds, invertebrate sampling, electric fishing of bullies and analysis of angler records. The Babbage review supports the conclusions that the proposal will not result in adverse ecological effects on the Teviot River, wetlands or upstream waterbodies that are more than minor.

Overall, effects to the aquatic values of Lake Onslow, the Teviot River and connected waterbodies as a result of the variation are considered to be minor.

7.2 Effects on Amenity Values

Effects on amenity values are a key consideration under the operative RPW. Objective 5.3.4 seeks to maintain or enhance the amenity values associated with Otago's lakes and rivers and their margins. The explanation notes that amenity values are the natural and physical qualities and characteristics that contribute to people's appreciation and enjoyment of the water body. Their appreciation and enjoyment relates to the pleasantness, aesthetic coherence and cultural and recreational attributes of a lake or river. Policy 5.4.2 seeks to avoid adverse effects on the amenity values supported by any water body. Policy 5.4.9 then outlines that the following qualities or characteristics must be had regard to when considering adverse effects on amenity values:

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

The key recreation activities associated with the Lake are identified in Section 3.4.5 of this report and these include lake and lake shore based activities such as fishing/angling, boating, swimming, game bird hunting and peripheral activities such as camping and biking.

There is sufficient evidence to support that Lake Onslow is a regionally significant trout fishery, in part due to the fish present in the lake (size, catch rates, fishable water, access to water) but also due to the aesthetic values of the lake that are appreciated when this recreational activity is undertaken. The effects of the proposal on anglers is necessary to consider. There is also evidence to suggest that a variety of fishing methodologies are employed, including fishing by boat and off the shore. Boat fishing includes fishing from the boat throughout the lake and use of the boat to access the lakeshore for land based fishing. All of the lake is considered 'high use'. Fishing typically occurs from spring through to the end of autumn although there may be some deep water fishing in winter[34].

The other recreational opportunities provided by the lake and its nearshore environment, besides from the ancillary boating activity, appear to be less common and have received limited assessment by the Applicant. There are several huts located near the lake and a boat ramp. Access to the lake is stated by the Applicant to be primarily via this boat ramp and the lake shore adjacent to it. This is mostly due to public access restrictions.

[33] the original proposal to change the draw down rate to 0.5 m/7 days was considered
[34] Lake Onslow – Otago Fish and Game brochure

Dr Kay Booth for R and R Consulting (NZ) Limited ('**Dr Booth'**) undertook an amenity audit of the Application and further information on behalf of Council. The conclusions within her audit are taken into consideration below.

The effects of the proposal on trout productivity are considered in Section 5.1 and are not reassessed here. In short, the proposal is not anticipated to result in more than minor adverse effects to trout habitat or their production and a monitoring regime has been proposed to confirm this.

Further effects of the proposed change on the fishing activity relate to how the fishing experience may change because of the increased rate of draw down. This includes access to the lake[35] and fisherman safety from boat standings. There is a potential that there could be an increased area of mudflats (wetted lake bed) that makes fishing access from the lake edges difficult and/or access to the lake via a boat more challenging. There is also the potential for increased destabilisation of some of the lakeshore bank. Another potential effect could be increased dust by having more lake bed exposed to wind over a seven-day period then currently occurs. The use of the higher rate of draw down is likely to occur in late summer/autumn, which is a key fishing time and higher use period for the lake for the above recreational reasons. Dr Booth concludes that the most material potential effects upon recreation are related to water-based activities and are associated with access, without which recreational activity cannot occur.

Dr Booth notes that the technical information provided (i.e. Recreation Report) is useful but incomplete with the primary weakness being the reliance of the knowledge of a single individual. She further notes that the Application has not assessed human use and appreciation values directly with assessment based on information about sites and species associated with amenity value (such as trout and waikōura) Effects on recreational values are assessed by the Applicant to not be significant. This is based on the proposition that the proposal will not modify to the existing operating environment. Each of the specific potential effects are considered below.

7.2.1 Public access

The proposed change on public access to the lake shoreline and fishing from the lake shoreline is assessed by the Applicant as having no significant effects. Given the location of trout in the late summer/autumn months, most anglers are anticipated to be fishing by boat rather than off the shoreline. The Applicant notes that anglers using boats will also not be inhibited from following the retreating shoreline by boat. Dr Booth recognises that the key angling effect from the proposed change will be to boat users.

