

1 Resource Consent Application



This application is made under Section 88 of the Resource Management Act 1991. *(For Office Use Only)*

Deposit Paid: \$

Charges / Deposits

A deposit **must** accompany the application (see page 8 for amounts). The applicant will be invoiced for all costs incurred in processing this application that exceed the deposit.

Council can accept electronic lodgement of applications if sent to consents.applications@orc.govt.nz. Include "consent application" in the subject line.

Please complete the application in pen. For questions marked with an * you will find notes on page 4

1.* Applicant(s) Details

Applicant(s) name(s) in full: _____

OR Company Name (in full) Rockburn Wines Limited

OR Names of Trustees (in full) if Applicant is a Trust _____

or Name of Incorporation _____

Postal Address C/o - Crowe Horwath

21 Brownston Street

Wanaka Post Code 9305

Street Address _____

(not a P O box number) _____

_____ Post Code _____

Phone Number Business _____ Private _____

Mobile 027 436 0262 Fax _____

Email Address duffyshamrock@xtra.co.nz

Please provide a valid and clear email address. Otago Regional Council is moving to a paperless consenting process – therefore any correspondence including decision documents and consent (if granted) will be sent via email, unless you request a paper copy.

If you do not prefer contact by electronic means, please tick

1(a). Key Contact for Applicant Details

If the applicant consists of multiple parties (e.g. multiple consent holders, Trust etc) please outline who the key contact for the consent will be, if granted.

Key contact name(s) in full: _____

Postal Address _____

_____ Post Code _____

Street Address _____
(not a P O box number) _____
_____ Post Code _____

Phone Number Business _____ Private _____
Mobile _____ Fax _____

Email Address _____

Please provide a valid and clear email address. Otago Regional Council is moving to a paperless consenting process – therefore any correspondence including decision documents and consent (if granted) will be sent via email, unless you request a paper copy.

If you do not prefer contact by electronic means, please tick

2.* Consultant/Contact Details (if not applicant)

Name of Consultant/ Contact Person: Will Nicolson - Landpro Ltd

Postal Address PO Box 302
Cromwell
_____ Post Code 9342

Phone Number Business _____ Private _____
Mobile 027 459 8090 Fax _____

Email Address will@landpro.co.nz

Please provide a valid and clear email address. Otago Regional Council is moving to a paperless consenting process – therefore any correspondence including decision documents and consent (if granted) will be sent via email, unless you request a paper copy.

If you do not prefer contact by electronic means, please tick

3. On Site Supervisor/Manager Contact Details (if applicable)

Name of On Site Supervisor/Manager Person:

Postal Address _____
_____ Post Code _____

Phone Number Business _____ Private _____
Mobile _____ Fax _____

Email Address _____

Please provide a valid and clear email address. Otago Regional Council is moving to a paperless consenting process – therefore any correspondence including decision documents and consent (if granted) will be sent via email, unless you request a paper copy.

If you do not prefer contact by electronic means, please tick

4.* a) Are there any current or expired resource consents relating to this proposal?

Yes No

If yes, give Consent Number(s) and Description: Deemed Permit 98526.V1

b) Do you agree to your current consent automatically being surrendered should a replacement consent be issued.

Yes No

c) Has there been a previous application for this activity that was returned as incomplete?

Yes No

If yes, give Consent Number(s) and Description: _____

d) Have you a pre-application lodged with Council for this activity?

Yes No

If yes, give pre-application Number(s) and Description: _____

e) Have you spoken to a Council staff member about this application prior to lodging this application?

Yes No If yes, please state name of staff member _____

5. The applicant is (tick one): owner leasee prospective purchaser **of the land on which the activity occurs.**

6*. Who is the owner of the land on which the activity occurs/is to occur? (only complete if applicant is not the landowner)

Name of landowner: _____

Postal Address _____

_____ Post Code _____

Phone Number Business _____ Private _____

Mobile _____ Fax _____

Email Address _____

7*. Who is the occupier of the land on which the activity occurs/is to occur? (only complete if the applicant is not the land occupier)

Name of land occupier _____

Postal Address _____

_____ Post Code _____

Phone Number Business _____ Private _____

Mobile _____ Fax _____

Email Address _____

8*. Who leases the land on which the activity occurs/is to occur? (only complete if land is leased and it is not leased to the applicant)

Name of land leasee _____
Postal Address _____

Post Code _____
Phone Number Business _____ Private _____
Mobile _____ Fax _____
Email Address _____

9. Tick the consents required in relation to this proposal:

Water

- Take Surface Water Divert
 Take Groundwater Dam

Discharge onto or into:

- Land Water Air

Land Use:

- Bore construction Bore alteration
 Activities in or on beds of lakes or rivers or floodbanks
 Disturbance of contaminated land

Coastal: Activities in the coastal marine area (i.e., below mean high water spring tide)?

Where you have indicated the type of consent that is required, you must complete the appropriate Application Form before your application can be processed. Application Forms can be found on the Council's website: www.orc.govt.nz.

10. What is the maximum term of consent you are seeking? 35 years

11. Territorial Local Authority in which activity is situated?

- Dunedin City Council Queenstown Lakes District Council
 Clutha District Council Waitaki District Council
 Central Otago District Council

12*. Do you require any other resource consent from any local authority for this activity?

- Yes No

If Yes, please list: _____

Have these consents been applied for/issued? Yes No If Yes

If Yes, please give the date applied for or issued: _____

Notes on Application Form Details

1. Applicant(s) Details

A resource consent can only be held by a legal organisation or fully named individual(s). A legal organisation includes a limited company, incorporated group or registered trust. If the application is for a trust the full names of all trustees are required. If the application is not for a limited company, incorporated group or trust, then you must use fully named individual(s).

2. Consultant/Contact Details

If you are using a consultant/agent for this application put their details here. If you are not, leave question 2 blank.

4 Previous Consent

Do you currently have a resource consent to do the activity that you are applying to renew with this application? If so, please enter the permit number if known and a brief description including the date of issue and the expiry date.

6-8 Landowner, occupier and leasee

If you are not the landowner, land occupier or leasee of the land where the activity will be undertaken, you may be required to obtain their unconditional written approval to your application. On pg 6 there is a form that can be used.

12. Additional Consents

If you are carrying out earthworks or building work you may need other consents from either the ORC or your Territorial Local Authority.

Declaration

Before signing the declaration below, in order to provide a complete application have you remembered to:

Fully completed this Form 1 and the necessary Application Forms

Attached the required deposit.(or pay on line) (see page 8 for deposit that is payable)
Cheques payable to Otago Regional Council

Please note: your deposit may not cover the entire cost of processing your application. At the end of the application process you will be invoiced for any costs that exceed the deposit. Interim invoices may be sent out for applications, where appropriate.

If the required deposit does not accompany your application, staff will contact you on the phone number provided on this form to request payment, and after 3 working days your application will returned if no payment is made for the required deposit.

I/we hereby certify that to the best of my/our knowledge and belief, the information given in this application is true and correct.

I/we undertake to pay all actual and reasonable application processing costs incurred by the Otago Regional Council.

Name/s WILL NICOLSON (on behalf of Rockburn Wines Ltd)
(BLOCK CAPITALS)

Signature/s 
(or person authorised to sign on behalf of applicant)

Designation Consultant
(e.g., owner, manager, consultant)

Date 08/01/2020

Otago Regional Council Postal Address: 70 Stafford St, Private Bag 1954, Dunedin 9054

Consultation

– (consultation is not compulsory, but it can make a process easier and reduce costs).

Under Section 95E of the Resource Management Act 1991 (the Act) the Council will identify affected parties to an application and if the application is to be processed on a non-notified basis the unconditional written approval of affected parties will be required. Consultation with potentially affected parties and interested parties can be commenced prior to lodging the application.

Consultation may be required with the appropriate Tangata Whenua for the area. The address of the local Iwi office is: Aukaha, 258 Stuart Street, P O Box 446, Dunedin, Fax (03)477-0072, Phone (03) 477-0071, email: info@aukaha.co.nz. If you require further advice please contact the Otago Regional Council.

Good consultation practices include:

- Giving people sufficient information to understand your proposal and the likely effects it may have on them
- Allowing sufficient time for them to assess and respond to the information
- Considering and taking into account their responses

Written approval forms are appended to this form on Page 9.

Information Requirements

In order for any consent application to be processed efficiently in the minimum time and at minimum cost, it is critical that as much relevant information as possible is included with the application. **Where an application is significantly incomplete, the Consent Authority may decide not to accept the application for processing.**

Resource Management Act 1991

FOURTH SCHEDULE—ASSESSMENT OF EFFECTS ON THE ENVIRONMENT

(Below are the provisions of the 4th schedule of the Act, which describes what must be in an application for resource consent, as amended in 2015.)

1 Information must be specified in sufficient detail

Any information required by this schedule, including an assessment under clause 2(1)(f) or (g), must be specified in sufficient detail to satisfy the purpose for which it is required.

2 Information required in all applications

- (1) An application for a resource consent for an activity (the **activity**) must include the following:
 - (a) a description of the activity;
 - (b) a description of the site at which the activity is to occur;
 - (c) the full name and address of each owner or occupier of the site;
 - (d) a description of any other activities that are part of the proposal to which the application relates;
 - (e) a description of any other resource consents required for the proposal to which the application relates;
 - (f) an assessment of the activity against the matters set out in Part 2;
 - (g) an assessment of the activity against any relevant provisions of a document referred to in section 104(1)(b). (*“document” includes regional & district plans, regulations, national policy statements, iwi plans*)
- (2) The assessment under subclause (1)(g) must include an assessment of the activity against—
 - (a) any relevant objectives, policies, or rules in a document; and
 - (b) any relevant requirements, conditions, or permissions in any rules in a document; and
 - (c) any other relevant requirements in a document (for example, in a national environmental standard or other regulations).
- (3) An application must also include an assessment of the activity's effects on the environment that—
 - (a) includes the information required by clause 6; and
 - (b) addresses the matters specified in clause 7; and
 - (c) includes such detail as corresponds with the scale and significance of the effects that the activity may have on the environment.

3 Additional information required in some applications

An application must also include any of the following that apply:

- (a) if any permitted activity is part of the proposal to which the application relates, a description of the permitted activity that demonstrates that it complies with the requirements, conditions, and permissions for the permitted activity (so that a resource consent is not required for that activity under section 87A(1));

(b) if the application is affected by section 124 or 165ZH(1)(c) (which relate to existing resource consents), an assessment of the value of the investment of the existing consent holder (for the purposes of section 104(2A)); (c) if the activity is to occur in an area within the scope of a planning document prepared by a customary marine title group under section 85 of the Marine and Coastal Area (Takutai Moana) Act 2011, an assessment of the activity against any resource management matters set out in that planning document (for the purposes of section 104(2B))

4 (relates to subdivisions- not included here as subdivisions not ORC jurisdiction.)

5 Additional information required in application for reclamation

An application for a resource consent for reclamation must also include information to show the area to be reclaimed, including the following:

- (a) the location of the area;
- (b) if practicable, the position of all new boundaries;
- (c) any part of the area to be set aside as an esplanade reserve or esplanade strip.

Assessment of environmental effects

6 Information required in assessment of environmental effects

- (1) An assessment of the activity's effects on the environment must include the following information:
 - (a) if it is likely that the activity will result in any significant adverse effect on the environment, a description of any possible alternative locations or methods for undertaking the activity;
 - (b) an assessment of the actual or potential effect on the environment of the activity;
 - (c) if the activity includes the use of hazardous substances and installations, an assessment of any risks to the environment that are likely to arise from such use;
 - (d) if the activity includes the discharge of any contaminant, a description of—
 - (i) the nature of the discharge and the sensitivity of the receiving environment to adverse effects; and
 - (ii) any possible alternative methods of discharge, including discharge into any other receiving environment;
 - (e) a description of the mitigation measures (including safeguards and contingency plans where relevant) to be undertaken to help prevent or reduce the actual or potential effect;
 - (f) identification of the persons affected by the activity, any consultation undertaken, and any response to the views of any person consulted;
 - (g) if the scale and significance of the activity's effects are such that monitoring is required, a description of how and by whom the effects will be monitored if the activity is approved;
 - (h) if the activity will, or is likely to, have adverse effects that are more than minor on the exercise of a protected customary right, a description of possible alternative locations or methods for the exercise of the activity (unless written approval for the activity is given by the protected customary rights group).
- (2) A requirement to include information in the assessment of environmental effects is subject to the provisions of any policy statement or plan.
- (3) To avoid doubt, subclause (1)(f) obliges an applicant to report as to the persons identified as being affected by the proposal, but does not—
 - (a) oblige the applicant to consult any person; or
 - (b) create any ground for expecting that the applicant will consult any person.

7 Matters that must be addressed by assessment of environmental effects

- (1) An assessment of the activity's effects on the environment must address the following matters:
 - (a) any effect on those in the neighbourhood and, where relevant, the wider community, including any social, economic, or cultural effects;
 - (b) any physical effect on the locality, including any landscape and visual effects;
 - (c) any effect on ecosystems, including effects on plants or animals and any physical disturbance of habitats in the vicinity;
 - (d) any effect on natural and physical resources having aesthetic, recreational, scientific, historical, spiritual, or cultural value, or other special value, for present or future generations;
 - (e) any discharge of contaminants into the environment, including any unreasonable emission of noise, and options for the treatment and disposal of contaminants;
 - (f) any risk to the neighbourhood, the wider community, or the environment through natural hazards or the use of hazardous substances or hazardous installations.
- (2) The requirement to address a matter in the assessment of environmental effects is subject to the provisions of any policy statement or plan.

Set out below are details of the amounts payable for those activities to be funded by fees and charges, as authorised by s36(1) of the Resource Management Act 1991.

Resource Consent Application Fees (from 1 July 2018)

Note that the fees shown below are a **deposit** to be paid on lodgement of a consent application and applications for exemptions in respect of water metering devices. This deposit will not usually cover the full cost of processing the application, and further costs are incurred at the rate shown in the scale of charges. GST is included in all fees and charges.

If you wish to make a payment via internet banking, or on line, the details are below. Please note the applicants name and "consent application" should be used as reference when paying the deposit -

For on line payments go to www.orc.govt.nz and go to Home/ Rates/ Way to Pay and follow prompts

Publicly Notified Applications: ³	\$
First application	5,000.00
Concurrent applications	225.00

Non Notified Applications and Limited Notified Applications: ³	\$
First application (except those below)	1,000.00
Concurrent applications ¹	50.00
Variation to conditions – s127	1,000.00
Administrative variation – s127	500.00
Exemptions from water measuring Regulations	200.00
Bores	500.00
Gravel	500.00

Hearings	Per Note 2 below
Payment for Commissioner request – s100A	Per Note 4 below

Objections	Per Note 4 below
Payment for Commissioner request – s357AB	Per Note 4 below

Transfers and Certificates Deposits:	\$
Transfer of permits and consents	100.00
Priority Table	100.00
Section 417 Certificate	200.00
Certificate of Compliance	200.00
Section 125 – Extension of lapse date	100.00
All Other Costs	As per Scale of Charges

Scale of Charges:	From 1 July 2018
	\$
Staff time per hour:	
* Executive staff	235.00
* Senior Technical/Scientist	170.00
* Technical/Scientist	125.00
* Field Staff	100.00
* Administration	85.00
Disbursements	Actual
Additional site notice	Actual
Advertisements	Actual
Vehicle use per kilometre	0.70
Travel and accommodation	Actual
Testing charges	Actual
Consultants	Actual
Commissioners	Actual
Photocopying and printing	Actual
Councillor hearing fees per hour	
*Chairperson	100
*Member	80
*Expenses	Actual

Notes

- For additional permits in respect of the same site, activity, applicant, time of application, and closely related effect as the first application.
- The deposit payable shall be 90% of the cost of a hearing as calculated by Council in accordance with information contained in the application file and using the scale of charges. The amount payable will be due at least 10 working days before the commencement of the hearing. If the amount is not paid by the due date, then the Otago Regional Council reserves the right under S36 (7) of the Resource Management Act to stop processing the application. This may include cancellation of the hearing.

Should a hearing be cancelled or postponed due to the non payment of the charge, the applicant will be invoiced for any costs that arise from that cancellation or postponement.

Following completion of the hearing process, any shortfall in the recovery of hearing costs will be invoiced, or any over recovery will be refunded to the applicant.

Under Section 100A of the RMA, one or more submitters may make a request to have a resource consent application heard by one or more hearing commissioners who are not members of Council. In this case the applicant will pay the amount that Council estimates it would cost for the application to be heard had the request not been made, and the submitter(s) who made the request will pay, in equal shares, the cost of the application being heard that exceeds that amount payable by the applicant.

Further, the applicant may request to have a resource consent application heard by one or more hearing commissioners who are not members of Council. In this case, the applicant will pay the full costs.

3. Where actual and reasonable costs are less than the deposit paid, a refund will be given.
4. Where an applicant requests under s100A (for a consent hearing) or under s357AB (for the hearing of an objection) an independent commissioner(s); the applicant will be required to pay any increase in cost of having the commissioner(s).

Where a submitter(s) requests under s100A an independent commissioner(s) any increase in costs that is in addition to what the applicant would have paid shall be paid by the submitter. If there is more than one submitter who has made such request the costs shall be evenly shared.

Administrative Charges

The following one-off administration charges shall apply to all resource consent applications received:

Publicly Notified and Limited Notified Applications	\$
First application	100.00
Concurrent applications	50.00
Non-Notified Applications	\$
First application	50.00
Concurrent applications	25.00
Other	\$
Certificate of Compliance	25.00
Section 417 Certificate	25.00
Exemptions from water metering regulations	25.00

Review of Consent Conditions

Following the granting of a consent, a subsequent review of consent conditions may be carried out at either request of the consent holder, or, as authorised under Section 128, as a requirement of Council. Costs incurred in undertaking such reviews will be payable by the consent holder at the rates shown in the Scale of Charges above.

Reviews initiated by Council will not be charged to consent holders.

Compliance Monitoring Charges (from 1 July 2017)

1. Performance Monitoring

The following charges will apply to the review of performance monitoring reports for all consent holders, except those listed in section 1.6 below. The charges shown are annual fixed fees per performance monitoring report or plan, and are inclusive of GST.

		From 1 July 2017
		\$
1.1 Discharge to Air Consent		
Measurement of contaminants from a Stack report		86.00
Ambient air quality measurement of contaminants report		100.00
Management plans and maintenance records		33.50
Annual Assessment report		66.50
1.2 Discharge to Water, Land and Coast		\$
• Effluent Systems	Environmental Quality report	46.50
	Installation producer statements	60.00
	Return of flow/discharge records	60.00
• Active Landfills	Environmental Quality report	58.00
	Management Plans	130.00
• Industrial Discharges	Effluent quality report	42.00
	Environmental report	92.50
	Return of flow/discharge records	60.00
	Annual Assessment report	50.00
	Management Plans – minor environmental effects	130.00
	Management Plans – major environmental effects	260.00
	Maintenance records	30.00

1.3 Water Takes

Verification reports	60.00
Annual assessment report	50.00
Manual return of data per take	80.00
Datalogger return of data per take sent to the ORC	50.00
Telemetry data per consent	35.00
Administration fee – water regulations	100.00
Low flow monitoring charge*	
- Kakanui at McCones	327.00
- Unnamed Stream at Gemmels	1,431.00

*Charge for monitoring sites established by the ORC specifically to monitor consented activities in relation to river flows.

1.4 Structures

Inspection reports for small dams	130.00
Inspection reports for large dams	260.00
Structure integrity reports	80.00

1.5 Photographs

Provision of photos	60.00
---------------------	-------

1.6 Set Fees for Specific Consent Holders

Performance monitoring fees will be charges as 75% of actual costs for the following consent holders

Dunedin City Council
Central Otago District Council
Clutha District Council
Queenstown Lakes District Council
Waitaki District Council
Ravensdown
Contact Energy
Trustpower
Pioneer Generation

Additional charges may be incurred for new consents granted during the year.

2. Audit

Audit work will be charged at half of the actual cost incurred, with the actual costs being calculated using the Scale of Charges.

3. Non-Compliance, Incidents and Complaints

Enforcement work on consent conditions, and remedying negative effects from permitted activities – Scale of Charges.

Gravel Inspection and Management

Gravel extraction fee – \$0.66 per cubic metre (incl. GST). Where more than 10,000 cubic metres of gravel is extracted within a prior notified continuous two month period, the actual inspection and management costs will be charged, as approved by the Director Corporate Services.

Written Approvals of Persons Likely to be Adversely Affected

I/We (Please print full name/s) _____

of (Address) _____

I /we have read the full application for the proposal by (Applicant)

for a Resource Consent (Number) _____ to _____

and give my/our written approval to the proposed activity/activities.

In signing this written approval I/we understand that:

- The consent authority must decide that I/we am/are no longer an affected person, and disregard adverse effects on me/us
- That /we I may withdraw my/our written approval in writing before the hearing, or if no hearing before a decision is made on the application.

Signature/s _____ Date _____

(or person authorised to sign on behalf of affected party/parties)

Phone _____ Fax _____ Email _____

Please note: If this application is subsequently notified the above approval does not constitute a submission as required under Section 96 of the Resource Management Act 1991.

Written Approvals of Persons Likely to be Adversely Affected

I/We (Please print full name/s) _____

of (Address) _____

I /we have read the full application for the proposal by (Applicant)

for a Resource Consent (Number) _____ to _____

and give my/our written approval to the proposed activity/activities.

In signing this written approval I/we understand that:

- The consent authority must decide that I/we am/are no longer an affected person, and disregard adverse effects on me/us
- That /we I may withdraw my/our written approval in writing before the hearing, or if no hearing before a decision is made on the application.