Any reduction or limitation on existing public access to the lake edges due to the creation of a greater mud flat area is considered by the Applicant to be an existing effect and is not expected to be enhanced significantly because of the proposal. Dr Booth recognises that exposure of the lake bed as the lake level lowers is dependent on the contour of the terrain and shallower areas will expose a greater area of lake bed surface. The Applicant notes that approximately 60% of the lake shoreline is soft, deep mud at lake levels of 3 m below the dam crest. The Applicant also identifies three bays with relatively shallow water (Pylon Bay in the north and south and south-east bays)[36]. It is recognized that these expose mudflats as the lake levels drop with such an effect

[35] It is noted that Policy 5.4.6 of the operative RPW relates to restriction of legal public access only where necessary and Policy 5.4.7 states that where existing public access to or along the margins of lakes or rivers is restricted by activities the provision or enhancement of alternative access may be required with respect to the restriction of existing legal public access and will be promoted with respect to the restriction of informal access arrangements.

[36] Further information 2 September 2021

being exacerbated in dry years when the lake level is dropped to near its maximum extent. Effects are therefore likely to be most pronounced in these locations. The Applicant assesses that any increase in mudflat creation will have limited effects. This is due to the primary method of fishing at the time of year when the low lake levels will occur (summer/autumn) is lake fishing in deep waters as this is where the trout are most likely to be located. The Applicant also recognizes that these low gradient lakebed margins are likely to be the least favoured locations for trout during the summer months. This does align with the information provided on trout behaviour in warmer temperatures but has not been confirmed with the primary recreational users of the lake. Dr Booth agrees that most of the fishing at this time of year would be away from the shallower areas of the lake. This means that the areas with the greatest potential effect tend to be low use from a recreational perspective.

The Applicant has considered the effects that the change may have to the operational use of the boat ramp; being the only lake launching site. They have identified that the boat ramp is concrete and boat access to lake is possible at different lake levels (within the current consented draw down range). The boat ramp has historically provided angler access at all lake levels since the raising of the lake in 1984. This conclusion is based on Mr Dungey historic and continued use of the boat ramp and aerial views of the boat ramp at different lake levels. It is recognized that there has not been direct communication with any other parties who use the boat ramp about such access. The use of the boat ramp when a faster draw down rate is being employed is relevant as previous advice is that trout will seek cooler and deeper waters and fishing from the lake edge is less likely to be successful. There is nothing to suggest that a change in draw down rate will affect the ability of the recreational users from accessing and using the existing boat ramp but this certainty could be improved by having direct feedback from other key users.

7.2.2 Boat stranding

The potential for there to be an increased risk of boat stranding as a result of the proposal has been considered by Dr Booth. It is recognized that recreational behaviour at the period of time when the increased draw down is likely to occur will most likely be boat based. The nature of the lake bed terrain and climate conditions currently require careful navigation and local knowledge. There is the potential for a life threatening situation to arise if a boat stranding were to occur.

Boat stranding has been assessed by the Applicant to be a very low risk as the change in the hourly maximum drawdown rate as a result of the proposed variation will be undetectable to lake users over a given day's activity. This is based on average figures of a seven-day period for the hourly rate of draw down (1.2 mm/hr at 0.2 m per 7-day draw down and 2.4 mm/hr at 0.4 m per 7-day draw down). The Applicant states that over 14 hours (a theoretical fishing day), the lake level draw down would be approximately 16.8 mm at the current draw down rate and approximately 33.6 mm under the proposed draw down rate resulting in an increased draw down rate of 16.8 mm (1.6 cm). Dr Booth acknowledges this but notes that these are averages over the seven-day period and most pertinent to boat users are short-term lake level changes.

The Applicant has also indicated that there will be no change to the instantaneous rate of draw down as a result of the proposal (i.e. there will be no change to the speed at which the lake can be drawn down currently) and therefore there is no potential for an increased risk of boat stranding. The instantaneous draw down is a function of lake levels (the lower the lake levels the higher the instantaneous draw down) and that the draw down will be even and gradual.

Dr Booth concludes that the risk of boat stranding being exacerbated or increased is slight for mid-range lake levels when the lake is 2 m below the dam but there is

uncertainty at lower lake levels especially within the short term. Overall, potential effects on boat stranding are assessed to be minor.

7.2.3 Dust Effects

There is the potential for increased dust generation from more exposed lakebed on a weekly basis. This could have a direct amenity effects on those who use the area recreationally as well as adversely affecting the occupiers of the fishing huts. It is noted that the climate data indicates that the Lake is a windy location. However, there appears to be no permanent residential dwellings in the vicinity of the lake and the primary receptors would be recreational users and the fishing hut occupiers.

The Applicant considers that an additional 0.2 m of exposed bed per week is minimal and is unlikely to represent a 100 percent increase in dust generation as the shoreline would dry at varying rates depending on the substrate. The Invertebrate Study lodged with the Application does consider lakebed exposure with drops in lake level around different parts of the lake (refer Table 6 below). The key conclusion from this is that depending on the slope each drop in lake level will expose more or less lakebed and that this varies significantly around the lake. The rocky shoreline is the steepest site, with the boat-ramp site intermediate and the muddy shore site the most gentle slope. These are average values and the boat ramp site is complicated by the fact that it starts off on a gentle slope but then drops off steeply at about 4 m below the dam crest. From an amenity perspective, this may mean there are some locations around the lake where the change in the draw down rate will have a limited potential for increasing dust effects especially if the lake bed is rocky in nature but that there are other locations where a more rapid draw down could expose significantly increased areas of lake bed on a weekly basis with a higher likelihood of increased dust generation. It is not clear from the information provided whether the boat ramp location is a high risk area; however, given the nature of the draw down activity and the receptors any dust effects will be no more than minor.

Table 6: Cumulative distance of lake bed exposed for each 0.5 m drop in Lake level Source: Applicant Invertebrate Study

Table 3, cumulative distance (m) of lakebed exposed for each 0.5m drop in lake level. L1S =Line 1 south end of transect, L8NW=line 8 northwest end of transect.

Site	0.5 drop	1m	1.5m	2m	2.5m	3m	3.5m
L1N	1	2	4	4	7	8	8.5
L1S	4	6	10	17	20	22	25
L2N	.5	5	7	10	20	40	55
L3N	2	3	4	8	10	12	15
L4N	20	50	65	70	90	140	215
L5E	20	40	50	50	75	80	130
L5W	10	15	20	20	27	30	50
L6S	25	50	325	330	340	345	350
L7S	20	125	240	500	510	530	560
L8SE	10	15	25	30	40	50	50
L8NW	1	1.5	5	10	15	20	25
L9N	1	2	5	10	15	25	30
L9S	20	115	250	350	500	540	550

7.2.4 Other Recreation

The Recreation report identified that waterfowl/gamebird hunting may occur occasionally in the vicinity of Lake Onslow and that this is most likely to occur around the shallow margins of the Lake. It is unclear from this report what times of the year and how this activity is undertaken specifically in relation to the period of time when the

increased draw down is most likely to occur. However, it is recognized that the effects are likely to be limited to the changes in the lakeshore environment or be related to the boating activity, which have been previously assessed. Given the occasional nature of this activity, it is assessed that any adverse effects will be less than minor.

It is anticipated that as any effects from the change in draw down will be limited to the lakeshore and lake itself and will likely only occur from Feb-May, other primary recreational users of the lake (e.g. mountain bikers, bird watchers, sightseers) are unlikely to be affected by the change or any effects on them will be de minimis or less than minor. Similarly, there is limited information on recreational use of the Teviot River and based on the terrain and nature of the river it is expected to be limited. However, changes to the flow regime are not anticipated to have more than minor effects on any such user, should they exist.

7.2.5 Summary

The Applicant has not proposed any specific mitigation in respect of amenity effects and do not consider mitigation to be necessary. Monitoring of amenity affects is not included within the LOMP.