Signature/s _____ Date _____

(or person authorised to sign on behalf of affected party/parties)

Phone _____ Fax _____ Email _____

Please note: If this application is subsequently notified the above approval does not constitute a submission as required under Section 96 of the Resource Management Act 1991.

Resource Consent Application Form 4

To take and use surface water

This application is made under Section 88 of the Resource Management Act 1991.

1. Note to applicants

The purpose of this form is to provide applicants with guidance on information that is required for your application under the Resource Management Act 1991. This form acts as a guide only and Otago Regional Council reserves the right to request additional information.

Please ensure that you fully complete this form **as well as** a fully completed resource consent application form (form 1) in support of your application, **and** preparation of an **Assessment of Environmental Effects** in terms of the Fourth Schedule of the Resource Management Act 1991. Failure to do so may result in Council rejecting your application, requesting further information, or publicly notifying your application, leading to delays in the processing of your application and potential increases in processing costs.

Acceptance of your application for processing does not constitute a guarantee that water allocation is available.

2. General

2.1 This application is for (please tick any applicable box):

A new surface water take

An application to replace a current Water Permit

Water permit number:

Expiry date:

An application to replace a Deemed Permit / Mining Privilege

Deemed permit number:

Expiry date:

2.2 A lapse period of _____ is sought. Provide reasons in application attached.

Note: This is the timeframe within which the consent must be given effect to. The default timeframe is 5 years after the date of commencement of the consent unless stated otherwise.

2.3 A consent term of _____ is sought. Provide reasons in application attached.

Note: This is the timeframe from the date of commencement of the consent which the consent will expire.

2.4 Provide a map or coloured aerial photograph which outlines the following details (as applicable):

The location of the existing and proposed point(s) of take and all associated infrastructure

The location of the water measuring device(s) or system(s)

The total property area boundary

The area(s) to be irrigated (if relevant) by water applied for under this application

The area of the community supply (if relevant)

Distances to any discharge activities

Other surface water bodies and wetlands, and distances from the point of take(s) to them

The coastline and the distance to it (if relevant)

The location of any dairy shed(s)

The location of any known recreational activities, other water takes, areas of significance to iwi and areas where food is obtained from the water body.

3. Volume and rates of take applied for

3.1 Quantity and rate of take

Note: 1,000 litres = 1 cubic metre

- | | |
|----------------------------|------------------------|
| a. Maximum rate of take: | litres per second |
| b. Maximum monthly volume: | cubic metres per month |
| c. Maximum annual volume: | cubic metres per year |

*Note: Some deemed permits refer to hourly/weekly rates. Water permits are issued in litres per second, m³ per month and m³ per year. Should you wish to seek hourly or weekly rates **in addition** to those listed on the form, please provide this information including justification for any variances.*

3.2 Frequency of take

Note both the maximum and estimated average take.

	Average	Maximum
How many hours per day?		
How many days per week?		
How many weeks per month?		

3.2.1 In your application describe the timing of your take, including which months of the year you expect to take water in both an average year and a dry year, and what part of day the water take will generally occur.

3.2.2 In your application describe whether the take is from re-charge or is an augmented take, along with whether your activity provides re-charge back into the catchment.

3.3 Storage

3.3.1 Do you intend to store your water before subsequent use?

Yes

No

3.3.2 If yes, what/how much storage will be provided?

m³

3.3.3 In your application outline the type of storage facilities that are proposed.

Note: You may need a building consent and/or additional resource consents for the construction of storage facilities. If the reservoir is in a water body or captures catchment runoff, you may require resource consents for damming and associated activities.

4. Point(s) of take description

4.1 What are the GPS coordinates of the point(s) you propose to take water from?

Note: if there are more than two points of take, please provide these details on a separate sheet.

Point 1: NZTM 2000 E:

N:

Point 2: NZTM 2000 E:

N:

4.2 Please provide photographs of the proposed point(s) of take

4.3 What is the name of the water body/ies from which the proposed take(s) is/are to occur?

Note: if the water body is unnamed please note this and note the water body it flows into.

4.4 If the take is from a river, stream, spring, drain or modified water body, in your application please provide a full description of the water course, including:

The average channel width and depth at various locations including at the point of take and upstream and downstream of the point of take.

Average flow water velocity including source of flow data and any changes to flow velocity above and below the point of take.

Any flow gauging of the water body. A flow gauging report with photographs of the site and methodology to be attached.

Bed of the water body at the point of take and upstream and downstream of the point of take.

Please also answer the following:

4.4.1 What type of water body will the take/s occur from?

River

Stream

Modified water body

Spring

Drain

4.4.2 Is the water course perennial (flows all year round) or ephemeral?

Perennial

Ephemeral

4.5 If the take is from a lake, pond or wetland please answer the following:

Lake

Pond

Wetland

4.5.1 If the take is from a wetland, is the wetland classed as a Regionally Significant Wetland identified in Schedule 9 of the Regional Plan: Water for Otago?

Yes (list the name and provide an assessment of effects on the wetland)

No

4.5.2 Has the wetland been formed by artificial means?

Artificial

Natural

4.5.3 What is the surface area of the lake/pond/wetland?

4.5.4 How deep is the lake/pond/wetland?

4.5.5 Does the lake/pond/wetland have an outlet? i.e. does water flow out of it?

Yes

No

4.5.6 What is the main source of water that fills the lake/pond/wetland?

Groundwater

Springs

Runoff from surrounding land

Direct rainfall

Stream/river (list name)

Other (provide details)

5. Historical water use

5.1 Water abstracted over at least the last 5 years

Note: if you are applying to replace an existing water permit for primary allocation, or an existing deemed permit or mining privilege you must provide evidence of the amount of water abstracted under that permit for at least the last five years.

The following usage evidence is provided in support of this application:

Water metering records, attached to this application with historical water use summarised and assessed

Water metering records sent to Council electronically or recorded on file by Council with historical water use summarised and assessed

Detail on alternative water use information, attached to this application

5.2 In your application please analyse and assess the historical volumes and pattern of water use based on the water use evidence.

5.3 Provide a summary of your analysis below:

- a. Maximum rate of take: litres per second
- b. Maximum monthly volume: cubic metres per month
- c. Maximum annual volume: cubic metres per year

5.4 For which years have these rates and volumes been recorded?

6. Water use and management

6.1 For what purpose(s) will the water be used?

- Stock water and/or dairy shed use
- Irrigation (provide detail of irrigation use in your application attached)
- Community supply
- Commercial/industrial
- Other

6.2 Will the water take be managed as part of an existing water allocation committee or water management group?

Yes (name of committee of group):

No

6.3 If yes, have you described how the allocation committee/management group operates in your application?

Yes

No

6.4 In your application describe any water rationing regime that operates in the catchment.

6.5 Will the take applied for be operated in accordance with the rationing regime you have described in question 6.4?

Yes

No

6.6 Will you or others “re-take” water from your take (i.e. via a water race)? If yes, please provide details of such re-takes in your application.

Yes

No

7. Measuring and reporting

7.1 In your application describe the type of water metering system that is installed or proposed to be installed.

Note: If currently installed provide proof of installation or note below if proof has already been provided to Council.

7.2 Provide information in your application demonstrating that the installation of the measuring device or system shall be undertaken in accordance with Council guidelines.

Note: If the installation is not able to meet these guidelines, you need to fill out and attach to this application form a Non-Standard Installation Form for Water Measuring Devices, available on our website or through the environmental services unit of the Council.

Tick if completed

Tick if completing a Non-Standard Installation Form for Water Measuring Devices

7.3 Is your water measuring device or system installed or proposed to be installed at the point(s) of take?

Note: The council considers the point of take to be within a 100 metre radius of the physical take point. If your answer is No, you need to apply for a Water Measuring Exemption (WEX) by filling out Application Form 24 – Application for Exemption to use a device or system near the location from which water is taken. A fully completed Form 24 should be lodged at the same time as this application to enable dual processing.

Yes

No – complete an Application Form 24 – Application for Exemption

WEX0164 already applies

8. Location and Efficiency of Water Use

8.1 Provide details of point/area of use (include legal description(s) and grid references.

Yes (attached to application)

No (please outline reasons why this has not been provided)

8.2 Provide a description of any existing works/infrastructure in place, including value, in your application.

Yes (attached to application)

No (please outline reasons why this has not been provided)

8.3 Provide a description of proposed works/infrastructure to give effect to consent sought, including value of investment, in your application.

Yes (attached to application)

No (please outline reasons why this has not been provided)

8.4 Provide an assessment of the proposed use against the Aqualinc report for reasonable water requirements¹.

Completed

Not Completed (provide details of alternative assessment and justification for that)

8.5 If you propose to use water to irrigate land, please outline:

- a. How many hectares of land will be irrigated?
- b. What is the soil type(s) of the land being irrigated?
- c. What will you be irrigating (i.e. crop, pasture etc in ha)?
- d. What is the target application rate (mm/day and mm/year)?

8.6 What type of irrigation system is proposed to be used or is currently being used?

K-line

Centre pivot

Travelling irrigator

Border-dyke/flood irrigation

Other – provide details

8.7 Do you have any water distribution infrastructure in place (for example pipes, storage tanks, open races etc.)?

Yes

No

If yes, in your application please describe the type of infrastructure in place and how you intend to ensure that it is maintained in good working order (e.g. do you intend to have a

¹ "Guidelines for reasonable irrigation water requirements in the Otago Region", Aqualinc, 2017. Note that while this document provides a basis for assessing efficiency of use, other matters may be applicable.

8.9.2 How much water do you require for your dairy shed?

litres/head/day

8.9.3 If you are seeking more water for stock and/or dairy shed use than that recommended by the Council please state why this is in your application.

Note: please provide the source of any data provided. Also include details of stock water transportation if relevant.

8.10 If you propose to use water for industrial use – in your application state what type of industry will be using the water and how will the water be used.

8.11 If you propose to use water for community/domestic supply – please answer the following:

- a. For households, the number of households to be supplied:
- b. For camping grounds, the maximum number of visitors and staff per year:
- c. For schools, the maximum number of students and staff per year:
- d. For motel units, the number and expected occupancy:
- e. Other uses (please describe):

8.12 For all uses, demonstrate in your application how have you calculated the amount of water you need?

Note: Please note that the Council will only grant volumes that have been assessed as efficient, and will assess the volumes sought for efficiency, taking into consideration the local climate, soils, and crop type.

Tick if completed.

8.13 In your application please describe any other sources of water available for the property. How much water is available and what it is used for.

8.14 In your application please describe any measures you are proposing to minimise wastage of water and maximise its efficient use.

9. Assessment of Environmental Effects

Note: Pursuant to Schedule 4 of the Resource Management Act, 1991, there are a number of matters that must be addressed by an assessment of environmental effects. These matters are listed in Form 1, with additional or specific matters relating to water permits are listed below.

9.4 Provide an independent ecological assessment/instream assessment of the water body. It is recommended that all takes not from the main stem of a catchment have this assessment carried out.

Yes (attached to application)

No (please outline reasons why an independent ecological assessment has not been undertaken in your application)

9.5 Outline any physical effect on the locality, including any landscape and visual effect.

Yes (attached to application)

No (please outline reasons why this has not been provided)

9.6 Outline any effect on ecosystems, including effects on plants or animals and any physical disturbance of habitats in the vicinity of the point of take.

Yes (attached to application)

No (please outline reasons why this has not been provided)

9.7 Does the taking of water from the water body cause it to dry up during summer or does the water body naturally dry up downstream of the take?

Yes

No

If Yes, your application should explain approximately how far downstream from your this occurs and in approximately which month in a wet year, average year and dry year this happens.

Note: Please discuss and attach any evidence to the application (e.g. photographs of water body downstream):

9.8 Assess effects on cultural values.

Yes (attached to application)

No (please outline reasons why this has not been provided)

9.8 Assess any effect on other water users or other human use values.

Yes (attached to application)

No (please outline reasons why this has not been provided)

9.9 Describe any positive effects from the take.

Yes (attached to application)

No (please outline reasons why this has not been provided)

9.10 Outline the mitigation you propose in your application. This should include a consideration of the following:

A residual flow

Fish screening on water intakes

Measures for management where there are low flows

Flow sharing measures

Whether base flow is necessary to maintain the water race

Any other applicable measures

9.10 Outline if your instantaneous abstraction rate (litres per second) will be reduced by increasing the length of time over which water is taken.

Yes (attached to application)

No

9.11 Provide a description of any possible alternative water sources or methods for undertaking the activity and why these alternatives have not been selected.

Yes (attached to application)

No (please outline reasons why this has not been provided)

10. Consultation

10.1 Include evidence of any consultation undertaken for this application.

10.2 Identify persons affected by this application.

10.3 Which persons approval have been provided to the application (attach copies of approvals)?

*Note: This **may** include (but not be limited to) consultation with adjoining landowners, other consent holders in the immediate area such as downstream permit holders, iwi (e.g. Te Rūnanga O Ngāi Tahu, Aukaha, Te Ao Marama Inc.), government departments/ministries (e.g. DOC), territorial authorities and recreational associations. To reduce costs and processing times, we recommended that written approval is obtained and submitted with the application for parties which may be affected. Such approval must be unconditional to avoid notification.*

11. Statutory Assessment

Please note that in accordance with Schedule 4 of the RMA, you are also be required to provide an assessment against the relevant provisions of the following documents (if relevant):

National Policy Statement for Freshwater Management.

National Policy Statement for Renewable Electricity Generation.

Resource Management (Measurement and Reporting of Water Takes) Regulations 2010.

National Environmental Standard for Sources of Human Drinking Water.

New Zealand Coastal Policy Statement.

Operative Regional Policy Statement 1998, Proposed Regional Policy Statement and Partially Operative Regional Policy Statement 2019.

Regional Plan: Water for Otago (including description of permitted activities and compliance with permitted activity standards).

Kai Tahu ki Otago Natural Resource Management Plan 2005.

Ngāi Tahu ki Murihiku Natural Resource and Environmental Iwi Management Plan 2008 (for takes from the south side of the Clutha River/Mata-Au)

Any other relevant plan, proposed plan and any other relevant regulations.



LANDPRO

Make the most of your land

**Resource Consent Application
To Otago Regional Council**
Prepared for Rockburn Wines Ltd

January 2020

Prepared For
Rockburn Wines Limited

Prepared By
Landpro Ltd
13 Pinot Noir Drive
PO Box 302
Cromwell

Tel +64 3 445 9905

QUALITY INFORMATION

Reference: L:\18454 - Rockburn Wines Ltd - Deemed
Permit\Docs\AEE\20190827_18454_Rockburn Wines Ltd_AEE_Final.docx

Date: 9 January 2020

Prepared by: Will Nicolson

Reviewed by: Christina Bright

Client Review: Brett Duffy

Version Number: Final

© Landpro 2019

Disclaimer:

We have prepared this report for our client based on their instructions. They may use it, as agreed between us. Landpro has no duty, and does not make or give any express or implied representation or guarantee, whatsoever to any person other than our client. If you are not our client then, unless this report has been provided to you as a local authority or central government agency as part of a public process:

- *you have no right to use or to rely on this report or any part of it, and*
- *you may not reproduce any of it.*

We have done our best to ensure the information is fit for purpose at the date of preparation and meets the specific needs of our client. Sometimes things change or new information comes to light. This can affect our recommendations and findings.

TABLE OF CONTENTS

1.	INTRODUCTION.....	1
1.1	Overview of Proposal	1
1.2	The Applicant.....	2
1.3	Purpose of Documentation.....	2
2.	DETAILS OF PROPOSAL	2
2.1	Overview	2
2.1.1	<i>Deemed Permit 98526 water take and use.....</i>	<i>4</i>
2.1.2	<i>Other applicable permits</i>	<i>9</i>
2.1.3	<i>Titles and easements</i>	<i>10</i>
2.2	Historic use and allocation sought	10
3.	DESCRIPTION OF EXISTING ENVIRONMENT	13
3.1	Land Use and Topography	13
3.2	Climate	13
3.3	Soils and geology.....	14
3.4	Park Burn hydrology and ecology.....	14
3.4.1	<i>Geohydrology.....</i>	<i>14</i>
3.4.2	<i>Aquatic ecology.....</i>	<i>17</i>
3.4.3	<i>Schedule 1 values</i>	<i>19</i>
4.	ACTIVITY CLASSIFICATION	19
4.1	Associated Permitted Activities	21
5.	NON-NOTIFICATION & CONSULTATION	22
6.	ASSESSMENT OF ENVIRONMENTAL EFFECTS.....	23
6.1	Assessment of Alternatives	23
6.2	Effects on stream ecology and hydrology	23
6.3	Residual flow.....	24
6.4	Effects on groundwater	24
6.5	Effects on other water users	25
6.6	Available water allocation.....	25
6.7	Efficiency of use.....	26
6.8	Effects on cultural values	27
6.9	Monitoring.....	27
6.10	Positive effects	27
6.11	Proposed consent conditions	27
7.	STATUTORY CONSIDERATIONS	29
7.1	Part 2 of the RMA	29
7.2	Section 104(1)(b) of the RMA.....	29
7.2.1	<i>National Policy Statement for Freshwater Management.....</i>	<i>30</i>
7.2.2	<i>Resource Management (Measurement and Reporting of Water Takes) Regulations.....</i>	<i>31</i>
7.2.3	<i>Partially Operative Regional Policy Statement for Otago</i>	<i>31</i>
7.2.4	<i>Proposed Regional Policy Statement for Otago</i>	<i>35</i>

7.2.5	<i>Regional Plan: Water for Otago</i>	38
7.2.6	<i>Cultural policies assessment</i>	42
7.2.6.1	Statutory Acknowledgements	42
7.2.6.2	Te Runanga o Ngai Tahu Freshwater Policy Statement	43
7.2.6.3	Kāi Tahu ki Otago NRMP	43
8.	CONSENT DURATION, REVIEW AND LAPSE.....	44
9.	CONCLUSION	45

LIST OF APPENDICES

APPENDIX A: Full-size maps

APPENDIX B: Certificates of title

APPENDIX C: Fish survey and residual flow report

APPENDIX D: Park Burn hydrology investigation

APPENDIX E: Aqualinc calculations and walkthrough

1. INTRODUCTION

1.1 Overview of Proposal

The applicant, Rockburn Wines Limited, holds Deemed Permit 98526.V1, Water Permit 98527.V1, and Discharge Permit 98655. The key details relating to these permits are as follows:

Table 1: Rockburn Wines Ltd permits

Permit No.	Details	Location	Rate of take/discharge	Replace permit?
98526.V1	To take 100,000 L/hour of water from the Park Burn and/or a tributary of the Park Burn.	NZMS 260 G41:124 784 & G41:123 779 (NZTM 2000: 1302448E 5016667N & 1302348E 5016167N)	28 L/s	Yes
98527.V1	To take water from a tributary of the Park Burn that has been discharged into the same tributary from branch race 8746Cr (associated with deemed permit 95789) for up to 4 days per month at a rate of flow of up to 84 L/s and a total volume of up to 15,4300 ¹ L/month.	NZMS 260 G41:123 779 (NZTM 2000: 1302348E 5016167N)	84 L/s	No
98655	To discharge water from branch race 8746Cr (associated with deemed permit 95789) into a tributary of the Park Burn for up to 4 days per month at a rate of flow of up to 84 L/s and for a total volume of up to 15,430,000 L/month.	NZMS 260 G41:112777	84 L/s	No

The purpose of this application is to replace Deemed Permit 98526, which is due to expire on October 1st, 2021. Rockburn Wines Ltd are also shareholders in Deemed Permit 95789, the replacement of which is the subject of a separate application. Permits 98655 and 98527, which respectively authorise the discharge and retake of 95789 water from the Park Burn, have not been utilised by the applicant as this water has instead been abstracted from a neighbouring water user's dam (discussed later). For this reason, the applicant does not wish to replace these two permits.

¹ It is assumed that is a typo, and in fact the maximum monthly limit is 15,430,000 L. It is unclear where this number is derived from, given that 4 days of abstraction at a maximum rate of 84 L/s would result in a total of 29,030,400 L (29,030 m³)

This application is being made more than 6 months prior to the expiry of the current permit, and so the applicant may continue to operate within the existing permit under s124 of the RMA until the new permit is granted.

1.2 The Applicant

Applicant Address: Rockburn Wines Limited
C/o – Crowe Horwath,
21 Brownston Street,
Wanaka, 9305

Address for Service: C/- Landpro Limited
PO Box 302
Cromwell 9342

1.3 Purpose of Documentation

Pursuant to Section 88 of the Resource Management Act 1991 (the RMA), this report provides an assessment of the activity's effects on the environment as required by Schedule 4 of the RMA.

2. DETAILS OF PROPOSAL

2.1 Overview

The applicant owns and manages approximately 24 ha of vineyard on the terraces above Lake Dunstan, 1.6 km northwest of Pisa Moorings. Water is taken from the Park Burn under Deemed Permit 98526 (subject to this application) for the purpose of irrigating these vines, with Deemed Permit 95789 water (not subject to this application) also occasionally taken to supplement irrigation water when Park Burn flows are lacking. Figure 1 shows the location the applicant's property in relation to the existing take points, races and reservoir, and the permitted (but currently unexercised) discharge location. A full-size copy of Figure 1 is provided in Appendix A.