The Applicant's assessment of amenity effects suggests that as there are no changes to the maximum and minimum extent of the lake or the maximum discharge rate, effects to amenity values will be limited and minor due to the nature of the environment and time of year that the increased draw down rate is likely to occur. Dr Booth has concluded the amenity values with the greatest potential for impact appear to be angling with water based angling being most affected. Dr Booth is primarily concerned with the risk of increased boat stranding recognizing that the risk is likely to be low but that a level of uncertainty exists in the information provided. It is also recognized that there is currently a lack of verified specifics from key users on how the lake is used during the key months when effects are likely to occur and limited information on recreational values associated with the Teviot River and effects on these values. Given the above, effects on amenity values are considered minor.

7.3 Effects on Natural Character

Similar to amenity, there is an objective in the operative RPW that seeks to protect the natural character of Otago's lakes and rivers and their margins from inappropriate subdivision, use or development. The explanation notes that the degree of natural character and what is inappropriate will vary from place to place. Policy 5.4.2 seeks to avoid adverse effects on the natural character or any lake or river, or its margins. Further, there is guidance in Policy 5.4.8 on what to have particular regard to when considering adverse effects on natural character. These include the following:

> *(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 I above*

This has been the primary guidance when considering the effects on natural character from the proposal. Additionally, the proposed RPS 2021 requires the preservation of natural character (LF-FW-P13) with a focus on environmental level regimes that support the health and well-being of the water body and sustaining the form and function of a water body that reflects its natural behaviours.

It is noted from the outset that Lake Onslow is a manmade lake that has altered the flow regime of the Teviot River catchment, along with the dams and associated structures along the river itself, for at least 130 years. Without the damming (i.e. development), there would not be a lake (it is understood a wetland existed in the location prior to the lake). There is therefore no natural water level of the lake or natural bed form or ecology or no natural bahaviour of the lake. This has all arisen as a result of the damming.

Nevertheless, the proposal is seeking to continue operating within the parameters of the existing consents, which requires the lake level to not drop below 5 m below the crest of the dam. As is evidenced from the above, every drop of 0.5 m results in exposed lakebed and a smaller lake area. The exposure is variable around the lake edges depending on the slope of the bed. It is understood that the proposal should not result in exacerbated erosion and will not have more than minor adverse effects on water quality, changes to lakebed topography or the ecology of the lake. For these reasons, and bearing in mind the development in the catchment, it is considered that the effects of the proposal on natural character are less than minor.

7.4 Effects on Cultural Values

As outlined in Section 6, the known Kai Tahu values associated with Lake Onslow and the Teviot River are mahika kai and waahi taoka. Policy 5.4.2 of the operative RPW directs that preference is given to avoiding adverse effects on spiritual and cultural beliefs, values and uses of significance to Kai Tahu as identified in Schedule 1D. Policy LF-WAI-P2 of the proposed RPS seeks to provide for a range of customary uses, including mahika kai, specific to each water body. The vision for the Clutha Mata-Au FMU (the Lake Onslow and the Teviot River are part of) seek that water bodies support thriving mahika kai and Kai Tahu whānui have access to mahika kai. It is considered that significant weight can be given to the proposed RPS even though it is early in the planning process as it represents a significant shift in Council policy and aligns with the NPS-FM 2020.

There is no detail in the Application regarding any direct consultation with local runaka about the specific mahika kai species that are valued at the site, mahika kai locations or the specific waahi taoka values that relate to the lake and the Teviot River. In further information dated 28 July 2021, the Applicant provides details on potential waahi taoka sites and likely mahika kai values based on the known presence of species and expert archaeological information. This further information has confirmed that they are not clear on the locations and extent of mahika kai gathering at Lake Onslow or the Teviot River.

In terms of waahi taoka, the Applicant recognises the presence of potential waahi taoka sites in or near Lake Onslow and the Teviot River but considers the proposed changes to draw down rates will have no effects on these sites. This is in part due to there being no change to the minimum and maximum inundation extent and that the sites would not be affected by shoreline fluctuations. Further, as the proposal is not anticipated to exacerbate erosion of the shoreline these sites are unlikely to be affected.

For mahika kai, the Applicant recognises three species: moa, freshwater mussels and waikōura. Any effects on moa would relate to maintaining the heritage associated with the mahika kai practices. The Applicant recognises that there is the potential for Māori ovens to be located near the bed of Lake Onslow. The proposal is not considered to have any effects on these due to there being no change to maximum and minimum lake levels and that likely adverse effects would have occurred through previous damming (e.g. the original creation of the reservoirs).