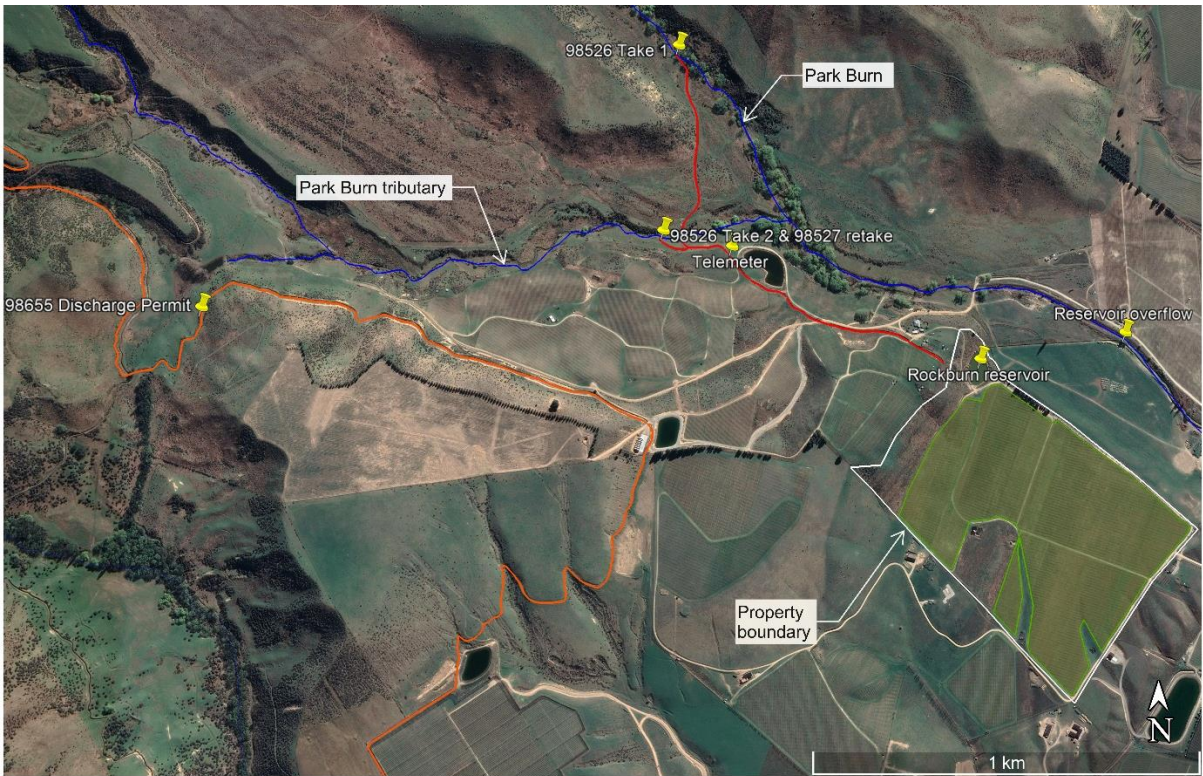


Figure 1: Rockburn Wines Ltd water take and use overview. The red line represents the applicant's Park Burn race, while the orange line represents the 95789 race (maintained by the applicant and others, not part of this application).



Figure 2: Close up of Rockburn water intake and conveyance infrastructure

2.1.1 Deemed Permit 98526 water take and use

The applicant's primary source of water is from the Park Burn, authorised by way of 98526. This permits the abstraction of up to 28 L/s from either of two locations – the first of which is on the main trunk (Take 1, Figure 3) of the Park Burn, and the second of which is on a tributary of the Park Burn (Take 2, Figure 5). Both intakes are simply open channel diversions from the source creek, however flows into both intakes can be controlled via sluice gate.

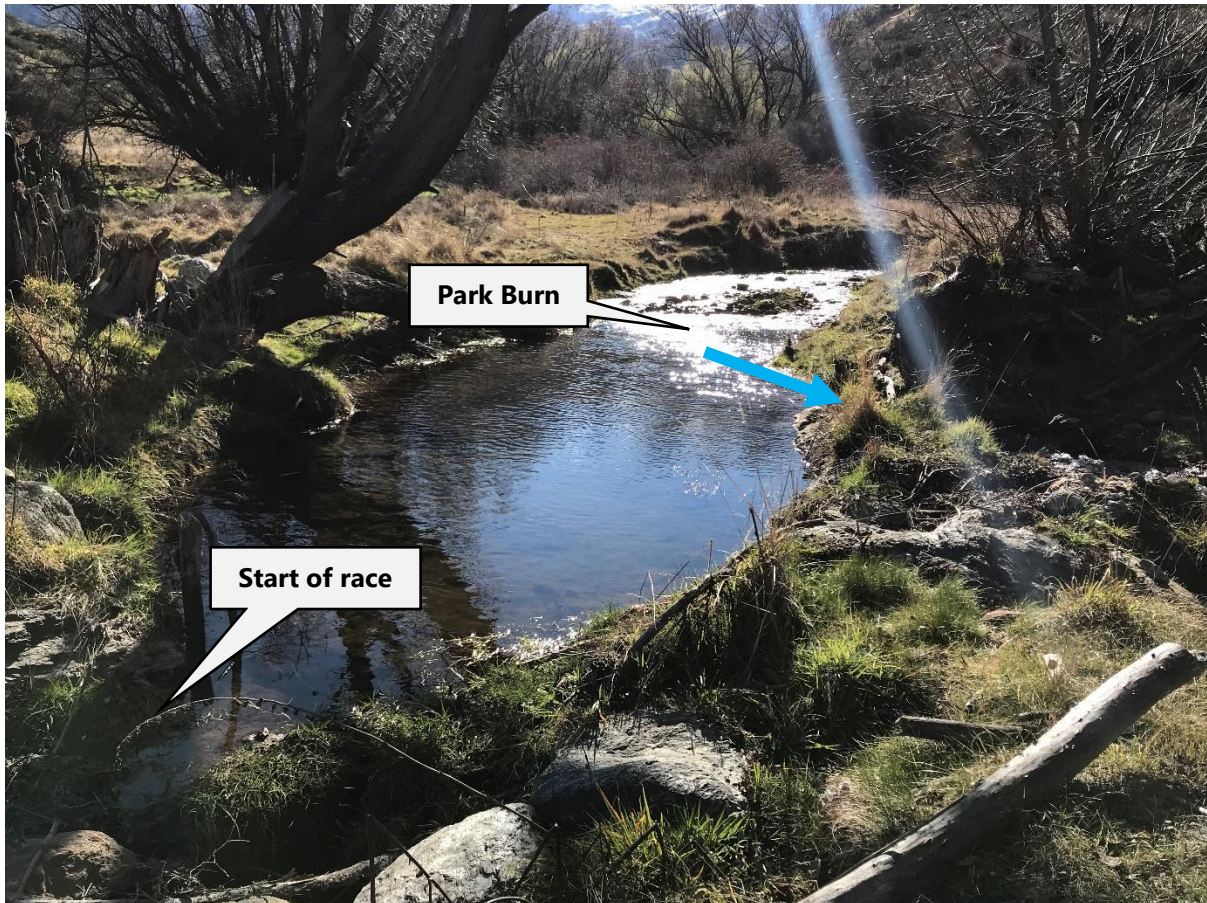


Figure 3: Permit 98526 Take 1 on the Park Burn (August, 2019)



Figure 4: Permit 98526 race just d/s of Take 1, closed for winter (August, 2019)

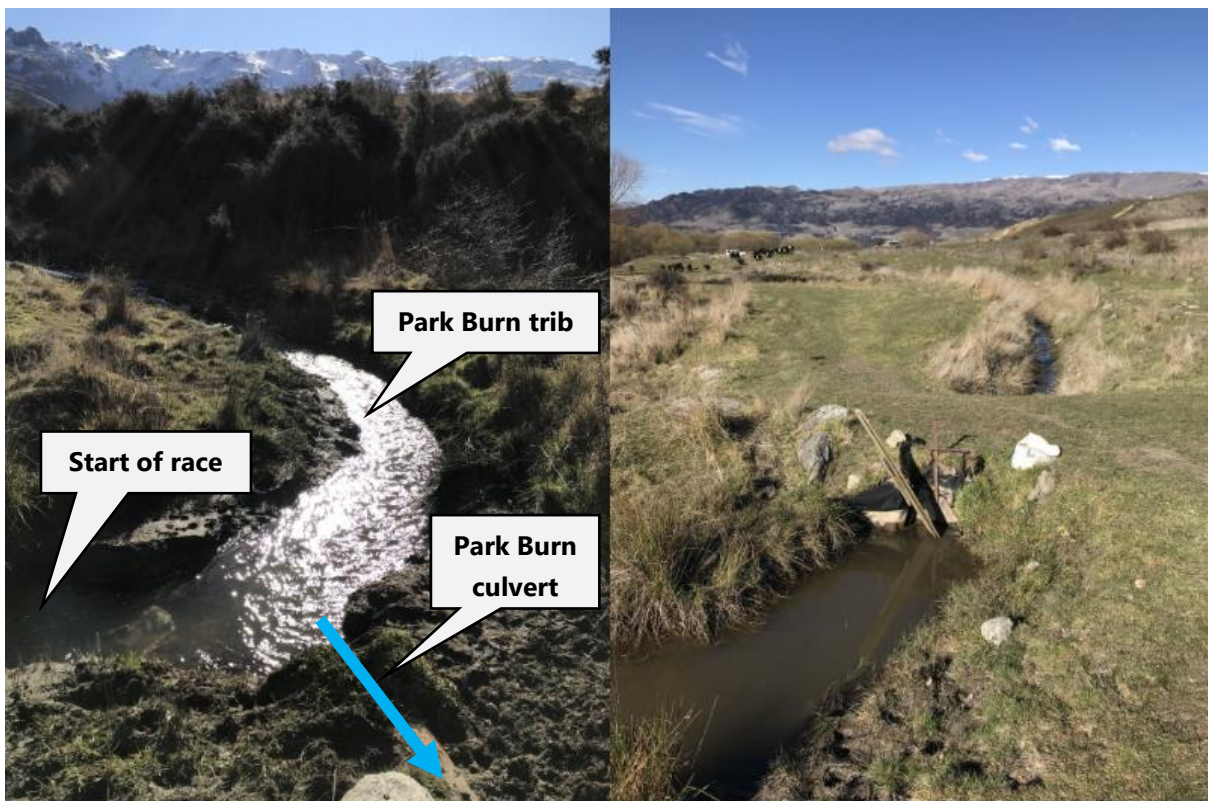


Figure 5: Permit 98526 Take 2 (left) and start of branch race (right) that joins with main Rockburn race (August, 2019)

The applicant's main race runs from below the upper 98526 intake (take 1) on the Park Burn to their northwestern property boundary, whereby it is piped for approximately 60 m into a storage pond. The main race crosses a tributary of the Park Burn via a perched pipe (Figure 6).



Figure 6: Rockburn main race piped across Park Burn tributary (August, 2019)

Water abstracted from the lower 98526 intake (Take 2) flows down a branch race for approximately 80 m before joining up with the main race. A race overflow (Figure 7) and telemetry station (Figure 8) are located approx. 70 m and 110 m downstream of this race junction, respectively. Notice of Exemption WEX0164 authorises the location of the telemeter down-race from the points of take.



Figure 7: Permit 98526 race overflow. Left: looking towards race. Right: looking towards Park Burn tributary (August, 2019)



Figure 8: Applicant's water monitoring station (August, 2019)

© Landpro Ltd 2019

All of the applicant's water feeds into a reservoir (Figure 9) at the northern corner of the property. From here, it is used to irrigate the full extent of the vineyard. A spillway directs excess clean reservoir water into a channel that discharges into the Park Burn (Figure 10).



Figure 9: Rockburn Wines Ltd reservoir – empty to facilitate winter maintenance (August, 2019)



Figure 10: Storage pond spillway and overflow ditch, with the Park Burn in the background (August, 2019)



Figure 11: Rockburn (dry) overflow to Park Burn (August, 2019)

2.1.2 Other applicable permits

As discussed earlier, the applicant is party to several other water takes and discharge permits. As a shareholder in Deemed Permit 95789, the applicant is entitled to take and use water from the Amisfield Burn. Discharge Permit 98655 authorises the applicant to discharge water from the 95789 race into a tributary of the Park Burn, with subsequent downstream re-take via Water Permit 98527 (see Figure 1).

The applicant has not exercised 98655 and 98527, as the specified discharge location is a long way from their existing take infrastructure and would require significant investment in order to get the Amisfield Burn water to the re-take location. Instead, the applicant has abstracted 95789 water on an as-needed basis via one of Mark II Ltd's reservoirs, as per an internal arrangement.

The following table provides an overview of the relevant water take and use infrastructure, including approximate coordinates and dimensions where applicable.

Table 2: Rockburn Wines Ltd water take and use infrastructure overview

Feature	Approx. location (NZTM 2000)	Notes or dimensions (if applicable)
98655 discharge location	1301247E 5015966N	Discharge from race, above tributary of the Park Burn.
98526 Park Burn abstraction (98526 Take 1)	1302345E 5016651N	This is the latest verified location. The location specified on the permit is

Feature	Approx. location (NZTM 2000)	Notes or dimensions (if applicable)
		approx. 100 m to the east of this point, presumably due to an administrative error.
98526 water race	Start point: 1302345E 5016651N. End point: 1303016E 5015942N.	Approx. 1.2 km long, average 0.4 m deep and 0.6 m wide. Unlined.
Piped section of race across Park Burn tributary	1302379E 5016211N	HDPE. Diameter unknown.
98526 Park Burn tributary abstraction (98526 Take 2)	1302328E 5016202N	This is the latest verified location. The location specified on the permit is approx. 40 m to the southeast of this point, presumably due to an administrative error.
Race overflow	1302437E 5016190N	Newly constructed. Sized and positioned to ensure excess race flows are returned to the Park Burn.
Telemeter	1302494E 5016173N	Last verified in 2019
Reservoir	1303103E 5015933N (centre). Inlet: 1303080E 5015941N Spillway: 1303102E 5015972N	Depth: 2.8. Average Width: 35 m. Average length: 60 m. Estimated max. volume: 5,880 m ³ .
Reservoir discharge to Park Burn	1303460E 5016015N	

2.1.3 Titles and easements

A summary of properties within which the applicant's 98526 water take, conveyance and use infrastructure are located is provided below:

- 98526 Take 1 and upper race: located on land owned by Lowburn Land Holdings LP (LLHLP) – Record of Title OT19A/906. S417 rights are registered against this title via instruments 10435540.2 and 10435540.3.
- 98526 Take 2, 98527 retake and lower race: located on land owned by Mark II Limited – Records of Title 844471 and 844470. S417 rights are registered against this title via instruments 10435540.2 and 10435540.3.
- Water storage and irrigation within the applicant's property – Record of Title OT19A535.
- Reservoir overflow: located on land owned by John Douglas Allison and Marilyn Elizabeth Allison – Record of Title 319229. Note that the applicant occasionally discharges water from the reservoir to the Park Burn via the Allison's land with the verbal approval of the landowner.

2.2 Historic use and allocation sought

Abstraction under Deemed Permit 98526 has been recorded via WM1363 since January 2015. As the below figure indicates, the applicant has regularly met and exceeded their consented maximum of 27.8 L/s.

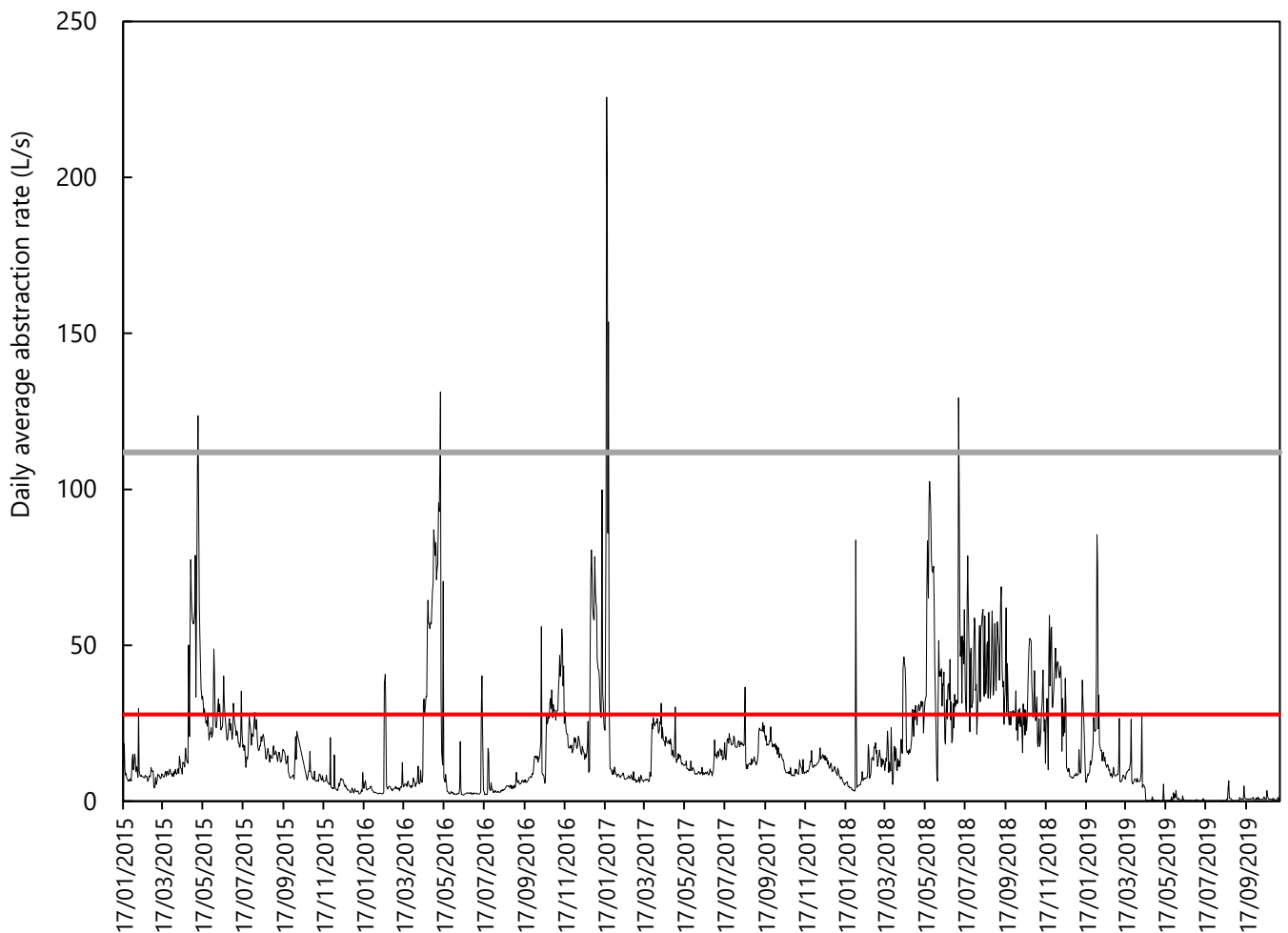


Figure 12: Rockburn Wines Ltd abstraction records showing daily average rate of take from the Park Burn and/or a tributary of the Park Burn, along with the 98526 maximum (red line) and 98526+98527 combined maximum (grey line) (Source: ORC)

As can be seen, there is almost always water in the race, with the applicant generally closing both intakes to facilitate maintenance to the race, reservoir, or monitoring station, and over the winter. It should be noted, however, that there is virtually always some water in the race due the difficulty in completely sealing off the intakes. There is little pattern to the abstraction record, with taking generally matching supply of water in both the Park Burn and it's tributary.

Exceedances of the consented maximum have occurred as the applicant was operating under the assumption that they could take up to 112 L/s as a combined rate of take, per Condition 3 of 98526 which states "the combined take of Water Permit 98526 and 98527 shall not exceed 112 litres per second at the water metering device location." It is now noted that the applicant has not been retaking 95789 water via the 98527 retake, therefore the applicant will endeavour to ensure that abstraction does not exceed the relevant consented rate of take. Any water taken by the applicant under 95789 has been captured via a different telemeter, and is not the subject of this application.

The below figure presents total monthly abstraction under 98526 since recording began.

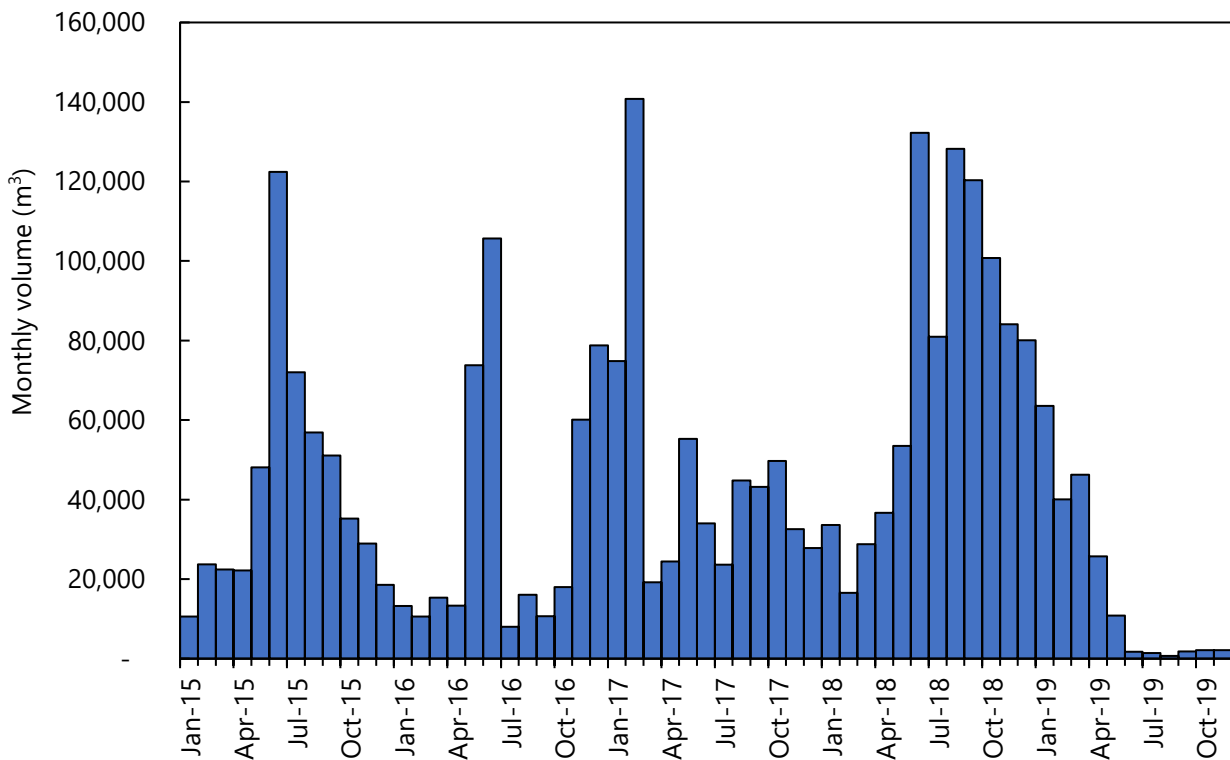


Figure 13: 98526 monthly abstraction (Source: ORC)

A summary of maximum rate of take along with monthly and annual abstraction volumes is as follows:

- Maximum rate of take: 225.8 L/s (19/01/2017)
- Maximum monthly volume: 140,814 m³ (February 2017)
- Maximum annual volume: 702,906 m³ (2018/19 water year)

As part of the consent replacement process, the applicant proposes to keep the existing rate of take (28 L/s) but to impose restrictions on the monthly and annual volumes based on efficient use calculations presented in Section 6. Due to the variability of water supply in the Park Burn catchment, it is critical that the applicant is able to abstract sufficient water from the creeks when it is available in order to fill their reservoir. Thus, when natural water supply drops later in the irrigation season, the applicant will have stored enough water to ensure their vineyard doesn't suffer prior to harvest. Due to the design of the two intakes, the applicant is physically unable to take all of the water from the creeks. This means that, even during times of low flow, a residual flow will remain past the points of take.

Monthly and annual volumes sought have been determined based on Aqualinc efficient use calculations for irrigating 24 ha of vineyard, and will ensure that the applicant does not take more water than they need.

Table 3: Proposed Rockburn Wines Ltd abstraction limits

	Rate/volume sought
Maximum rate of take (L/s)	28
Total monthly volume (m3)	73,000
Total annual volume (m3)	237,933

3. DESCRIPTION OF EXISTING ENVIRONMENT

3.1 Land Use and Topography

The applicant's water take infrastructure and property are situated on the lower flanks of the Pisa Range, on a series of gently sloping terraces above Lake Dunstan. Elevation varies, from approximately 300 masl at 98526 Take 1, to approximately 240 masl at the bottom corner of the applicant's property. Of the applicants approx. 34 ha property, 24 ha are already planted in grapes, with a further 1.7 ha earmarked for grapes in future. All of the existing 24 ha is irrigated via drip irrigation, with any future vineyard expansions utilising the same method of irrigation.

While any frost fighting is currently carried out via helicopter, there is a strong likelihood that the applicant will move to overhead sprinklers for their frost fighting needs in future. This is due to inherent unreliability of using helicopters for frost fighting – increasing demand for frost fighting means they are not always available in a timely manner, and encroaching adjacent subdivision may mean helicopters will no longer be viable due to the disturbances they cause.

Vegetation in the vicinity of the abstraction points is generally comprised of exotic grasses and willows.

3.2 Climate

The climate of the Cromwell area can be described as a typical Central Otago semi-arid landscape, with long sunshine hours, low rainfall and high summer temperatures coupled with significant temperature inversions in winter.

The applicant's vineyard is located within the 350 mm/year Aqualinc rainfall class band.

The potential evapotranspiration rate at the site is significant during the growing season: approx. 620-635 mm between September and April, according to GrowOtago. However, comparison of the GrowOtago evapotranspiration model with actual NIWA evapotranspiration records for Alexandra and Queenstown (the nearest weather stations for which measured evapotranspiration values are stated in NIWA's 2015 report) shows that this may be a significant underestimation. Alexandra experiences ~730 mm of evapotranspiration from September to April in an average year according to NIWA's report, vs. 620-630 mm in GrowOtago's model. For Queenstown, the corresponding numbers are 791 mm measured evapotranspiration vs. 614 mm modelled.

Comparison of the GrowOtago modelled evapotranspiration with data from the Cromwell weather station (since it was established in 2006) shows an even greater discrepancy. Evapotranspiration records for the Cromwell weather station for the 12 completed calendar years since its installation in 2006 show 971 mm of evapotranspiration between September and April (annual average: 1,058 mm). GrowOtago predicts only 627 mm of September-April evapotranspiration for this location (near the intersection of State Highways 6 and 8).

According to modelling by NIWA (2015), the site and surrounding area experience approx. 110-120 days per year of soil moisture deficit.

Frost is a significant issue for grapes, and can dramatically compromise crop viability if managed poorly. GrowOtago indicates that the applicant's property experiences approximately 9-12 spring frosts, which can damage young vine shoots and flowers, each year (7-8 in September, 2-3 in October and 0-1 in November).

Data for autumn frosts (which can damage pre-harvest grapes) is not available from GrowOtago. However, based on NIWA² (see Table 18) data for frosts in Alexandra, the number of ground frost days in March-May (34) is similar to the number in September-November (33). Grape harvest typically occurs no later than mid-May, so only approximately half of the May frosts would occur while frost-protection is required. This gives an estimated number of relevant autumn frosts per year of 25 for Alexandra. Assuming that the ratio of spring frosts to autumn frosts is the same at the applicant's property as in Alexandra, there would be an estimated 9 autumn frosts ($12/34 \times 25$) within the study area which are likely to occur before harvest and require frost-fighting. This equates to a total of 21 frost-fighting events per year (~12 in spring and 9 in autumn). While we acknowledge that this value is approximate, it is based on the best data available. We also note that the GrowOtago modelling data on which these values are ultimately based are estimates of the median numbers of frosts per month, rather than a maximum, which would be more applicable for limit-setting if appropriate.

3.3 Soils and geology

SMap-designated soils (Landcare Research/Manaaki Whenua, 2019) within the applicant's property areas are composed of the following (see Appendix A for further details):

- Waenga_5a.3 on the gentler-sloping sections, which make up most of the property and support all of the existing vineyard. These are very shallow, moderately well drained loams.
- Moly_10a.1 at the northwest section of the property, which is steeper sloping and includes the existing reservoir and proposed future vines. These are well drained, moderately stony, sandy loams.

The GNS Science New Zealand Geology Web Map indicates that all of the land within the irrigation area is underlain by Middle Quaternary glacial outwash deposits (muddy to sandy gravel).

3.4 Park Burn hydrology and ecology

3.4.1 Geohydrology

The geohydrology of the Park Burn is similar to that of the nearby Amisfield Burn, with its headwaters beginning at around 1,800 masl on the Pisa Range. After a steep descent, the channel gradient eases at an elevation of around 650 masl. Further downstream, the main trunk of the stream picks up several smaller tributaries, the largest of which 98526 Take 2 is located on. Below the tributary confluence, the Park Burn drops down onto the Dunstan flats before passing under SH6 and ultimately discharging into Lake Dunstan.

There is no flow monitoring data for the Park Burn, and MfE river flow modelling is relatively unreliable given that there are discrepancies between the topographic mapping used to calculate the model and the real-world creek dynamics. For example, the MfE data considers the main trunk of the Park Burn at the 98526 Take 1 to have a mean flow of 25 L/s and a MALF of 5.9 L/s. Conversely, on the tributary in the vicinity of 98526 Take 2, which one would expect to have a much lower flow due to it being a significantly smaller catchment, the model predicts a mean flow of 150 L/s and a MALF of 38 L/s. A more realistic representation of the real hydrology would reverse these figures, such that the Park Burn main stem had the higher modelled flows.

² NIWA, 2015. The climate and weather of Otago.



Figure 14: Park Burn looking upstream, above 98526 Take 1 (August, 2019)



Figure 15: Park Burn looking downstream, below 98526 Take 1 (August, 2019)

Gauging was undertaken by Landpro on January 16, 2019 to quantify Park Burn flows at various sites throughout the catchment (see Appendix D). For the duration of the survey and for 24 hours prior, the applicant ceased taking water from their points of take.

The below table and figure present the findings from this gauging exercise.

Table 4: Park Burn gauging results

Easting (NZTM 2000)	Northing (NZTM 2000)	Date	Measured flow (L/sec)	†Gauging uncertainty flow range (L/sec)	Site Name
1300141	5017562	16/01/2019	92.4	90 – 95	Park1
1301722	5017250	16/01/2019	113.5	110 – 117	Park2
1302532	5016438	16/01/2019	83.5	80 - 87	Park3
1303013	5016126	16/01/2019	85.9	83 - 89	Park4
1302290	5016214	16/01/2019	10.1	10 - 11	Park5C
1304218	5015366	16/01/2019	43.5	42 – 45	Park6

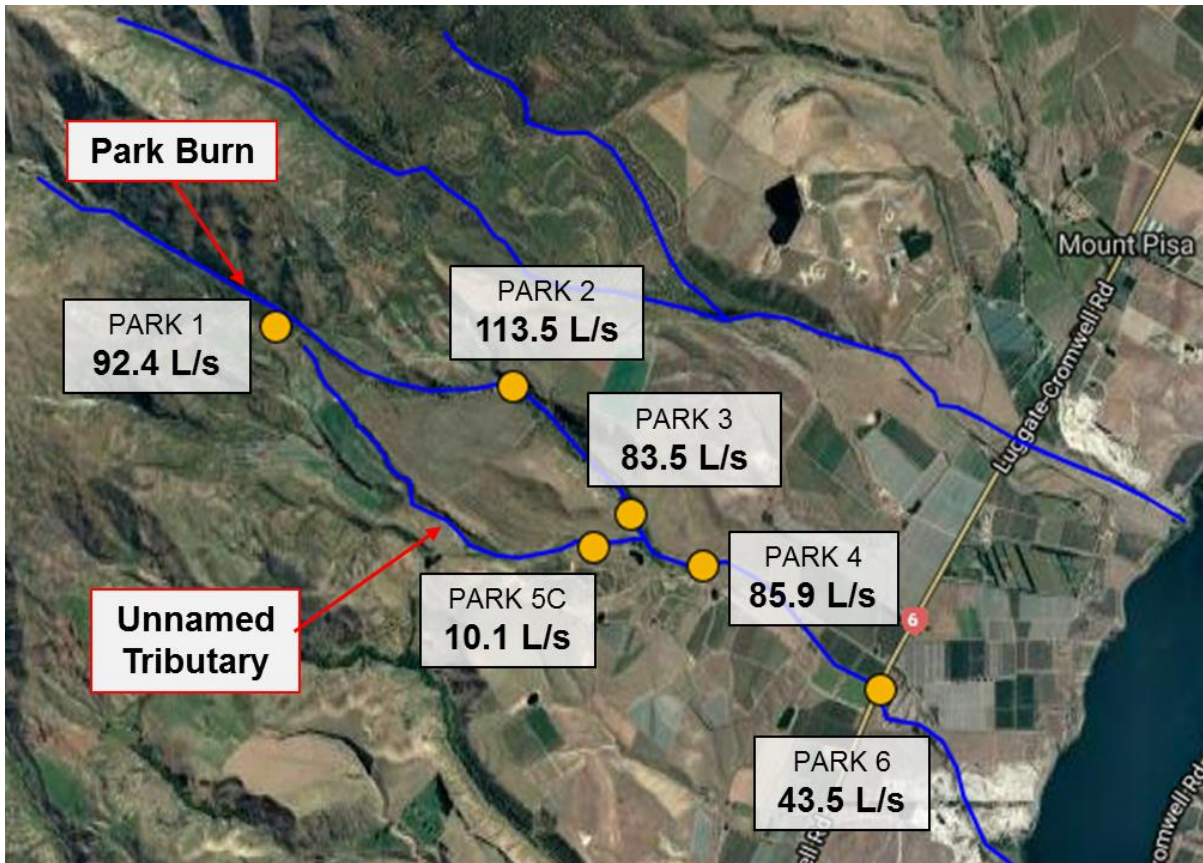


Figure 16: Park Burn flow gauging sites with measured flow

Similar to gauging investigations on the Amisfield Burn, there were considerable surface water losses between the upstream reaches of the creek and the lower reaches, with a net loss of 70 L/s between the second gauging site (Park 2) and the bottom gauging site (Park 6). No gauging below the State Highway was possible due to a quarry, which prevented access, however it is unlikely that there was any surface flow discharge into Lake Dunstan, considering the rate at which water was lost further upstream and the relatively minimal flows left in the creek at the State Highway. This conclusion is supported by other gauging results from similar creeks on the eastern face of the Pisa Range.

3.4.2 Aquatic ecology

Three records for the Park Burn are registered on the New Zealand Freshwater Fish Database (NZFFD), as shown in the below figure.

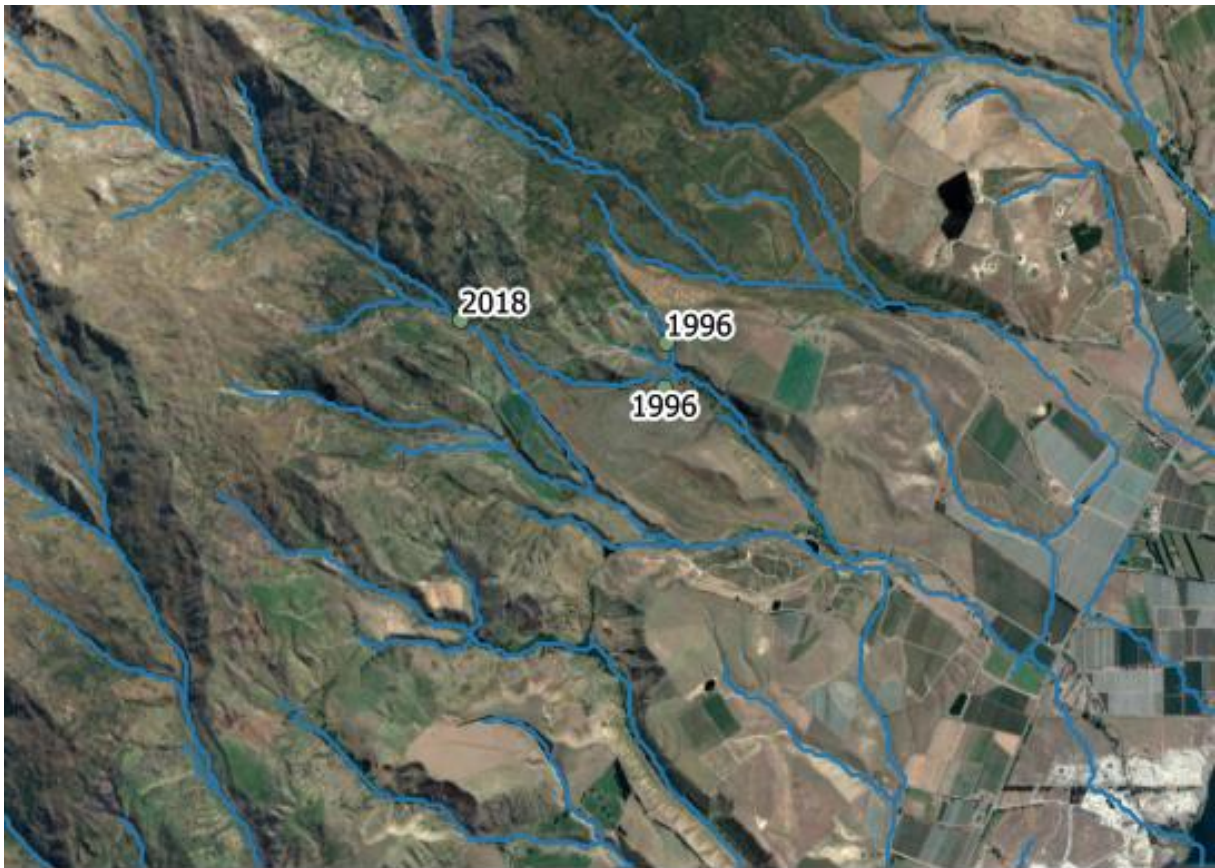


Figure 17: NZFFD survey locations

All three surveys found brown trout only, with no other species present.

To supplement this data, Water Ways Consulting Ltd conducted further aquatic surveys of the Park Burn in April 2019. These survey locations are shown in the below figure (also presented earlier).

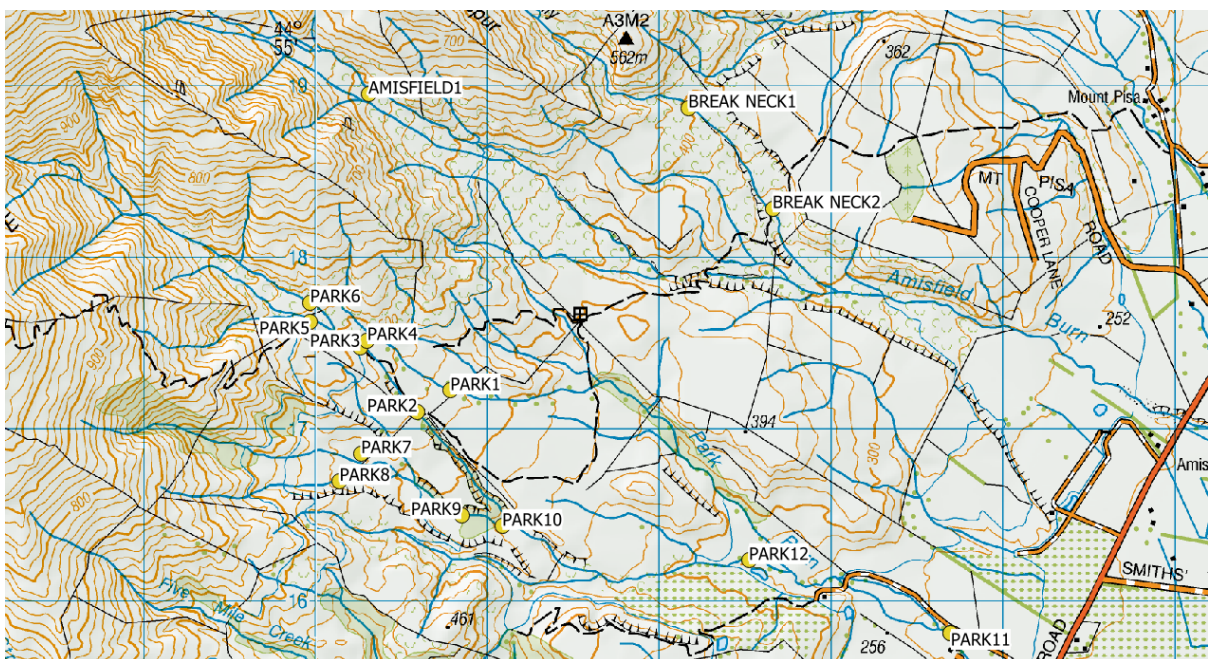


Figure 18: 2019 fish survey locations (Source: Water Ways Consulting Ltd)

Brown trout were identified at several sites on the Park Burn, with a single rainbow trout found at one site. No native fish were identified in the Park Burn, with results presented in the below table.

Table 5: Park Burn survey locations and results (Source: Water Ways Consulting Ltd)

Site	Area fished (m ²) and stream type	Species caught
Park Burn 1	100 (stream, low flow)	Brown trout (219 mm)
Park Burn 2	Nil (dry stream)	Nil
Park Burn 3	10 (seepage)	Nil
Park Burn 4	80 (stream)	Brown trout (length 67-80 mm)
Park Burn 5	20 (seepage)	Nil
Park Burn 6	80 (stream)	Brown trout (length 77-97 mm)
Park Burn 7	Nil (Natural very small stream))	Nil
Park Burn 8	Nil (Natural very small stream)	Nil
Park Burn 9	30 (small stream)	Brown trout (78-205 mm)
Park Burn 10	50 (high flow small stream)	Nil
Park Burn 11	100 (stream)	Brown trout (length 104, 151 mm) Rainbow trout (length 127 mm)
Park Burn 12	80 (stream high flow)	Nil

Note that the Park Burn 12 site is in the vicinity of 98526 Take 2, while the Park Burn 11 site is downstream of both of the applicant's take points.

3.4.3 Schedule 1 values

The Park Burn is not listed in Schedule 1 of the Regional Plan: Water for Otago (RPW).

4. ACTIVITY CLASSIFICATION

This application seeks to replace an existing permit that has primary allocation status. Replacement of Deemed Permit 98526.V1 as part of the proposal is authorised by Rule 12.1.4.5 of the RPW:

Rule 12.1.4.5

Taking and use of surface water as primary allocation applied for prior to 28 February 1998 in catchments not listed in Schedule 2A:

- (i) *This rule applies to the taking of surface water, as primary allocation, in catchment areas not listed in Schedule 2A, if the taking was the subject of a resource consent or other authority:*
 - (a) *Granted before 28 February 1998; or*
 - (b) *Granted after 28 February 1998, but was applied for prior to 28 February 1998; or*
 - (c) *Granted to replace a resource consent or authority of the kind referred to in paragraph (a) or (b).*
- (ii) *Unless covered by Rule 12.1.1A.1, the taking and use of surface water to which this rule applies is a **restricted discretionary** activity. The matters to which the Otago Regional Council has restricted the exercise of its discretion are set out in Rule 12.1.4.8.*
- (iii) *Unless covered by Rule 12.1.1A.1, the taking and use of surface water in the Waitaki catchment to which this rule applies is a restricted discretionary activity provided that by itself or in combination with any other take, use, dam, or diversions, the sum of the annual volumes authorised by resource consent, does not exceed the allocation to activities set out in Table*

12.1.4.2. The matters to which the Otago Regional Council has restricted the exercise of its discretion are set out in Rule 12.1.4.8.