For freshwater mussels, the Applicant has uncertainty whether this mahika kai value relates to pre-formation of the lake or is an ongoing activity. The Applicant notes that

the NZFFD has only one record of the freshwater mussel[37] at a location in the lower reach of the Teviot River. Adverse ecological effects are not anticipated due to changes in flows in the river as a result of the proposal. The Applicant considers that any adverse effects on mussels present in the lake will be captured by the LOMP in the amended Application. It is noted the LOMP does not specifically mention or require data on mussel presence to be recorded or considered.

In respect of waikōura, the Applicant recognises that this could be a mahika kai species. The Applicant considers that other threats to this population (e.g. commercial harvesting) will overshadow any effects that the proposal could have on this species and the mahika kai value. The monitoring proposal in the amended Application is stated as the measure to mitigate effects from the proposal on this value. There is no specific recording or assessment proposed in the LOMP in respect of waikōura or any reference to mahika kai in the proposed conditions. It is understood that the monitoring of invertebrates, common bullies and trout is intended to be a proxy for determining the effects of the proposal on waikōura.

In terms of accessing mahika kai and the overall mahika kai experience, effects will be similar to effects on recreational values. It is unclear whether the mahika kai activity is currently occurring or could occur and whether the activity is undertaken in a similar manner to recreational trout fishing. It is understood that waikōura prefer deeper waters and rocky shores suggesting that boat access and the likely collection locations will be less affected by the draw down change. Dr Booth's audit has confirmed that no technical information has been provided about the presence, extent or importance of the activity of mahika kai gathering. She agrees that based on the 2005 CIA the most important mahiha kai species are likely to be waikōura and trout but that the CIA refrains from discussing the activity of mahika kai gathering. Dr Booth recognises that the Applicant's assessment is based on their being no changes to the operating environment. Dr Booth concludes that mahika kai gathering is unlikely to be a significant existing amenity value based on the CIA. Overall, effects on this value are considered to be similar to the activity of angling, which have been assessed as minor (including any effects on future amenity value).

The Applicant stated in further information dated 28 July 2021 that they undertook consultation with iwi via Aukaha prior to lodging the Application. Further consultation has occurred since lodgement as iterations of amendments to the proposal have been made. Aukaha have also been provided a copy of the Amendment lodged with Council. The Applicant notes that they have accommodated some of the suggestions proposed by Aukaha including consideration of water quality in the proposed LOMP and that further discussions are being had with iwi on the inclusion of cultural monitoring conditions and whether these form part of the proposal or not.

To provide some further direction on considering effects on cultural values, the following are the polices in the KtkO NRMP that relate to mahika kai and wai māori in the Clutha River/Mata-Au catchment:

> *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.*

[37] Card no. 30844

7. To require co-ordinated pest management controls

10.2.3 Wai Mäori Policies in the Clutha/Mata-au Catchment
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 Kä Papatipu Rünaka and depending on the legal status of the dam Kä Papatipu Rünaka may advocate for either the removal of existing dams or decline consent to dam.

The Application being considered is limited to the effects of the changes being proposed and the Applicant is not seeking to replace their dam and water permit consents. The proposal does not seek to change or modify existing fish passage and will not result in instream works. The establishment of a natural flow regime will be constrained by the existing consent conditions. The majority of the policies above will be relevant considerations when the current consents are re-consented on expiry (if applications are made). The increased rate of draw down is likely to increase the maximum rate discharged when the draw down is being implemented and the specific cultural effects of this, including whether this alters the mauri of the Teviot River, are unknown.

The potential effects on cultural values will relate to the changes in the rate of draw down affecting invertebrate populations and subsequent mahika kai species in the lake or downstream in the Teviot River. I note that the focus has been on faunal mahika kai species, but there could be plant species also present in these waterbodies that may be affected by the proposal however this may be unlikely given the data available about plant species in the lake and river. The increased rate of draw down could also potentially change the mahika kai experience (e.g. effects on amenity values and access). The ecological evidence indicates that the change to the lake draw down rate will not have more than minor effects on macroinvertebrates or fish species; however, given the lack of understanding of the specific mahika kai values associated with the site, overall effects could be minor.

7.5 Effects on Heritage Values

The effects on heritage values are addressed in part in the section above, where they relate to cultural heritage.

It is noted that the direction of the operative RPW is to avoid adverse effects on registered historic places identified in Schedule 1C of the RPW (Policy 5.4.2). There are no registered historic places associated with Lake Onslow or the Teviot River. This suggests that the proposal will have limited, if any, effects on heritage values. However, Policy 5.4.10 of the operative RPW states that in the management of any activity involving surface water or the bed or margin of any lake or river, particular regard will be given to the heritage value of any site, building, place or area. This includes sites outside of Schedule 1C of the RPW. It is recognised that as the proposal is not changing the inundation extent of the lake from currently, there will be no modification to any archaeological sites that exist outside of the inundation zone, because of the change.

The ‘old dam’ structure may be considered an archaeological site and/or have heritage values, given it was constructed prior to 1900. There has been no confirmation from the

Applicant regarding this and the nature of any heritage values are unknown. The Applicant has confirmed that the crest of the old dam is below the current minimum operating level of Lake Onslow. Accordingly, the proposed changes to the draw down rate would have no effect on this structure or any heritage values it may have. I am satisfied that there is not a need for specific identification of the heritage values associated with this structure or further assessment of effects.

Overall, considering the nature of the proposal, any effects on heritage values are likely to be limited and will be less than minor.

7.6 Effects on other Water Users

Effects on recreational users are assessed in the section above. Other water users could include other consented or permitted activity users of the lake and river. It is noted that Policy 5.4.2 of the operative RPW requires the avoidance of adverse effects on water supply values identified in Schedule 1B of the RPW. There are no such values associated with Lake Onslow or the Teviot River. Policy 5.4.3 of the operative RPW requires the avoidance of adverse effects on existing lawful uses.

The Council's records show the current consents associated with the lake and river are held by the Applicant or the Teviot Irrigation Company (TIC) only. It is understood that both parties manage the scheme to provide for water for hydroelectric and irrigation purposes.

Key effects on TIC would relate to a change in the draw down rate affecting the quality of the water that they take. As discussed previously, the quality of the water (e.g. sedimentation/nutrients) is not anticipated to change significantly as a result of the change to the draw down rate and this is not expected to impact upon their operation. However, there are likely to be changes to water quality as a result of other activities in the catchment. Any minor changes to loadings or the timing of these loadings would have a less than minor effect on TIC and their use of the water for irrigation purposes. The change to the draw down rate is not anticipated to have any adverse effects on the quantity of water available to TIC. The draw down rate can only occur within the consented operating range of the lake for which the maximum extent is the crest of the 'old' dam. TIC hold the consents for the 'old' dam in Lake Onslow for which exercise of the consents is only required when lake levels drop below the crest of the 'old' dam. As previously noted, the Applicant operates the TIC consents in Lake Onslow and the Teviot River on their behalf. Any exacerbation of the use of these consents because of the proposed changes is less than minor.

There are no known permitted activity users in Lake Onslow or the Teviot River and effects on any other water users are *de minimis* or less than minor.

7.7 Conclusion

The proposed changes to draw down rate, if granted, are anticipated to be implemented in late summer and autumn during seasons/years where there have been low rainfall inputs. However, the Applicant is not proposing any restrictions on when the increased rate of draw down will be used. The proposal could have some adverse effects on Lake Onslow and its margins and the Teviot River. Lake Onslow is an important fishery and is recognised for other amenity and cultural values. There are limited other consented users associated with the lake or the river. The change may have some minor adverse effects on amenity values, cultural values and ecological values but overall these effects are considered to be no more than minor based on the nature of the activity, its location and the adaptive management measures proposed. It is recognised that the change will occur with discrete events and this may make some of the effects temporary. The cumulative effects are also considered to be no more than minor.

8. Notification and Written Approvals

8.1 Section 95A Public Notification

Step 1: Is public notification mandatory as per questions (a) – (c) below?