- (iv) Takes to which this rule applies will not be subject to a minimum flow condition until the minimum flow has been determined by investigation and added to Schedule 2A by a plan change. Note: If a minimum flow has been determined for a catchment previously not listed in Schedule 2A, and that minimum flow has been set by a plan change, the catchment will then be listed in Schedule 2A and Rule 12.1.4.2 or Rule 12.1.4.4 will apply.

Rule 12.1.4.8 Restricted discretionary activity considerations

In considering any resource consent for the taking and use of water in terms of Rules 12.1.4.2 to 12.1.4.7 and 12.2.3.1A, the Otago Regional Council will restrict the exercise of its discretion to the following:

- (i) The primary and supplementary allocation limits for the catchment; and
- (ii) Whether the proposed take is primary or supplementary allocation for the catchment; and
- (iii) The rate, volume, timing and frequency of water to be taken and used; and
- (iv) The proposed methods of take, delivery and application of the water taken; and
- (v) The source of water available to be taken; and
- (vi) The location of the use of the water, when it will be taken out of a local catchment; and
- (vii) Competing lawful local demand for that water; and
- (viii) The minimum flow to be applied to the take of water, if consent is granted; and
- (ix) Where the minimum flow is to be measured, if consent is granted; and
- (x) The consent being exercised or suspended in accordance with any Council approved rationing regime; and
- (xi) Any need for a residual flow at the point of take; and
- (xii) Any need to prevent fish entering the intake and to locate new points of take to avoid adverse effects on fish spawning sites; and
- (xiii) Any effect on any Regionally Significant Wetland or on any regionally significant wetland value; and
- (xiv) Any financial contribution for regionally significant wetland values or Regionally Significant Wetlands that are adversely affected; and
- (xv) Any actual or potential effects on any groundwater body; and
- (xvi) Any adverse effect on any lawful take of water, if consent is granted, including potential bore interference; and
- (xvii) Whether the taking of water under a water permit should be restricted to allow the exercise of another water permit; and
- (xviii) Any arrangement for cooperation with other takers or users; and
- (xix) Any water storage facility available for the water taken, and its capacity; and
- (xx) The duration of the resource consent; and
- (xxi) The information, monitoring and metering requirements; and
- (xxii) Any bond; and
- (xxiii) The review of conditions of the resource consent; and
- (xxiv) For resource consents in the Waitaki catchment the matters in (i) to (xxiii) above, as well as matters in Policies 6.6A.1 to 6.6A.6.

Notification and written approvals

- (a) For applications for resource consent to which this Rule applies, to take and use water from a river, the Consent Authority is precluded from giving public notification, if the application is to take and use water from:

- (i) *A river for which a minimum flow has been set by or under this Plan; or*
- (ii) *A river for which it is not necessary for the Council to consider whether, if consent is granted, the taking should be subject to a condition requiring a residual flow to remain in the river at the point of take, or a condition requiring other provision for native fish, other than a condition requiring fish screening.*

Other applications for resource consent to take and use water from a river may be considered without notification as allowed by the Resource Management Act.

(b) For applications for resource consent to which this rule applies, to take and use water from a water body other than a river, the Consent Authority is precluded from giving public notification.

Water sought as replacement for Deemed Permit 98526 is less than that allocated via permit prior to 28 February 1998, as per Rule 12.1.4.5(i)(a).

The Park Burn catchment is not listed in Schedule 2A of the RPW, meaning this permit replacement is a **restricted discretionary** activity.

4.1 Associated Permitted Activities

As discussed earlier, the discharge of water to water occasionally occurs when the applicant's reservoir (which is filled with Park Burn water) overflows to the Park Burn. This is a permitted activity under Rule 12.C.1.1 of the RPW:

The discharge of water or any contaminant to water, or onto or into land in circumstances which may result in a contaminant entering water, is a permitted activity.

None of the provisions that might confound the permitted status of this activity (i.e., causing flooding, discharge between catchments, etc.) are triggered by the discharge.

In addition, the applicant may, at times, need to conduct maintenance to the intake infrastructure at both Take 1 and Take 2. This will involve instream works, and is a permitted activity under Rule 13.5.1 of the RPW:

*The disturbance of any lake or river...and any resulting discharge or deposition of bed material associated with: (iii) The maintenance or reinstatement of a water intake, in order to enable the exercise of a lawful take of water...is a **permitted activity**.*

All conditions of this rule will be adhered to, including the notification of DoC and Fish and Game (F&G) in advance of any instream works between 1 May and 30 September.

The applicant's reservoir is not located within a watercourse, nor does it capture natural runoff – meaning it is not subject to the rules of the RPW. Due to the size and capacity of the reservoir (discussed earlier), it would not be considered a "large" dam under the Building Act.

5. NON-NOTIFICATION & CONSULTATION

A consent authority has the discretion whether to publicly notify an application unless a rule or National Environmental Standard (NES) precludes public notification (in which case the consent authority must not publicly notify) or section 95A(2) applies.

The effects of the activities will be no more than minor, the applicant does not request public notification and there are no rules or NES' which require the public notification of the application. In addition, there are no special circumstances relating to the application. As such, notification of the application is not necessary.

Clause 6(1)(f) of Schedule 4 of the RMA requires the identification of, and any consultation undertaken with, persons affected by the activity. Council might consider Smallburn Ltd to be affected as a result of their existing water abstraction from the Park Burn (under permits RM15.007.01 and 94394). While this abstraction is upstream of the applicant's take points, any residual flow considerations applied to Smallburn's upcoming permit replacements may need to take Rockburn's downstream abstractions into account. Smallburn Ltd have prepared their replacement application alongside the applicant's to facilitate more informed assessment and more efficient processing of these applications.

Due to the presence of sportfish in the Park Burn catchment, Fish & Game (F&G) may be considered affected by the proposal. However, due consideration should be given to the ecological assessment of the Park Burn conducted earlier this year by Water Ways Consulting Limited, discussed in Section 3.4 and attached in Appendix C:

- Only one rainbow trout specimen has ever been recorded in the Park Burn.
- Brown trout are present throughout much of the Park Burn catchment, however findings indicate that these are self-sustaining, stunted populations that do not provide any recreational fishing value.
- The Park Burn does not have a natural connection with Lake Dunstan during the late summer/early autumn months, which coincide with the height of the irrigation season.
- The Park Burn is considered too small to have upstream spawning runs of brown trout, and findings suggest that rainbow trout spawning is not present. The rainbow trout individual found in the Park Burn was likely introduced via the Pisa Irrigation Company race, which regularly discharges to the Park Burn above SH6 and is anecdotally reported to contain trout.

For these reasons, Fish & Game are considered to be interested only, as the proposal will not adversely affect the instream values under the existing environment.

No native fish have ever been found in the Park Burn catchment, therefore DoC are not considered affected by the proposal. Iwi (Aukaha) are considered to be affected by the proposal due to their interest in water in Otago.

Overall, it is considered that this application will be processed non-notified.

6. ASSESSMENT OF ENVIRONMENTAL EFFECTS

In addition to the application being made in the prescribed forms and manner, Section 88 of the RMA also requires that every application for consent includes an assessment of the effects of the activity on the environment as set-out in Schedule 4 of the RMA.

6.1 Assessment of Alternatives

Alternative sources of water for the applicant's property include the Clutha River and groundwater. Both of these sources may provide viable irrigation water for the applicant, however both would require significant investment in order to establish a secure connection – particularly in the case of Clutha water, which would need substantial surveying, easement and resource consent investment along with pump and conveyance infrastructure capable of moving large volumes of water over a long distance (~2.5 km) and up a steep ascent (~80 m elevation gain).

In contrast, the applicant's abstractions are long-established, and the conveyance and storage infrastructure is already in place (at considerable cost to keep these in working condition). These sources represent the most practical means of taking water for the applicant's vineyard, given that the take points are located above the irrigable areas, meaning the water can be gravity fed to the storage reservoir without pumping or electrical requirements.

6.2 Effects on stream ecology and hydrology

As discussed in Section 3.4, the hydrology and ecology of the Park Burn catchment is relatively well understood. The two race intakes effectively act as open diversion channels, meaning abstraction is only ever a subset of total natural flow in the creeks. This means that there is always water left in the creeks downstream of the take points, unless of course there is no natural flow present upstream of the takes. Furthermore, due to the open nature of the intakes, taking generally matches the natural hydrological cycles of the watercourses, with higher rates of take during times of high natural flows, and lower rates of take during times of low flow. This ensures that the natural hydrological dynamics of the creeks are maintained downstream of the takes, albeit with diminished flows.

With regards to fish values, the current effects assessment is able to draw upon historic surveys along with a suite of recent surveys to develop a detailed representation of what is present in the Park Burn catchment. As discussed in Section 3.4, no native fish have been identified in the catchment to date.

With regards to introduced species, brown trout have been found throughout the Park Burn, with only a single rainbow trout identified (likely due to introduction via another race, as discussed earlier). Importantly, all trout found have been indicative of stunted, isolated populations, meaning the Park Burn does not provide valuable spawning habitat for sportfish.

While abstraction will likely have some effect on brown trout (the only migratory species present, disregarding rainbow trout) by having a minor impact on creek connectivity with Lake Dunstan, it is likely that a number of other factors play a more significant role in controlling the up-migration of this species. The first of these is the fact that the Park Burn naturally dries up in the summer, regardless of abstraction (see Section 3.4). The second is the presence of barriers in the creek, like the culvert below the applicant's take points. Control of these structures is outside the remit of the applicant.

Finally, due consideration should be given to the results of the stream gauging completed in January 2019, which indicated that the Park Burn naturally goes to ground well upstream of its confluence with

Lake Dunstan during the summer months. The gauging took place during a particularly wet summer, with above-average flows, indicating that the creek would normally run dry considerably further up-channel of the Dunstan confluence in typically drier summers. This gauging took place while all water abstraction had ceased on the creek, and as such it can be concluded that the applicant's abstractions do not impact sportfish values in the Park Burn. As the creek appears to lose surface connectivity with Lake Dunstan regardless of abstraction, the proposal has little to no effect on the ability of sportfish to up-migrate.

Invertebrate values in the Park Burn will not be affected by the proposal, given that the applicant is seeking the same rate of take as presently consented. There may, in fact, be some small improvement in invertebrate habitat as the applicant is committed to prevent consented abstraction exceedances in future.

Due to the relatively low fish values in the Park Burn, it is not envisaged that the installation of fish screens on either of the intakes would provide a measurable benefit to aquatic ecology. Based on the fish survey findings, the only trout that may be present in the vicinity of any of the applicant's intakes would be stunted, isolated individuals that provide little or no value to the catchments. No other migratory species appear to be present.

6.3 Residual flow

Any residual flow considerations should be determined based on the above in-stream effects assessment. The ecological report prepared by Water Ways Consulting Limited earlier this year noted that any residual flow condition "should recognise that a connecting flow to the Clutha River is unlikely during summer low flow conditions in the Park Burn."

The value of any residual flow conditions imposed at the applicant's intakes would therefore have only limited beneficial effects by perhaps increasing the downstream reach of the Park Burn during low flows but likely failing to ensure surface water connectivity with Lake Dunstan. Conversely, imposing a strict residual flow condition could significantly affect the applicant's ability to obtain sufficient water during the summer and early autumn months, thereby placing their harvest and livelihood at risk.

6.4 Effects on groundwater

There are no designated aquifers within the study area, with the closest designated aquifer being the Lowburn Alluvial Ribbon Aquifer approximately 5 km to the southeast of the applicant's take points. No effects of the activity on this aquifer are anticipated, given the distance.

The closest neighbouring groundwater take to the applicant's abstraction points is Bore G41/0386 (Consent No. RM16.002.01), approximately 2.2 km to the southeast. Due to the distance between the take points and any neighbouring bores, it is unlikely that the activity will adversely affect any groundwater users in the area – particularly considering the proposal is for maintenance of the status quo in terms of rate of take. While the aforementioned bore is located close to the lower reach of the Park Burn, it is assumed that the key source of recharge for this bore and for groundwater in general in this area is Lake Dunstan.

No adverse effects on underlying groundwater resources, such as aquifer compaction or degraded groundwater quality, are expected as a result of the proposal.

6.5 Effects on other water users

The following table presents a summary of consented water takes on the Park Burn.

Table 6: Summary of other water users on the Breakneck Creek, the Amisfield Burn and the Park Burn

Permit No.	Creek	Location	Rate of take (L/s)	Primary consent holder
RM15.007.01 & 94394	Park Burn	Approx. 2.5 km u/s of 98526 Take 1.	250	Smallburn Limited
93177	Park Burn	Approx. 1 km d/s of the 98526 Take 2.	55.6 (unexercised)	Mark II Limited

It is understood that no water has been abstracted under Deemed Permit 93177 for some time, therefore the only other legal water user that may be affected by the proposal is Smallburn Ltd. For this reason, and as mentioned earlier, Smallburn Ltd and the applicant have prepared their applications concurrently to facilitate a streamlined approach to discussions around water sharing in the catchment.

Given the small size, steep topography and relative inaccessibility of the subject creeks, it is unlikely that there will be any adverse effects on recreational users due to the proposal – particularly considering the unsuitability of the creeks for angling, and that the creeks are non-navigable and access is by permission of the private land owners bounding the creeks.

6.6 Available water allocation

Policy 6.4.2 of the RPW defines the primary allocation limit for the catchment:

To define the primary allocation limit for each catchment, from which surface water takes and connected groundwater takes may be granted, as the greater of:

(a) That specified in Schedule 2A, but where no limit is specified in Schedule 2A, 50% of the 7-day mean annual low flow; or

*(b) **The sum of consented maximum instantaneous, or consented 7-day, takes of:***

*(i) **Surface water as at:***

(1) 19 February 2005 in the Welcome Creek catchment; or

(2) 7 July 2000 in the Waianakarua catchment; or

*(3) **28 February 1998 in any other catchment;** and*

(ii) Connected groundwater as at 10 April 2010,

less any quantity in a consent where:

(1) In a catchment in Schedule 2A, the consent has a minimum flow that was set higher than that required by Schedule 2A.

(2) All of the water taken is immediately returned to the source water body.

(3) All of the water being taken had been delivered to the source water body for the purpose of that subsequent take.

(4) The consent has been surrendered or has expired (except for the quantity granted to the existing consent holder in a new consent).

(5) The consent has been cancelled (except where the quantity has been transferred to a new consent under Section 136(5)).

(6) The consent has lapsed.

This proposal seeks to take water from the Park Burn that is within the allocation limit as defined by Policy 6.4.2(b)(i)(3), as no more water than was consented on 28 February 1998 is being sought for replacement of Deemed Permit 98526.

6.7 Efficiency of use

Policy 6.4.0A of the RPW requires an application to prove that the quantity of water granted to take is no more than that required for the purpose of use. This efficiency assessment needs to take into account climate, soil, crop or pasture type, along with the efficiency of the proposed water transport, storage and application system. The actual quantity required for the purpose of use of the water taken must be reflected in any consent granted.

An assessment of reasonable irrigation demand has been undertaken for the applicant's vineyard in accordance with Aqualinc 2017³ guidelines, which involved determining soil types within the command area via Landcare Research's S-Map⁴ online tool. The soil types encompassed within the irrigable areas are presented in Appendix A. Aqualinc was then used in conjunction with ORC mean annual rainfall (MAR) data to determine the peak monthly and annual irrigation demand.

The below table provides a summary of the Aqualinc outputs and volumes sought by the applicant, with full calculations and explanations presented in Appendix E.

Table 7: Aqualinc modelled irrigation application requirements for existing and reasonably foreseeable future irrigated areas of Rockburn Wines Ltd, and frost fighting water requirements, compared to current allocation.

Volume	Daily (m ³)	Monthly (m ³)	Annual (m ³) 100 th %ile
Irrigation volumes required (per Aqualinc calcs)	639	19,800	87,549
Current paper allocation	2,400 ⁵	73,000 ⁶	876,000
Frost fighting requirements (less redundant irrigation demand)	7,161	57,289	150,384
Volume sought	-	73,000	237,933

Note that a daily volume has been provided in the above table for information purposes only; a daily volumetric limit is not being sought by the applicants. The summarised calculations above assume that no irrigation water is needed for the applicant's vineyard on days when frost fighting is required, meaning irrigation requirements have been subtracted from those particular days.

As can be seen in the table, frost fighting requirements make up the bulk of the monthly and annual volumes sought by the applicant. Once the applicant installs an overhead sprinkler system, this water will be critical for ensuring their harvest at the end of the growing season is not compromised by frosts in spring and autumn.

Monthly allocation sought has been capped at 73,000 m³, which is the existing maximum monthly volume that the applicant can theoretically take at 100,000 L/hour under 98526 (but which is slightly less than that needed for combined maximum monthly frost fighting and irrigation requirements,

³ McIndoe I, Brown P, Rajanayaka C, KC. B, 2017. Guidelines for Reasonable Irrigation Water Requirements in the Otago Region. Otago Regional Council, 2. Aqualinc Research Limited.

⁴ <https://smap.landcareresearch.co.nz/app>

⁵ Based on 100,000 L/hour limit specified on 98526.

⁶ No monthly or annual limits are specified on 98526, so these are the maximum monthly and annual volumes that can currently be taken assuming an hourly maximum of 100,000 L/hour.

equating to 77,089m³). Annual allocation sought is considerably less than what the applicant can take under the existing consent. It should also be noted that the volumes sought are significantly less than maximum recorded abstractions, as presented in Section 2.2.

The applicant will continue to irrigate their vines via the drip irrigation system, which is the most efficient method of irrigating grapes. The on-site reservoir will ensure that water is used when it is needed but stored when it is not, meaning very little abstracted water should be wasted.

6.8 Effects on cultural values

While the Park Burn is not identified in Schedule 1D of the RPW, it is recognised that this creek may still have cultural significance and every effort has been made to preserve it in light of these values. In particular, iwi values as they relate to the Park Burn have been addressed in Section 7.2.6.

6.9 Monitoring

Abstraction under 98526 will continue to be metered and reported as per the current arrangement. As discussed earlier, one meter is located downstream of both take points and so captures all abstraction under this permit. WEX0164 authorises the location of this meter away from the points of take.

6.10 Positive effects

The positive effects of the take and use of Park Burn water under Deemed Permit 98526 are numerous, and include:

- Enabling the continued operation of a world class vineyard, which is a key contributor to the local and regional economies.
- Low energy consumption – because the water takes, conveyance and some of the irrigation system is gravity-fed, energy consumption can be kept to a minimum. Alternative sources of water (groundwater, Lake Dunstan water) would require considerable investment in electrical connections and pump infrastructure, and would place more pressure on the national grid. The result is a more sustainable operation.
- Supporting the community by providing job opportunities, supporting local businesses (through equipment and supply acquisition, for example), and improving land value.

6.11 Proposed consent conditions

The following consent conditions are proposed to ensure that any potential adverse effects from the activity are appropriately managed.

- Purpose: to take water as primary allocation from the Park Burn and a tributary of the Park Burn for irrigation and frost fighting.
- Point of Take 1: Park Burn, approximately 2.5 km upstream from State Highway 6.
 - Legal description: Lot 3 Deposited Plan 27494
 - Map reference: NZTM 2000: 1302345E 5016651N
- Point of Take 2: Park Burn tributary, approximately 2 km upstream from State Highway 6.
 - Legal description: Lot 2 Deposited Plan 526279

- Map reference: NZTM 2000: 1302328E 5016202N
- This permit shall not commence until Deemed Permit 98526 has expired or been surrendered.
- The combined rate of take shall not exceed 28 L/s.
- The volume of water taken under this consent shall not exceed:
 - 73,000 m³/month
 - 237,933 m³/year
- The consent holder shall maintain a water meter to record the water takes, at or close to the points of take, within an error accuracy of +/- 5% over the meter's nominal flow range, and a telemetry compatible datalogger with at least 24 months data storage and a telemetry unit to record the rate and volume of take, and the date and time this water was taken. The datalogger shall record the date, time and flow in L/s. Data shall be provided to the Consent Authority by means of telemetry. The consent holder shall ensure data compatibility with the Consent Authority's time-series database. The water meter shall be installed according to the manufacturer's specifications and instructions. There shall be enough space in the pipe/flume to allow for verification of the accuracy of the meter under Condition (X).
- The Consent Holder shall ensure the full operation of the water meter, data logger and telemetry unit at all times during the exercise of this consent. All malfunctions of the water meter and/or datalogger during the exercise of this consent shall be reported to the Consent Authority within 5 working days of observation and appropriate repairs shall be performed within 5 working days. Once the malfunction has been remedied, a Water Measuring Device Verification Form completed with photographic evidence must be submitted to the Consent Authority within 5 working days of the completion of repairs.
- If a mechanical insert water meter is installed it shall be verified for accuracy each and every year from the first exercise of this consent. An electromagnetic or ultrasonic flow meter shall be verified for accuracy every 5 years from the first exercise of this consent. Each verification shall be undertaken by a Consent Authority approved operator and a Water Measuring Device Verification Form shall be provided to the Consent Authority within 5 days of the verification being performed, and at any time upon request.
- The consent holder shall take all practicable steps to ensure that:
 - There is no leakage from pipes and structures;
 - The use of water is confined to the target areas.
- The Consent Authority may, in accordance with Sections 128 and 129 of the RMA 1991, serve notice on the consent holder of its intention to review the conditions of this consent within 3 months of each anniversary of the commencement of this consent for the purpose of:
 - Adjusting the consented rate or volume of water under Conditions X and X, should monitoring under Condition X or future changes in water use indicate that the consented rate or volume is not able to be fully utilised; or
 - Determining whether the conditions of this consent are adequate to deal with any adverse effect on the environment which may arise from the exercise of the consent and which it is appropriate to deal with at a later stage; or

- Ensuring the conditions of this consent are consistent with any NPS, NES, relevant plans and/or the Otago RPS; or
- Adjusting or altering the method of water take data recording and transmission.

Note that the proposed map references are slightly different to those listed on the existing permit, however these new references reflect the actual ground-truthed take locations.

7. STATUTORY CONSIDERATIONS

Schedule 4 of the RMA requires that an assessment of the activity against the matters set out in Part 2 and any relevant provisions of a document referred to in Section 104 of the RMA is provided when applying for a resource consent for any activity. These matters are assessed as follows.

7.1 Part 2 of the RMA

The proposal is consistent with the purpose and principles of the RMA, as outlined in Section 5. The proposal will have less than minor effect on the Park Burn's ability to meet the reasonably foreseeable needs of future generations, or on the life-supporting capacity of the Park Burn catchment and any ecosystems associated with it. The proposal ensures that adverse effects on the environment are avoided, remedied or mitigated.

There are no matters of national importance under Section 6 of the RMA that will be affected by the proposal. The proposal is also consistent with the requirements of Section 7 of the RMA, with particular regard given to the efficient use of natural resources, intrinsic values of ecosystems, and the maintenance and enhancement of the quality of the environment. Regarding Section 8, the proposed activity is not inconsistent with the principles of the Treaty of Waitangi.

Overall, the activity is considered to be consistent with Part 2 of the RMA, given the minor nature of the activities and the proposed mitigation.

7.2 Section 104(1)(b) of the RMA

In accordance with Schedule 4 of the RMA, an assessment of the activity against the relevant provisions of a document referred to in 104(1)(b) of the RMA must be included in an application for resource consent. Documentation in this section are noted as being:

- (i) National Policy Statement for Freshwater Management, 2014
- (ii) Resource Management (Measurement and Reporting of Water Takes) Regulations, 2010
- (iii) Partially Operative Otago Regional Policy Statement, 2019
- (iv) Partially Operative Regional Policy Statement for Otago, 1998
- (v) Proposed Regional Policy Statement for Otago, 2015
- (vi) Regional Plan: Water for Otago, 2004

Under the RMA, regional plans need to give effect to national policy statements (NPSs), NESs and regional policy statements (RPSs). Thus, for a consent application, an assessment of the application against the regional plan is usually adequate as these plans ultimately give effect to the higher order statutory instruments. In 2015, however, ORC released the Proposed Regional Policy Statement for

Otago and have subsequently released the Partially Operative Regional Policy Statement for Otago earlier this year. As the RPW does not reflect these latest versions of the RPS, consideration of these two documents has been considered below.

Additionally, for the sake of completeness, the national policy statement and Resource Management (Measurement and Reporting of Water Takes) Regulations have also been considered below.

It is also noted that the consent authority should give consideration to iwi management plans under Section 104(1)(c), and an assessment of the application against relevant iwi documents is provided below.

7.2.1 National Policy Statement for Freshwater Management

The National Policy Statement for Freshwater Management 2014 (NPSFM) sets objectives and policies for the management of freshwater quality and quantity, emphasising the need for safeguarding of the values of freshwater, avoiding over-allocation, improving efficiency and providing reasonable opportunity for iwi and hapū involvement in overall freshwater management including planning and decision-making. The following policies, which give effect to the NPS's objectives, are of most relevance to this application for resource consent.

Policy B5

By every regional council ensuring that no decision will likely result in future over-allocation – including managing fresh water so that the aggregate of all amounts of fresh water in a freshwater management unit that are authorised to be taken, used, dammed or diverted does not over-allocate the water in the freshwater management unit.

Policy B6

By every regional council setting a defined timeframe and methods in regional plans by which overallocation must be phased out, including by reviewing water permits and consents to help ensure the total amount of water allocated in the freshwater management unit is reduced to the level set to give effect to Policy B1.

Policy B8

By every regional council considering, when giving effect to this national policy statement, how to enable communities to provide for their economic well-being, including productive economic opportunities, while managing within limits.

With regards to Policies B5 and B6, the proposal is not seeking to change instantaneous and monthly allocation in the Park Burn, while the annual volume sought is significantly lower than that what is already consented. The water sought by the applicant is within the allocation limits defined by Policy 6.4.2 of the RPW.

With regards to Policy B8, the proposal will enable the applicant's vineyard to continue operating at its fullest potential. This land use is a fundamental aspect of the local and regional economies, and the proposal therefore supports the continued economic well-being of the people who work this land and of the local community in general.

Council considers that the current and proposed policies in the RPS and RPW generally meet the requirements of the NPS. Consideration of these documents in light of the activities proposed is given below.

7.2.2 Resource Management (Measurement and Reporting of Water Takes) Regulations

Section 4(1) of the Regulations states that “These regulations apply only to a water permit that allows fresh water to be taken at a rate of 5 litres/second or more.” Because the proposed takes are greater than 5 L/s, the activity must be in accordance with the Regulations. Specifically, the Regulations require the following:

- That the permit holder “keep records that provide a continuous measurement of the water taken under a water permit, including water taken in excess of what the permit allows.” As a minimum, this typically means taking measurements of the volume of water taken each day.
- The water measurement device must be verified as accurate by a suitably qualified person:
 - Before the end of a permit’s first water year; and
 - Every 5 years thereafter.
- The permit holder must provide records that cover each water year of the permit to the regional council that granted the permit, no later than 1 month after the end of the water year.
- The regional council that granted a water permit may, at its discretion, grant approval to the permit holder to keep records using a device or system that is installed as near as practicable to the location from which water is taken under the permit (instead of at that location).

The proposal is consistent with the requirements of the Regulations, with the applicant’s abstraction record indicating ongoing adherence to the Regulations with no proposed change to this system of water measurement and reporting.

7.2.3 Partially Operative Regional Policy Statement for Otago

The following policies from the 2019 Partially Operative Regional Policy Statement are relevant to this application. Policies in this version of the plan (January 2019, updated March 2019) that have not yet been made operative have been omitted.

Table 8: Relevant policies from the Partially Operative Regional Policy Statement for Otago, 2019

Policy	Comments
<p>2.2.1 <i>Manage the natural environment to support Kāi Tahu wellbeing by all of the following:</i></p> <p><i>a) Recognising and providing for their customary uses and cultural values in Schedules 1A and B; and</i></p> <p><i>b) Safe-guarding the life-supporting capacity of natural resources.</i></p>	<p>As no increase in rates of take are proposed, the life-supporting capacity of the catchments will be safeguarded. In general, it is envisaged that Kāi Tahu values, as detailed in Schedule 1A, will be protected and potentially enhanced as a result of the proposal. No Schedule 1B sites are located within the study area.</p>

<p>2.2.2 <i>Recognise and provide for the protection of wāhi tūpuna, by all of the following:</i></p> <p><i>a) Avoiding significant adverse effects on those values that contribute to the identified wāhi tūpuna being significant;</i></p> <p><i>b) Avoiding, remedying, or mitigating other adverse effects on the identified wāhi tūpuna;</i></p> <p><i>c) Managing the identified wāhi tūpuna sites in a culturally appropriate manner.</i></p>	<p>Consideration has been given to Schedule 1C sites of cultural significance (wāhi tupuna). No specific wāhi tupuna sites are known within the study area, however the Park Burn may have some small significance in terms of Wāhi Mahika kai (food and natural material gathering sites).</p>
<p>3.1.1 <i>Safeguard the life-supporting capacity of fresh water and manage fresh water to:</i></p> <p><i>a) Maintain good quality water and enhance water quality where it is degraded, including for:</i></p> <p><i>i. Important recreation values, including contact recreation; and, ii. Existing drinking and stock water supplies;</i></p> <p><i>b) Maintain or enhance aquatic:</i></p> <p><i>i. Ecosystem health;</i></p> <p><i>ii. Indigenous habitats; and,</i></p> <p><i>iii. Indigenous species and their migratory patterns.</i></p> <p><i>c) Avoid aquifer compaction and seawater intrusion;</i></p> <p><i>d) Maintain or enhance, as far as practicable:</i></p> <p><i>i. Natural functioning of rivers, lakes, and wetlands, their riparian margins, and aquifers;</i></p> <p><i>ii. Coastal values supported by fresh water;</i></p> <p><i>iii. The habitat of trout and salmon unless detrimental to indigenous biological diversity; and</i></p> <p><i>iv. Amenity and landscape values of rivers, lakes, and wetlands;</i></p> <p><i>e) Control the adverse effects of pest species, prevent their introduction and reduce their spread;</i></p> <p><i>f) Avoid, remedy or mitigate the adverse effects of natural hazards, including flooding and erosion; and,</i></p> <p><i>g) Avoid, remedy or mitigate adverse effects on existing infrastructure that is reliant on fresh water.</i></p>	<p>The ecological and hydrological features of the Park Burn are discussed in Section 3.4, while the potential effects on these features are discussed in Section 6.2. Water quality is unlikely to be affected by the activities. Kāi Tahu and other cultural values have been assessed above and in Section 7.2.6 of this document. Recreational values are addressed in Section 6.5, aesthetic and landscape values will be unaffected by the proposal, and no flooding, erosion, or other natural hazards will be caused or exacerbated by the activity.</p>
<p>3.1.2 <i>Manage the beds of rivers, lakes, wetlands, their margins, and riparian vegetation to:</i></p> <p><i>a) Safeguard the life supporting capacity of fresh water;</i></p> <p><i>b) Maintain good quality water, or enhance it where it has been degraded;</i></p> <p><i>c) Maintain or enhance bank stability;</i></p> <p><i>d) Maintain or enhance ecosystem health and indigenous biological diversity;</i></p> <p><i>e) Maintain or enhance, as far as practicable:</i></p> <p><i>i. Their natural functioning and character; and</i></p>	<p>See response to 3.1.1 above.</p>

<p>ii. Amenity values;</p> <p>f) Control the adverse effects of pest species, prevent their introduction and reduce their spread; and,</p> <p>g) Avoid, remedy or mitigate the adverse effects of natural hazards, including flooding and erosion.</p>	
<p>3.1.3 Manage the allocation and use of fresh water by undertaking all of the following:</p> <p>a) Recognising and providing for the social and economic benefits of sustainable water use;</p> <p>b) Avoiding over-allocation, and phasing out existing over-allocation, resulting from takes and discharges;</p> <p>c) Ensuring the efficient allocation and use of water by:</p> <p>i) Requiring that the water allocated does not exceed what is necessary for its efficient use;</p> <p>ii) Encouraging the development or upgrade of infrastructure that increases use efficiency;</p> <p>iii. Providing for temporary dewatering activities necessary for construction or maintenance.</p>	<p>An evaluation of efficient water use in relation to the proposal is provided in Section 6.7. The proposal will see no change in allocation from the Park Burn, however based on the aforementioned efficient use calculations there will be a significant reduction in annual volume sought. The catchment is fully allocated in accordance with Policy 6.4.2 of the RPW, and the proposal will not over-allocate the catchment with regards to these terms. The applicant is already using their water as efficiently as possible, utilising a reservoir and drip irrigation systems.</p>
<p>3.1.4 Manage for water shortage by undertaking all of the following:</p> <p>a) Encouraging land management that improves moisture capture, infiltration, and soil moisture holding capacity.</p> <p>b) Encouraging collective coordination and rationing of the take and use of water when river flows or aquifer levels are lowering, to avoid breaching any minimum flow or aquifer level restriction to optimise use of water available for taking;</p> <p>c) Providing for water harvesting and storage, subject to allocation limits and flow management, to reduce demand on water bodies during periods of low flows.</p>	<p>As explained above, the applicant utilises water efficiently via a low-waste drip system, ensuring over-use is avoided. Water harvesting and storage takes place within property the via a reservoir.</p>
<p>4.1.4 Assess activities for natural hazard risk to people, property and communities, by considering all of the following:</p> <p>a) The natural hazard risk identified, including residual risk; and</p> <p>b) Any measures to avoid, remedy or mitigate those risks, including relocation and recovery methods; and</p> <p>c) The long term viability and affordability of those measures; and</p> <p>d) Flow-on effects of the risk to other activities, individuals and communities; and</p>	<p>According to ORC's Natural Hazard Database, the Pisa Fault is located to the north of the applicant's northern boundary, close to the two take points. As this reservoir is not classified as a large dam and is located above land that is owned and operated by the applicant, it is not envisaged that there is any significant hazard risk posed by this arrangement.</p>

<p><i>e) The availability of, and ability to provide, lifeline utilities, and essential and emergency services, during and after a natural hazard event.</i></p>	
<p><i>4.2.2 Ensure Otago's people and communities are able to mitigate and adapt to the effects of climate change, over no less than 100 years, by all of the following:</i></p> <p><i>a) Taking into account the effects of climate change, including by using the best relevant climate change data; and</i></p> <p><i>b) Applying a precautionary approach when assessing and managing the effects of climate change where there is scientific uncertainty and potentially significant or irreversible effects; and</i></p> <p><i>c) Encouraging activities that assist to reduce or mitigate the effects of climate change; and</i></p> <p><i>d) Encouraging system resilience.</i></p>	<p>The uncertainty of the effects of climate change are such that providing future water security to the applicant, both in terms of sufficient volume and duration, is critical to the ongoing operation of the vineyard.</p>
<p><i>5.2.1 Recognise all of the following elements as characteristic or important to Otago's historic heritage:</i></p> <p><i>a) Residential and commercial buildings;</i></p> <p><i>b) Māori cultural and heritage values;</i></p> <p><i>c) 19th and early 20th century pastoral sites;</i></p> <p><i>d) Early surveying, communications and transport, including roads, bridges and routes;</i></p> <p><i>e) Early industrial historic heritage, including mills and brickworks;</i></p> <p><i>f) Gold and other mining systems and settlements;</i></p> <p><i>g) Dredge and ship wrecks;</i></p> <p><i>h) Coastal historic heritage, particularly takata whenua occupation sites and those associated with early European activity such as whaling;</i></p> <p><i>i) Memorials;</i></p> <p><i>j) Trees and vegetation.</i></p>	<p>As the applicant's deemed permit is based on historic mining privileges and water race licences, it may have some heritage value as a remnant of Central Otago's gold mining heritage. Continued operation of the water take infrastructure under the status quo will help to preserve these features.</p>
<p><i>5.3.1 Manage activities in rural areas, to support the region's economy and communities, by:</i></p> <p><i>a) Enabling primary production and other rural activities that support the rural economy; and</i></p> <p><i>b) Providing for mineral exploration, extraction and processing; and</i></p> <p><i>c) Minimising the loss of significant soils; and</i></p> <p><i>d) Restricting the establishment of activities in rural areas that may lead to reverse sensitivity effects; and</i></p> <p><i>e) Minimising the subdivision of productive rural land into smaller lots that may result in rural residential activities; and</i></p>	<p>Replacement of the applicant's permit with sufficient instantaneous and volumetric rates of take will ensure the vineyard and wine-making operation can continue into the future. This will also help to minimise any chance of future subdivision of productive rural land. Water use is already via efficient means (drip), meaning the proposal does not pose any risk to soil health.</p>

<p><i>f) Providing for other activities that have a functional need to locate in rural areas, including tourism and recreational activities that are of a nature and scale compatible with rural activities.</i></p>	
<p>5.4.3 <i>Apply a precautionary approach to activities where adverse effects may be uncertain, not able to be determined, or poorly understood but are potentially significant or irreversible.</i></p>	<p>Due to reliable historic abstraction records and a long history of use, uncertainty is low and a precautionary approach is not considered necessary. The effects of taking and use of water are well known and not significant. Any effect is not irreversible. Where information gaps occur, Council has the ability to review consent conditions and adjust methods or approaches to better manage adverse effects.</p>

7.2.4 Proposed Regional Policy Statement for Otago

The following policies from the 2015 Proposed Regional Policy Statement are relevant to this application. Only those policies that have not been directly superseded by operative policies have been included.

Table 9: Relevant policies from the Proposed Regional Policy Statement for Otago, 2015

Policy	Comments
<p>1.1.2 <i>Ensure that local authorities exercise their functions and powers, to:</i></p> <p><i>a) Accord Kāi Tahu a status distinct from that of interest groups and members of the public, consistent with their position as a Treaty partner; and</i></p> <p><i>b) Involve Kāi Tahu in resource management decision-making processes and implementation; and</i></p> <p><i>c) Take into account Kāi Tahu views in resource management decision-making processes and implementation, particularly regarding the relationship of their culture and traditions with their ancestral lands, water, sites, wāhi tapu, and other taoka; and</i></p> <p><i>d) Ensure Kāi Tahu have the prerogative to:</i></p> <p><i>i. Identify their relationship with their ancestral lands, water, sites, wāhi tapu, and other taoka; and</i></p> <p><i>ii. Determine how best to express that relationship; and</i></p> <p><i>e) Ensure Kāi Tahu are able to exercise kaitiakitaka; and</i></p> <p><i>f) Ensure that district and regional plans:</i></p> <p><i>i. Give effect to the Ngāi Tahu Claims Settlement Act 1998; and</i></p> <p><i>ii. Recognise and provide for statutory acknowledgement areas, as detailed in Schedule 2; and</i></p>	<p>Aukaha have been given due consideration as a stakeholder in Section 5. Applicable provisions of the Kāi Tahu ki Otago Natural Resource Management Plan as they relate to this application have also been considered below. The Clutha River/Mata-Au (Lake Dunstan), which the catchment drains into, has been identified as a statutory acknowledgement area.</p>

<p><i>iii. Provide for other areas in Otago that are recognised as significant to Kāi Tahu in a manner similar to that prescribed for statutory acknowledgement areas.</i></p>	
<p><i>2.1.1 Recognise freshwater values, and manage freshwater, to:</i></p> <ul style="list-style-type: none"> <i>a) Support healthy ecosystems in all Otago aquifers, and rivers, lakes, wetlands, and their margins; and</i> <i>b) Retain the range and extent of habitats provided by freshwater; and</i> <i>c) Protect outstanding water bodies and wetlands; and</i> <i>d) Protect migratory patterns of freshwater species, unless detrimental to indigenous biodiversity; and</i> <i>e) Avoid aquifer compaction, and seawater intrusion in aquifers; and</i> <i>f) Maintain good water quality, including in the coastal marine area, or enhance it where it has been degraded; and</i> <i>g) Maintain or enhance coastal values supported by freshwater values; and</i> <i>h) Maintain or enhance the natural functioning of rivers, lakes, and wetlands, their riparian margins, and aquifers; and</i> <i>i) Retain the quality and reliability of existing drinking water supplies; and</i> <i>j) Protect Kāi Tahu values; and</i> <i>k) Provide for other cultural values; and</i> <i>l) Protect important recreation values; and</i> <i>m) Maintain the aesthetic and landscape values of rivers, lakes, and wetlands; and</i> <i>n) Avoid the adverse effects of pest species, prevent their introduction and reduce their spread; and</i> <i>o) Mitigate the adverse effects of natural hazards, including flooding and erosion; and</i> <i>p) Maintain the ability of existing infrastructure to operate within their design parameters.</i> 	<p>The ecological and hydrological features of the Park Burn are discussed in Section 3.4, while the potential effects on these features are discussed in Section 6.2. Water quality is unlikely to be affected by the activities. Kāi Tahu and other cultural values have been assessed above and in Section 7.2.6 of this document. Recreational values are addressed in Section 6.5, existing established aesthetic and landscape values will be unaffected by the proposal, and no flooding, erosion, or other natural hazards will be caused or exacerbated by the activity. Replacement of the applicant's permit will enable them to continue operating their existing infrastructure within their design parameters.</p>
<p><i>2.1.2 Recognise the values of beds of rivers and lakes, wetlands, and their margins, and manage them to:</i></p> <ul style="list-style-type: none"> <i>a) Protect or restore their natural functioning; and</i> <i>b) Protect outstanding water bodies and wetlands; and</i> <i>c) Maintain good water quality, or enhance it where it has been degraded; and</i> 	<p>Much of this policy is also reflected in Policy 2.1.1, which is discussed above.</p>

<p>d) <i>Maintain ecosystem health and indigenous biodiversity; and</i></p> <p>e) <i>Retain the range and extent of habitats supported; and</i></p> <p>f) <i>Maintain or enhance natural character; and</i></p> <p>g) <i>Protect Kāi Tahu values; and</i></p> <p>h) <i>Provide for other cultural values; and</i></p> <p>i) <i>Maintain their aesthetic and amenity values; and</i></p> <p>j) <i>Avoid the adverse effects of pest species, prevent their introduction and reduce their spread; and</i></p> <p>k) <i>Mitigate the adverse effects of natural hazards, including flooding and erosion; and</i></p> <p>l) <i>Maintain bank stability.</i></p>	
<p>2.1.6 <i>Recognise the values of ecosystems and indigenous biodiversity, and manage ecosystems and indigenous biodiversity, to:</i></p> <p>a) <i>Maintain or enhance ecosystem health and indigenous biodiversity; and</i></p> <p>b) <i>Maintain or enhance areas of predominantly indigenous vegetation; and</i></p> <p>c) <i>Buffer or link existing ecosystems; and</i></p> <p>d) <i>Protect important hydrological services, including the services provided by tussock grassland; and</i></p> <p>e) <i>Protect natural resources and processes that support indigenous biodiversity; and</i></p> <p>f) <i>Maintain habitats of indigenous species that are important for recreational, commercial, cultural or customary purposes; and</i></p> <p>g) <i>Protect biodiversity significant to Kāi Tahu; and</i></p> <p>h) <i>Avoid the adverse effects of pest species, prevent their introduction and reduce their spread.</i></p>	<p>The ecosystem values of the Park Burn catchment are discussed in Section 3.4, while the potential effects on these values are explored in Section 6.2.</p>
<p>2.1.7 <i>Recognise the values of natural features, landscapes, seascapes and the coastal environment are derived from the following attributes, as detailed in Schedule 4:</i></p> <p>a) <i>Biophysical attributes, including:</i></p> <p>i. <i>Natural science factors;</i></p> <p>ii. <i>The presence of water;</i></p> <p>iii. <i>Vegetation (indigenous and introduced);</i></p> <p>iv. <i>The natural darkness of the night sky;</i></p> <p>b) <i>Sensory attributes, including:</i></p> <p>i. <i>Legibility or expressiveness;</i></p> <p>ii. <i>Aesthetic values;</i></p> <p>iii. <i>Transient values, including nature's sounds;</i></p> <p>iv. <i>Wild or scenic values;</i></p> <p>c) <i>Associative attributes, including:</i></p>	<p>The values of applicable natural features potentially affected by the proposal (namely the Park Burn) have been recognised in Section 3.4. The applicant utilises a water race that is a remnant of the region's gold mining history – a continuation of abstraction under the status quo will ensure that this heritage feature can persist into the future.</p>

<ul style="list-style-type: none"> i. Whether the values are shared and recognised; ii. Cultural and spiritual values for Kāi Tahu; iii. Historical and heritage associations. 	
<p>3.1.1 Recognise the natural and physical environmental constraints of an area, the effects of those constraints on activities, and the effects of those activities on those constraints, including:</p> <ul style="list-style-type: none"> a) The availability of natural resources necessary to sustain the activity; and b) The ecosystem services the activity is dependent on; and c) The sensitivity of the natural and physical resources to adverse effects from the proposed activity/land use; and d) Exposure of the activity to natural and technological hazard risks; and e) The functional necessity for the activity to be located where there are significant constraints. 	<p>The existing natural environment as it relates to the proposal is examined in Section 3 of this document, while the effects of the activities on the natural environment are assessed in Section 6.</p> <p>Based on ORC's GIS mapping, the Pisa Fault runs to the north of the applicant's property.</p>

7.2.5 Regional Plan: Water for Otago

The following policies, which give effect to the plan's objectives, are relevant to this application for resource consent.