(a) Has the Applicant requested that the application be publicly notified? **No**

(b) Is public notification required by Section 95C? **No**
Has further information been requested and not provided within the deadline set by Council? **No**
Has the Applicant refused to provide further information? **No**
Has the Council notified the Applicant that it wants to commission a report but the Applicant does not respond before the deadline to Council's request? **No**
Has the Applicant refused to agree to the Council commissioning a report?

(c) Has the application been made jointly with an application to exchange recreation reserve land under section 15AA of the Reserves Act 1977? **No**

Step 2: Is public notification precluded as per questions (a) – (b) below?

(a) Is public notification precluded by a rule in the plan or a NES? **No**

(b) Is the application for one or more of the following activities but no other activities**:**

(i) A controlled activity? **No**

(ii) *Repealed*

A restricted discretionary, discretionary or non-complying activity but only if the activity is a boundary activity? **No**

Repealed

Step 3: Does the application meet either of the criteria in (a) or (b) below?

(a) Is the application for a resource consent for one or more activities, and any of those activities is subject to a rule or national environmental standard that requires public notification? **No**

(b) Will the activity have or be likely to have adverse effects on the environment that are more than minor in accordance with Section 95D? **No**

The adverse environmental effects on the environment from the proposal are discussed in section 5 of this report. Based on this review, I consider that there will not be more than minor adverse effects on the environment (discounting the site and adjacent sites).

Step 4: Do special circumstances exist in relation to the application that warrant the application being publicly notified? No

8.2 Section 95B Limited Notification

Step 1

Section 95B(2) Are there any affected groups or persons identified under Section 95B(2):

(a) Protected customary rights groups? **No**

(b) Customary marine title groups? **No**

Section 95B(3)(a) Is the proposed activity on or adjacent to, or may it affect, land that is the subject of a statutory acknowledgement made in accordance with an Act specified in Schedule 11? **No**

Section 95B(3)(b) Is a person to whom a statutory acknowledgement is made an affected person under Section 95E? **No**

Step 2

Is Limited Notification precluded under Section 95B(6)?

(a) Is the application for a resource consent for one or more activities, and each

activity is subject to a rule or national environmental standard that preclude limited notification? **No**

(b) Is the proposal a Controlled Activity that requires consent under the District Plan (other than a subdivision of land)? **No**

Step 3

Having regard to Section 95E of the Resource Management Act, identify persons who would be adversely affected by the proposed activity by effects that are minor or more than minor, but not less than minor and give reasons why affected parties were identified.

No unconditional written approvals were lodged with the Application or in the subsequent period before a notification recommendation was made (Jan 2018 to October 2021).

Section 127(4) provides that for the purposes of determining who is adversely affected by the change, the Council must consider, in particular, every person who make a submission on the original application and may be affected by the change. All original submitters have been considered below and it is noted the specific details of the submission as it relates to the proposed variation.

The following parties have been identified to be affected parties due to effects on them that are minor or more than minor for the reasons stated below. There are no circumstances that justify why it would be unreasonable to require these approvals to be obtained.

Affected Party	**How they are affected**
The Teviot Angling Club	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. The Teviot Angling Club submitted on the resource consents processed 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. 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 assessment[38], the effects of the proposal on them are minor.
Otago Fish and Game Council	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

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

	enhance sports fish and game resources in the recreational interest of anglers and hunters 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. 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.
Aukaha on behalf of Te Runanga o Otakou	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. 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 runanga from the proposal are minor.
Department of Conservation on behalf of the Director General of Conservation	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. 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 waters[39]. There is the potential that the change to the draw down rate could affect these values in a minor manner. DoC also have a statutory responsibility to preserve indigenous freshwater fisheries (as far as practicable) and to protect recreational 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. 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. Overall, the effects of the proposed change on DoC are minor.