Table 10: Assessment of RPW policies

Policy	Comments
<p>5.4.1 To identify the following natural and human use values supported by Otago's lakes and rivers, as expressed in Schedule 1:</p> <ul style="list-style-type: none"> (a) Outstanding natural features and landscapes; (b) Areas with a high degree of naturalness; (c) Areas of significant indigenous vegetation, significant habitats of indigenous fauna, and significant habitats of trout and salmon; (d) Ecosystem values; (e) Water supply values; (f) Registered historic places; and (g) Spiritual and cultural beliefs, values and uses of significance to Kai Tahu. 	<p>No Schedule 1 values directly relate to the activity.</p>
<p>5.4.2 In the management of any activity involving surface water, groundwater or the bed or margin of any lake or river, to give priority to avoiding, in preference to remedying or mitigating:</p> <p>(1) Adverse effects on:</p> <ul style="list-style-type: none"> (a) Natural values identified in Schedule 1A; 	<p>The Park Burn is not listed in Schedule 1. No adverse effects on the natural character or amenity values of the Park Burn are anticipated due to the proposal.</p>

Policy	Comments
<p>(b) Water supply values identified in Schedule 1B;</p> <p>(c) Registered historic places identified in Schedule 1C, or archaeological sites in, on, under or over the bed or margin of a lake or river;</p> <p>(d) Spiritual and cultural beliefs, values and uses of significance to Kai Tahu identified in Schedule 1D;</p> <p>(e) The natural character of any lake or river, or its margins;</p> <p>(f) Amenity values supported by any water body; and</p> <p>(2) Causing or exacerbating flooding, erosion, land instability, sedimentation or property damage.</p>	<p>The proposal will not cause or exacerbate flooding, erosion, land instability, sedimentation or property damage.</p>
<p>5.4.3 In the management of any activity involving surface water, groundwater or the bed or margin of any lake or river, to give priority to avoiding adverse effects on:</p> <p>(a) Existing lawful uses; and</p> <p>(b) Existing lawful priorities for the use of lakes and rivers and their margins.</p>	<p>Other lawful water users in the Park Burn catchment have been consulted and have prepared their deemed permit replacement applications concurrently to ensure that everyone's needs are considered and met.</p> <p>Smallburn Ltd are the only other active consent holder on the Park Burn, with their permits (RM15.007.01 & 94394) currently having priority over the applicant's permit (98526).</p>
<p>5.4.4 To recognise Kai Tahu's interests in Otago's lakes and rivers by promoting opportunities for their involvement in resource consent processing.</p>	<p>The Kai Tahu ki Otago Natural Resource Management Plan (NRMP) is considered later in this report.</p>
<p>5.4.8 To have particular regard to the following features of lakes and rivers, and their margins, when considering adverse effects on their natural character</p> <p>(a) The topography, including the setting and bed form of the lake or river;</p> <p>(b) The natural flow characteristics of the river;</p> <p>(c) The natural water level of the lake and its fluctuation;</p> <p>(d) The natural water colour and clarity in the lake or river;</p> <p>(e) The ecology of the lake or river and its margins; and</p>	<p>The natural flow characteristics of the Park Burn and associated tributary are discussed earlier in this report. The abstraction of water will undeniably have some influence on the natural flow regime of the creeks, however the open nature of the intakes is such that the natural character of the creeks should remain largely uncompromised, with the water level fluctuations, colour, clarity and ecology that would typically be expected of a natural watercourse.</p> <p>As remnants of historic mining privileges, the takes have been occurring for some time, meaning the ecology and (to a lesser extent)</p>

Policy	Comments
<p><i>(f) The extent of use or development within the catchment, including the extent to which that use and development has influenced matters (a) to (e) above.</i></p>	<p>hydrology of the creeks have likely adapted to account for the abstractions. Any significant changes to these takes would likely change the character of the creeks themselves. It should also be noted that the takes have enabled the development and ongoing operation of a world-class vineyard.</p>
<p><i>5.4.9 To have particular regard to the following qualities or characteristics of lakes and rivers, and their margins, when considering adverse effects on amenity values:</i></p> <p><i>(a) Aesthetic values associated with the lake or river; and</i></p> <p><i>(b) Recreational opportunities provided by the lake or river, or its margins.</i></p>	<p>Considering the long history of abstraction from the Park Burn, it could be argued that the aesthetic values of the creeks are intrinsically tied to the long-established water takes. Furthermore, virtually all of the catchment is located on private land and is unsupportive of recreation, with the small size of the creeks unsupportive of angling.</p>
<p><i>6.4.0 To recognise the hydrological characteristics of Otago's water resources, including behaviour and trends in:</i></p> <p><i>(a) The levels and flows of surface water bodies; and</i></p> <p><i>(b) The levels and volumes of groundwater; and</i></p> <p><i>(c) Any interrelationships between adjoining bodies of water, when managing the taking of water.</i></p>	<p>The hydrological regime of the Park Burn and associated tributary are discussed earlier in this report.</p>
<p><i>6.4.0A To ensure that the quantity of water granted to take is no more than that required for the purpose of use taking into account:</i></p> <p><i>(a) How local climate, soil, crop or pasture type and water availability affect the quantity of water required; and</i></p> <p><i>(b) The efficiency of the proposed water transport, storage and application system.</i></p>	<p>The proposed irrigation volumes have been calculated in accordance with guidelines which ORC accepts as representing reasonable water requirements for irrigation of grapes. The irrigation volumes account for all factors mentioned in the policy (climate, crop, efficiency of use, etc.).</p> <p>The applicant maintains a reservoir to reduce reliance on instantaneous water demand, and the vineyard is irrigated via efficient (drip) irrigation techniques. The race itself is of limited efficiency, given that a fraction of the water taken is likely to be lost during conveyance to leaks and evaporation.</p>
<p><i>6.4.0C To promote and give preference, as between alternative sources, to the take and use of water from the nearest practicable source.</i></p>	<p>The proposal seeks to enable the continued taking of water from the nearest practicable sources.</p>

Policy	Comments
<p>6.4.1 To enable the taking of surface water, by:</p> <p>(a) Defined allocation quantities; and</p> <p>(b) Provision for water body levels and flows, except when:</p> <p>(i) The taking is from Lakes Dunstan, Hawea, Roxburgh, Wanaka or Wakatipu, or the main stem of the Clutha River/Mata-Au or Kawarau Rivers.</p> <p>(ii) All of the surface water or connected groundwater taken is immediately returned to the source water body.</p> <p>(iii) Water is being taken which has been delivered to the source water body for the purpose of that subsequent take.</p>	<p>The proposal seeks to take water that is within the current primary allocation limit for the Park Burn catchment.</p>
<p>6.4.2 To define the primary allocation limit for each catchment, from which surface water takes and connected groundwater takes may be granted, as the greater of:</p> <p>(a) That specified in Schedule 2A, but where no limit is specified in Schedule 2A, 50% of the 7-day mean annual low flow; or</p> <p>(b) The sum of consented maximum instantaneous, or consented 7-day, takes of:</p> <p>(i) Surface water as at:</p> <p>(1) 19 February 2005 in the Welcome Creek catchment; or</p> <p>(2) 7 July 2000 in the Waianakarua catchment; or</p> <p>(3) 28 February 1998 in any other catchment; and</p> <p>(ii) Connected groundwater as at 10 April 2010, less any quantity in a consent where:</p> <p>(1) In a catchment in Schedule 2A, the consent has a minimum flow that was set higher than that required by Schedule 2A.</p> <p>(2) All of the water taken is immediately returned to the source water body.</p> <p>(3) All of the water being taken had been delivered to the source water body for the purpose of that subsequent take.</p> <p>(4) The consent has been surrendered or has expired (except for the quantity granted to the existing consent holder in a new consent).</p> <p>(5) The consent has been cancelled (except where the quantity has been transferred to a new consent under Section 136(5)).</p> <p>(6) The consent has lapsed.</p>	<p>The proposal seeks to take water that is within the current primary allocation limit for the Park Burn, per Policy 6.4.2(b)(i)(3).</p>

Policy	Comments
<p>6.4.2A <i>Where an application is received to take water and Policy 6.4.2(b) applies to the catchment, to grant from within primary allocation no more water than has been taken under the existing consent in at least the preceding five years, except in the case of a registered community drinking water supply where an allowance may be made for growth that is reasonably anticipated.</i></p>	<p>The rate of take sought is no more than what has been taken under the existing consent.</p>
<p>6.4.7 <i>The need to maintain a residual flow at the point of take will be considered with respect to any take of water, in order to provide for the aquatic ecosystem and natural character of the source water body.</i></p>	<p>Residual flow considerations are discussed earlier in this report (Section 6.3).</p>
<p>6.4.16 <i>In granting resource consents to take water, or in any review of the conditions of a resource consent to take water, to require the volume and rate of take to be measured in a manner satisfactory to the Council unless it is impractical or unnecessary to do so.</i></p>	<p>The takes will continue to be metered in accordance with the Resource Management (Measurement and Reporting of Water Takes) Regulations 2010.</p>
<p>6.4.19 <i>When setting the duration of a resource consent to take and use water, to consider:</i></p> <ul style="list-style-type: none"> <i>(a) The duration of the purpose of use;</i> <i>(b) The presence of a catchment minimum flow or aquifer restriction level;</i> <i>(c) Climatic variability and consequent changes in local demand for water;</i> <i>(d) The extent to which the risk of potentially significant, adverse effects arising from the activity may be adequately managed through review conditions;</i> <i>(e) Conditions that allow for adaptive management of the take and use of water;</i> <i>(f) The value of the investment in infrastructure; and</i> <i>(g) Use of industry best practice.</i> 	<p>These matters are discussed in Section 8.</p>

7.2.6 Cultural policies assessment

Iwi planning documents are not statutory instruments, but they do have statutory weight under the RMA in relation to the plan preparation process. The RPS must take into account any relevant planning document recognised by an iwi authority, however, iwi management plans retain their ability to address concepts from a Maori paradigm without constraint from the RMA.

7.2.6.1 Statutory Acknowledgements

The Park Burn is a tributary of the Clutha River/Mata-Au (Lake Dunstan), which is a Statutory Acknowledgement Area. Pursuant to the Ngai Tahu Claims Settlement Act 1998, Te Runanga o Ngai Tahu should be advised of this application.

7.2.6.2 Te Runanga o Ngai Tahu Freshwater Policy Statement

The Ngai Tahu Freshwater Policy Statement has status as an iwi management plan, to complement and be read alongside the Kai Tahu Ki Otago Natural Resource Management Plan (NRMP).

In terms of integrated management, whilst this document is mostly directed at the organizational level, the policy statement confirms that catchment management planning is the preferred approach. This includes catchment-specific strategies as providing a better basis for achieving integrated sustainable management of natural resources.

Where Ngai Tahu values have been identified, they should be maintained as a minimum, but preferably enhanced. Particular consideration of the mauri (life force) of the watercourses has been given throughout the application, as exemplified in an assessment of the effects of the activity on the hydrology and ecology of the subject creeks, which are key contributors to the mauri of these creeks.

7.2.6.3 Kāi Tahu ki Otago NRMP

The policies within the Kāi Tahu ki Otago NRMP that are considered particularly relevant to this application are presented in the below table. The proposal is considered generally consistent with these policies, as discussed in the table.

Table 11: Relevant policies of the Kai Tahu ki Otago NRMP

Policy	Comments
<i>To require an assessment of instream values for all activities affecting water.</i>	Values of the subject watercourses are considered in Section 3.4.
<i>To require that resource consent applicants seek only the amount of water actually required for the purpose specified in the application.</i>	The proposed water take volumes are considered to be reasonable for the proposed uses, based on the specific characteristics of the sites and recognised reasonable water use guidelines for irrigation (see Section 6.7). As discussed earlier, the monthly volume sought is in fact less than that which is required to efficiently irrigate the applicant's property, while the annual volume sought is significantly less than what is currently authorised under the existing permit.
<i>To require that all water takes are metered and reported on, and information be made available upon request to Kāi Tahu ki Otago.</i>	The water takes will continue to be metered as detailed in Section 6.8. Metering data will be made available to ORC, and Kāi Tahu ki Otago can request this data either from ORC or from the applicant, if desired.
<i>To oppose the granting of water take consents for 35 years. Consistent with a precautionary approach, either a review clause or a reduced term may be sought.</i>	Consent duration is discussed in Section 8.

Policy	Comments
<i>To require that fish passage is provided for at all times, both upstream and downstream.</i>	As discussed in Section 6.3, the Park Burn naturally loses connectivity with Lake Dunstan in mid to late summer and early autumn, meaning it would be virtually impossible to provide for fish passage year-round irrespective of any residual or minimum flow conditions imposed.
<i>To require that fish screens be fitted to all pumps and race intakes.</i>	Based on ecological assessment and historic fish survey data, no fish screens are proposed. This is discussed in further detail in Section 6.2.
<i>To encourage those that extract water for irrigation to use the most efficient method of application. Flood irrigation, border dyke and contour techniques are less likely to be supported than spray irrigation techniques.</i>	As discussed earlier, the applicant utilises drip irrigation, which is the most efficient method of application.
<i>To encourage irrigation to occur at times when winds are light and evaporation low.</i>	Irrigation at the most efficient times is in the applicant's best interests as well, although it is noted that it will not be practical to avoid irrigation in adverse conditions 100 % of the time.

8. CONSENT DURATION, REVIEW AND LAPSE

A consent term of 35 years is sought. In accordance with Section 123 of the RMA, a term of up to 35 years may be granted for a resource consent to take and use water. This consent duration satisfies the criteria set out in Policy 6.4.19 of the RPW due to the following:

- The use of the water for irrigation supply is very likely to be in effect for a duration of at least 35 years, given the suitability of the property for grape growing and winemaking. It is also worth noting that the proposed takes will supply irrigation infrastructure that is in place and established, with recognition of reasonably foreseeable future expansion.
- While there is no historic flow data for the Park Burn, the similarity between this catchment and that of the nearby Amisfield Burn (which has 6 years of continuous flow data to draw upon) means data relating to the latter can be used as a reliable proxy for the former, along with other data from nearby similar streams, such as the Low Burn. This means that the existing environment and the anticipated effects on it are well understood.
- Abstraction from the creeks under the existing permit and preceding permits and rights has occurred for many years. This long history of take and use makes it easier to forecast future potential effects on natural and cultural values due to the continuing operation of the activity.
- The local climate is likely to become more variable and less predictable in the coming decades due to climate change, based on the climate change projections for the Otago region prepared

by the Ministry for the Environment in 2018 as available on their website. In particular, temperatures (and therefore evapotranspiration) are expected to increase, and while precipitation may also increase, changes in the timing (largest increases in winter and spring) and form (more rain and less snow) may reduce water security in the region. More frequent droughts are predicted. Securing reliable water access to the Park Burn, while preserving the values of this catchment, will enable the vineyard to continue operating at its fullest potential into the future.

- This report and the supporting documents demonstrate that the activity will have no more than minor actual or potential adverse environmental effects. The probability that this assessment and proposed mitigation measures have not addressed all actual or potential adverse effects is low and the scope of remaining unforeseen adverse effects is limited. Review conditions can adequately manage unforeseen adverse effects if required.
- The existing water distribution infrastructure and irrigation systems represent a significant investment. With standard costs of around \$15,000/ha on subsoil irrigation, \$50,000/ha on above-ground vineyard works, up to \$50,000 on the reservoir, and further expenditure on pump and electrical infrastructure, investment in this property far exceeds \$1.5 million. Further investment will be required for ongoing maintenance of the infrastructure, and any future expansions. The request for a 35-year consent duration gives the applicant the security to make ongoing investment decisions based on the returns from their operation over this duration.

9. CONCLUSION

A decision to grant consent pursuant to Section 104C under delegated authority can be made on the basis that:

- a) It is expected that the adverse effects on the environment will be minor or less;
- b) The proposal meets the non-notification requirements of Section 95A of the RMA; and
- c) The proposal is consistent with the requirements of the RMA, Council policy and other relevant matters.

Granting of the consents will be consistent with the purpose of the RMA for the reasons explained within this report. The proposed activities are not expected to result in further degradation of water quality and potential adverse effects will be avoided, remedied or mitigated as far as practicable.

Appendix A: Full-size maps



98526 Take 1

98526 Take 2

Race piped over Park Burn trib

Race overflow

Telemeter



300 m



Appendix B: Certificates of title



**RECORD OF TITLE
UNDER LAND TRANSFER ACT 2017
FREEHOLD
Search Copy**




R. W. Muir
Registrar-General
of Land

Identifier OT19A/906
Land Registration District Otago
Date Issued 26 November 1999

Prior References

OT12C/1084 OT19A/538

Estate Fee Simple
Area 277.6231 hectares more or less
Legal Description Lot 3 Deposited Plan 27494

Registered Owners

Lowburn Land Holdings LP

Interests

Saving and excepting all minerals within the meaning of the Land Act 1924 on or under the within land (affects the land formerly contained in CT OT19A/538)

Subject to Section 59 Land Act 1948

Section 16 and Part Section 35 herein is subject to a right to the Crown to enter upon the said land and thereon to take, lay, construct water races, drains and all other works for the supply of water to the said land and to take water from races so provided for irrigation purposes at a price to be fixed by the Crown and excepting the Crown from liability for any damage caused by any overflow or breakaway of any race of channel.