[39] Department of Conservation website: Conservation Act 1987: DOC's role

The following parties were not considered to be affected parties to the application as effects on them will be less than minor:

Party	Why they are not affected
Land Information New Zealand	Part of the Lake Onslow bed is Crown Land. There are no records to confirm that this is managed by LINZ. Effects on LINZ are less than minor.
Teviot Irrigation Company	Teviot Irrigation Company hold resource consents for the 'old' dam and take from this dam and for permits associated with damming and taking on the Teviot River. These permits are managed by the Applicant. Potential effects to the TIC include increased use of their damming and water take permit and changes in water quality and quantity. The effects to TIC are less than minor.
Neighbouring landowners including Minzion Station Limited, Beaumont Station Limited, Greg Pannett, Andrew Hore	The changes proposed to the draw down rate will not have adverse effects that are minor or more than minor on the neighbouring properties. The land use of these properties is currently low intensive pastoral farming and any changes to dust generation will be limited and less than minor for these landholdings. There are no known residential or similar structures close to Lake Onslow on these properties. No changes to the operating range of the Lake is proposed and there is no increased potential for inundation or flooding of land as a result of the proposal.
Te Ao Marama	Lake Onslow is located on the true north of the Clutha River/Mata-Au and is understood to not be within the rohe of Runanga represented by Te Ao Marama
Central Otago District Council (CODC) as roading manager and tourism promotor	CODC submitted on the original resource consents. Their submission was in support. The access roads maintained by CODC will not be affected by the change in draw down. Any indirect effects, such as increased dust generation, will be less than minor. Any adverse effects on national or international tourism from the change will be less than minor, given the nature of the proposal and anticipated/assessed effects on amenity values.
Other submitters for the 2001 consent applications (Mr John Cotton of Mt Teviot Station, A J and D J Gillespie, Mr James Richard Hill, G S and R M Pannett, J A and J M Pannett, Deepburn Farming Company	The other submitters on the original consents processed in 2001 did not mention in their submissions any concerns regarding the draw down rate or management of the activity as it related to effects on ecology within the lake or river, amenity values or cultural values. The majority of the submitters were in support and represented users of the irrigation water from the scheme. As identified above, potential effects on TIC are less than minor. Overall, effects on the other submitters are less than minor.

Limited	
Other recreational users e.g. anglers, game bird hunters, mountain bikers, bird watchers	It is considered that Otago Fish and Game Council and the Teviot Angling Club sufficiently represent recreational anglers and game bird hunters and that adverse effects on other recreational users will be limited or non-existent due to the nature and location of these activities and likely effects from the proposed change.
Heritage New Zealand/Pouhere Taonga	Heritage New Zealand/Pouhere Taonga is an autonomous Crown Entity under the Crown Entities Act 2004. Its work, powers and functions are prescribed by the Heritage New Zealand Pouhere Taonga Act 2014. The primary purpose is to promote the identification, protection, preservation and conservation of the historical and cultural heritage of New Zealand. Heritage New Zealand/Pouhere Taonga (under a previous name of NZ Historic Places Trust) supported the original application but requested that an archaeological survey be undertaken. It is unclear whether this has been undertaken. There is some uncertainty on the heritage values associated with the site but, given the nature of the changes proposed, there will not be any effect on the 'old' dam or any heritage locations outside of the current lake bed extent. Overall, the effects on Heritage New Zealand/Pouhere Taonga are less than minor.

Have all persons identified as affected under Step 3 provided their written approvals? No

Step 4 Further notification in special circumstances

Do special circumstances exist in relation to the application that warrant notification of the application to any other persons not already determined to be eligible for limited notification under this section (excluding persons assessed under Section 95E as not being affected persons)? **No**

NOTIFICATION RECOMMENDATION:

In accordance with the notification steps set out above, it is recommended that the application proceed on a **limited notified** basis to the following parties:

- The Teviot Angling Club
- Otago Fish and Game Council
- Aukaha on behalf of Te Runanga o Otakou
- Department of Conservation on behalf of the Director General of Conservation

Name: Natasha Pritchard
Title: Principal Consents Officer
Date: 1 November 2021

DECISION ON NOTIFICATION

Sections 95A to 95G of the Resource Management Act 1991

Date: **2 November 2021**

Application No: **RM18.004**

Subject: ***Decision on notification of resource consent application under delegated authority***

Decision under Delegated Authority

The Otago Regional Council decides that this resource consent application is to be processed on a **limited notified** basis in accordance with sections 95A to 95G of the Resource Management Act 1991.

The above decision adopts the recommendations and reasons outlined in the Notification Recommendation Report above in relation to this application. I have considered the information provided, reasons and recommendations in the above report. I agree with those reasons and adopt them.

This decision is made under delegated authority by:

Joanna Gilroy
Manager Consents