Section 16 and part Section 35 herein is subject to Section 315 Land Act 1924

947504.1 Mining Certificate 947504.1 under Section 417 Resource Management Act 1991 to (now) Lowburn Land Holdings LP - 8.5.1998 at 9:05 am

966109.1 Certificate under Section 417(2) Resource management Act 1991 - 21.4.1999 at 11.06 am (affects the land formerly contained in CT OT12C/1084)

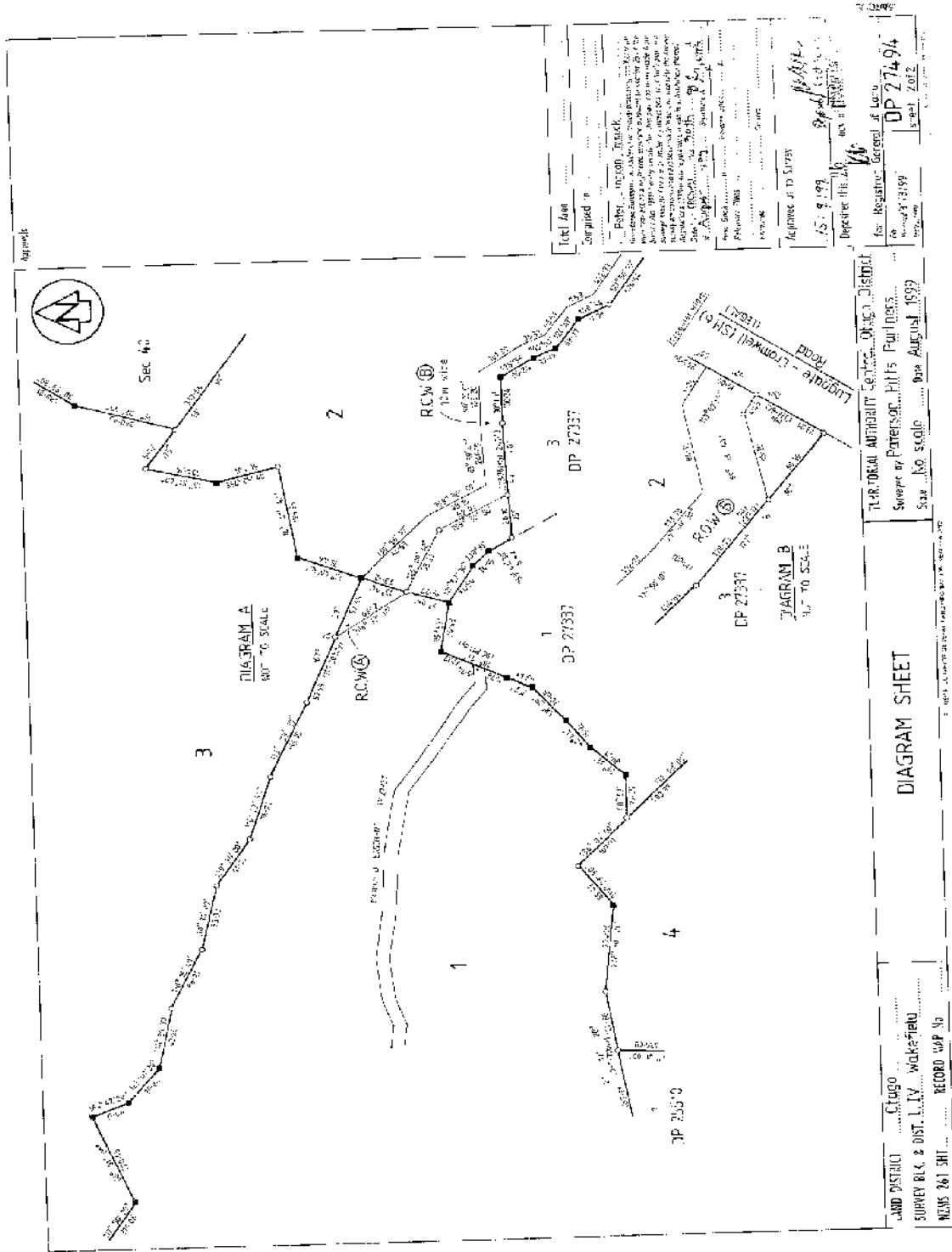
Appurtenant hereto is a right of way and right to convey electricity & telecommunications created by Transfer 6267740.3 - 24.12.2004 at 9:00 am

Land Covenant in Easement Instrument 7613283.2 - 13.11.2007 at 9:00 am

9667125.6 Mortgage to Bank of New Zealand - 28.3.2014 at 5:23 pm

10435540.2 Certificate pursuant to Section 417 Resource Management Act 1991 to Rockburn Wines Limited - 2.8.2016 at 2:41 pm

10435540.3 Certificate pursuant to Section 417 Resource Management Act 1991 to Rockburn Wines Limited - 2.8.2016 at 2:41 pm



Total Area
 Comprised in
 Paper
 Approved as to Survey
 AS of 1999
 Deposited this 16th day of August 1999
 for Registrar General of Land
 DP 27494
 Sheet 2012

THE REGISTAR GENERAL OF LAND DISTRICT
 Survey of Paterson Hills Part 1999
 Scale, No. scale for August 1999

DIAGRAM SHEET

LAND DISTRICT Clago
 SURVEY BLK. & DIST. L.V. Wakefield
 MEMS 261 SHT RECORD MAP No



**RECORD OF TITLE
UNDER LAND TRANSFER ACT 2017
FREEHOLD
Search Copy**




R. W. Muir
Registrar-General
of Land

Identifier 84470
Land Registration District North Auckland
Date Issued 22 December 2003

Prior References

63313

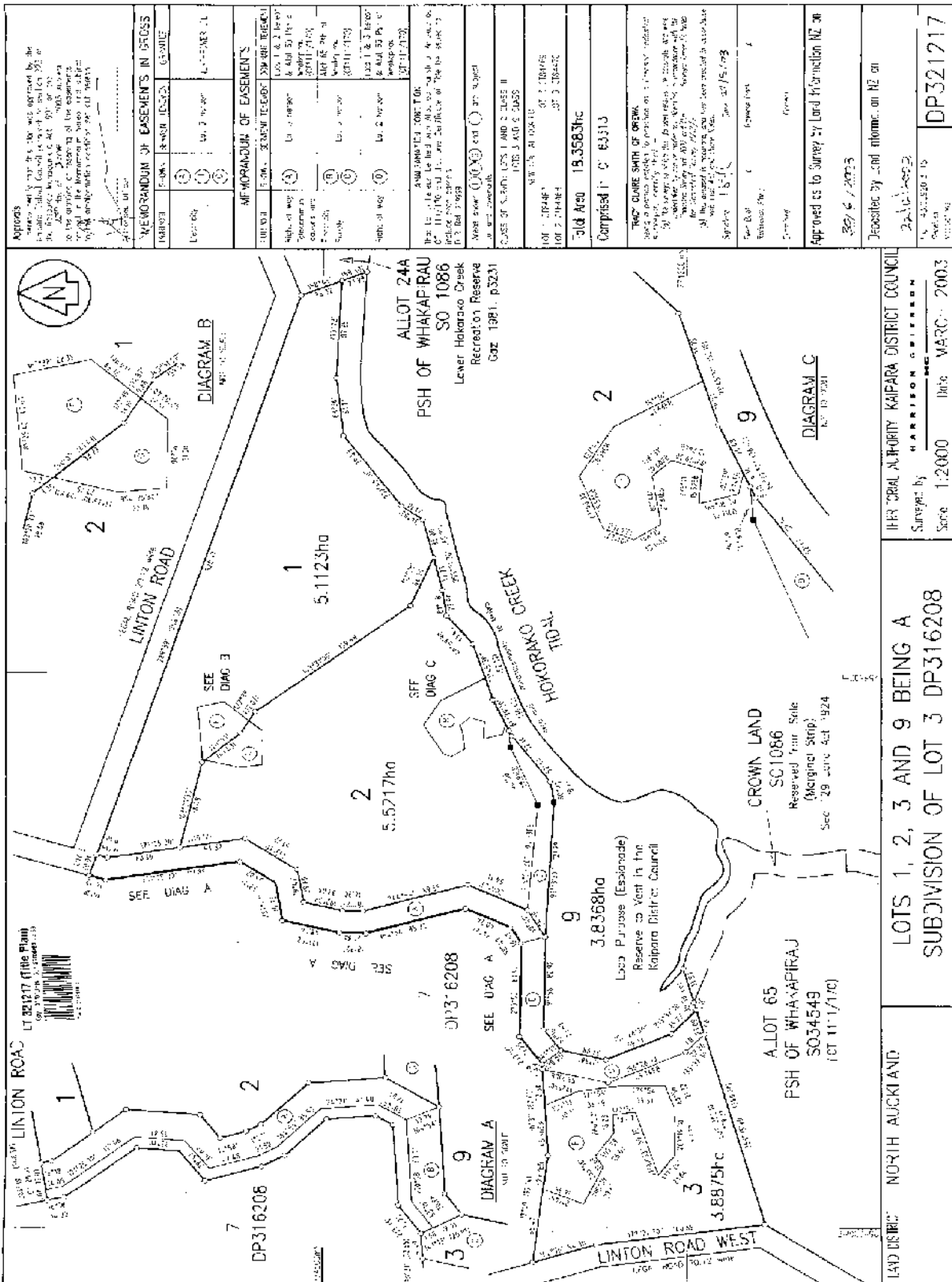
Estate Fee Simple
Area 3.8368 hectares more or less
Legal Description Lot 9 Deposited Plan 321217
Purpose Local Purpose (Esplanade) Reserve

Registered Owners

Kaipara District Council

Interests

Subject to the Reserves Act 1977



Approvals

where only part of the site is approved by the relevant Council or other authority, the portion of the site which is approved shall be shown by a dashed line.

MEMORANDUM OF EASEMENTS IN CROSS

NUMBER	FROM	TO	REASON	DATE
1	1	2	WATER	19/11/1978
2	2	1	WATER	19/11/1978
3	1	2	WATER	19/11/1978

MEMORANDUM OF EASEMENTS

NUMBER	FROM	TO	REASON	DATE
1	1	2	WATER	19/11/1978
2	2	1	WATER	19/11/1978
3	1	2	WATER	19/11/1978

APPROVED FOR THE PURPOSES OF THE RESERVE ACT 1977 BY THE BOARD OF RESERVES ON 19/11/1978.

APPROVED FOR THE PURPOSES OF THE RESERVE ACT 1977 BY THE BOARD OF RESERVES ON 19/11/1978.

APPROVED FOR THE PURPOSES OF THE RESERVE ACT 1977 BY THE BOARD OF RESERVES ON 19/11/1978.

APPROVED FOR THE PURPOSES OF THE RESERVE ACT 1977 BY THE BOARD OF RESERVES ON 19/11/1978.

APPROVED FOR THE PURPOSES OF THE RESERVE ACT 1977 BY THE BOARD OF RESERVES ON 19/11/1978.

APPROVED FOR THE PURPOSES OF THE RESERVE ACT 1977 BY THE BOARD OF RESERVES ON 19/11/1978.

APPROVED FOR THE PURPOSES OF THE RESERVE ACT 1977 BY THE BOARD OF RESERVES ON 19/11/1978.

APPROVED FOR THE PURPOSES OF THE RESERVE ACT 1977 BY THE BOARD OF RESERVES ON 19/11/1978.

APPROVED FOR THE PURPOSES OF THE RESERVE ACT 1977 BY THE BOARD OF RESERVES ON 19/11/1978.

THE RURAL AUTHORITY KAIPARA DISTRICT COUNCIL

Surveyed by HARRISON QUILLBERN

Scale 1:2000 Date MARCH 2003

LOTS 1, 2, 3 AND 9 BEING A SUBDIVISION OF LOT 3 DP316208

LAND DISTRICT NORTH AUCKLAND

Approved as to Survey by Land Information NZ on 20/11/2003

Registered by Land Information NZ on 22/11/2003

Lot 1: 5.1123ha

Lot 2: 5.5717ha

Lot 3: 3.8875ha

DP321717



**RECORD OF TITLE
UNDER LAND TRANSFER ACT 2017
FREEHOLD
Search Copy**




R. W. Muir
Registrar-General
of Land

Identifier 844471
Land Registration District Otago
Date Issued 19 February 2019

Prior References

829494

Estate Fee Simple
Area 82.6260 hectares more or less
Legal Description Lot 2 Deposited Plan 526279

Registered Owners

Mark II Limited

Interests

Subject to Section 59 Land Act 1948 (affects parts formerly Section 46 Block I Wakefield Survey District contained in RT OT12C/1084 and Part Section 35 Block I Wakefield Survey District contained in RT OT19A/538)

Saving and excepting all minerals within the meaning of the Land Act 1924 on or under the within land (affects part formerly Part Section 35 Block I Wakefield Survey District contained in RT OT19A/538)

Part formerly Section 35 Block I Wakefield Survey District contained in RT OT19A/538 herein is subject to a right to the Crown to enter upon the said land and thereon to take lay, construct water-races, drains and all other works for the supply of water to the said land and to take water from races so provided for irrigation purposes at a price to be fixed by the Crown and excepting the Crown from liability for any damage caused by any overflow or breakaway of any race or channel

Subject to Section 315 Land Act 1924 (affects part formerly Part Section 35 Block I Wakefield Survey District contained in RT OT19A/538)

966109.1 Certificate under Section 417 (2) Resource Management Act 1991 - 21.4.1999 at 11.06 am

Subject to a right to convey water over part marked PA, IA and IB on DP 526279 created by Transfer 975233.8 - 20.9.1999 at 10.49 am

Appurtenant hereto is a right of way and right to convey electricity and telecommunications created by Transfer 6267740.3 - 24.12.2004 at 9:00 am

7346903.1 Gazette Notice (2001/p1044) declaring the adjoining State Highway SH 6 to be a limited access road - 2.5.2007 at 9:00 am

7346903.2 Notice pursuant to Section 91 Transit New Zealand Act 1989 - 2.5.2007 at 9:00 am

Appurtenant hereto is a right of way created by Easement Instrument 7489310.13 - 3.8.2007 at 9:00 am

10435540.2 Certificate pursuant to Section 417 Resource Management Act 1991 to Rockburn Wines Limited - 2.8.2016 at 2:41 pm

10435540.3 Certificate pursuant to Section 417 Resource Management Act 1991 to Rockburn Wines Limited - 2.8.2016 at 2:41 pm

10435540.5 Consent Notice pursuant to Section 221 Resource Management Act 1991 - 2.8.2016 at 2:41 pm

Appurtenant hereto is a right of way, right to store water and pump water and a right to convey electricity, telecommunications and computer media created by Easement Instrument 10435540.8 - 2.8.2016 at 2:41 pm

Some of the easements created by Easement Instrument 10435540.8 are subject to Section 243 (a) Resource Management Act 1991 (see DP 490342)

Identifier**844471**

Subject to a right of way over part marked RA, RB, IA, IB, G, H, T and FA and a right to store water over part marked FA all on DP 526279 created by Easement Instrument 10435540.8 - 2.8.2016 at 2:41 pm

Subject to a right to convey water over part marked IR, RI, GA, TI, H, W, AT, ER, LI, QU and ID on DP 526279 on DP 522616 created by Easement Instrument 10570977.1 - 23.9.2016 at 11:13 am

Appurtenant hereto is a right to convey water created by Easement Instrument 10570977.1 - 23.9.2016 at 11:13 am

10994522.1 Mining Certificate 10994522.1 under Section 417 Resource Management Act 1991 to (now) Mark II Limited, Chard Farm Trustees Limited, Mt Pisa Station Holdings Limited, Stuart Douglas Hawker, Phillipa Mary Hawker and Robert Stanley Perriam in equal shares - 19.12.2017 at 12:03 pm

10994522.2 Certificate pursuant to Section 417 Resource Management Act 1991 to Robert Stanley Perriam - 19.12.2017 at 12:03 pm

10994522.3 Certificate pursuant to Section 417 Resource Management Act 1991 to Stuart Douglas Hawker and Phillipa Mary Hawker - 19.12.2017 at 12:03 pm

Appurtenant hereto is a right to convey water created by Easement Instrument 11086083.1 - 7.8.2018 at 11:50 am

11245556.4 Consent Notice pursuant to Section 221 Resource Management Act 1991 - 18.10.2018 at 9:15 am

Appurtenant hereto is a right to convey water created by Easement Instrument 11245556.5 - 18.10.2018 at 9:15 am

Appurtenant hereto is a right of way and a right to convey water, electricity, telecommunications and computer media created by Easement Instrument 11245556.7 - 18.10.2018 at 9:15 am

The easements created by Easement Instrument 11245556.7 are subject to Section 243 (a) Resource Management Act 1991

Subject to a right of way over part marked RA, RB, IA, IB, G, H, T, C and FA, a right to convey water over part marked FA, W, AT, ER, QU and C and a right to convey electricity, telecommunications and computer media over part marked FA all on DP 526279 created by Easement Instrument 11245556.7 - 18.10.2018 at 9:15 am

Land Covenant in Easement Instrument 11245556.8 - 18.10.2018 at 9:15 am

Subject to a right (in gross) to convey electricity over part marked FA on DP 526279 in favour of Aurora Energy Limited created by Easement Instrument 11284981.1 - 22.11.2018 at 3:37 pm

Subject to a right (in gross) to convey telecommunications and computer media over part marked FA on DP 526279 in favour of Chorus New Zealand Limited created by Easement Instrument 11284981.2 - 22.11.2018 at 3:37 pm

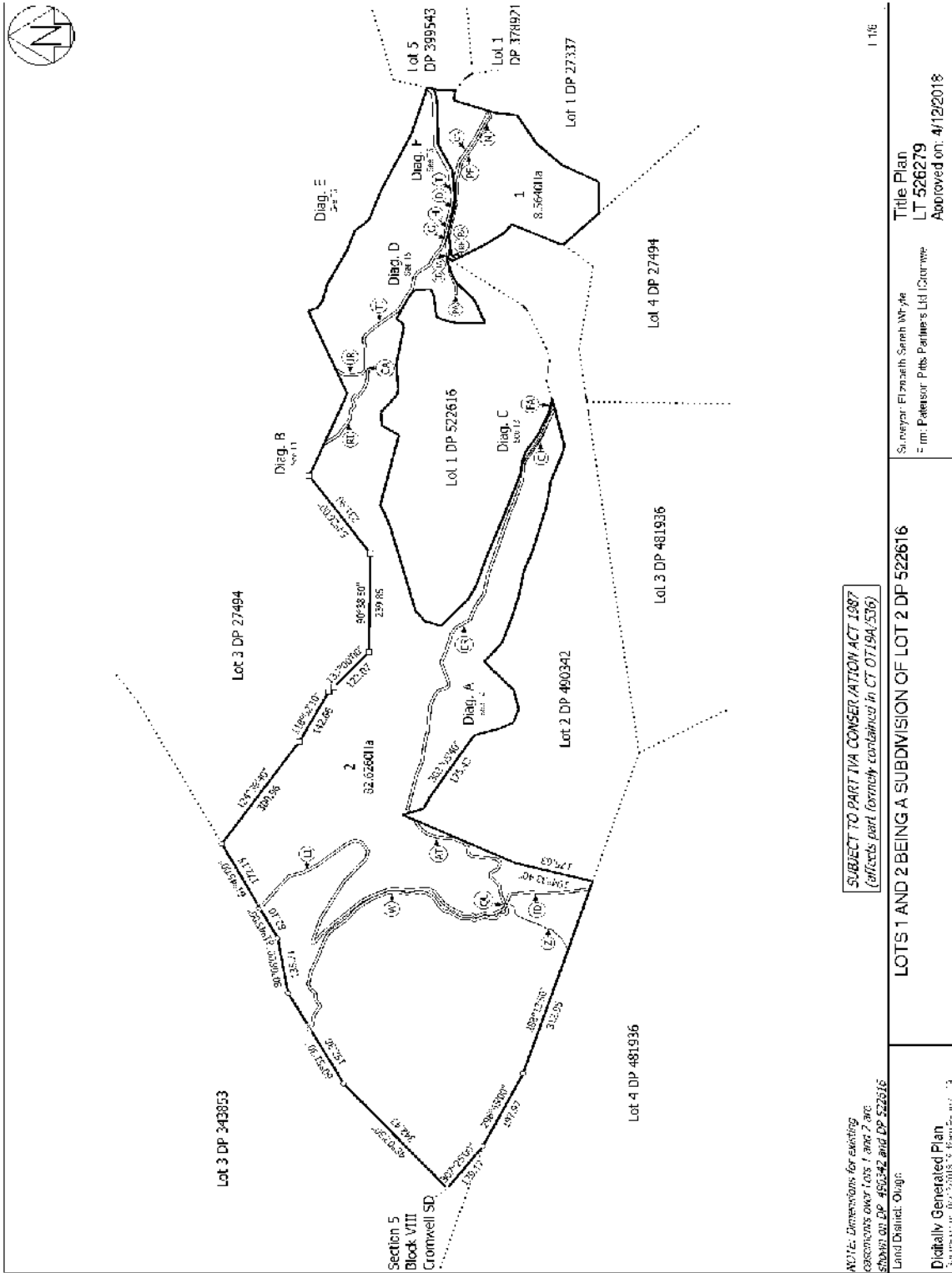
11363115.4 Consent Notice pursuant to Section 221 Resource Management Act 1991 - 19.2.2019 at 2:49 pm

Subject to a right of way over part marked RA, RB, IA, IB, G, H and T, a right to convey water over part marked IB, RB and PA and a right to convey electricity, telecommunications and computer media over part marked RB and IB all on DP 526279 created by Easement Instrument 11363115.5 - 19.2.2019 at 2:49 pm

Some of the easements created by Easement Instrument 11363115.5 are subject to Section 243 (a) Resource Management Act 1991 (see DP 526279)

11471418.1 CAVEAT BY AURORA ENERGY LIMITED - 19.6.2019 at 3:07 pm

11521943.1 CAVEAT BY CHARD FARM TRUSTEES LIMITED - 3.9.2019 at 11:35 am



SUBJECT TO PART IVA CONSERVATION ACT 1987
 (effects part formerly contained in CT 01194/536)

NOTE: Dimensions for existing
 corners over Lots 1 and 2 are
 shown on EP 450342 and EP 522616
 Land District: Orange

Digitally Generated Plan
 Generated on 07/20/18 11:33 East Scale: 1:3

LOTS 1 AND 2 BEING A SUBDIVISION OF LOT 2 DP 522616

Surveyor: Elizabeth Sarah Wylie
 E-mail: Paterson.Pitts.Palmer's.Ltd@orange.nsw.gov.au
 Title Plan
 LT 526279
 Approved on: 4/12/2018

1:16



**RECORD OF TITLE
UNDER LAND TRANSFER ACT 2017
FREEHOLD
Search Copy**



R. W. Muir
Registrar-General
of Land

Identifier **OT19A/535**
Land Registration District **Otago**
Date Issued 20 September 1999

Prior References

OT16A/941 OT17C/535

Estate Fee Simple
Area 33.6305 hectares more or less
Legal Description Lot 1 Deposited Plan 27337

Registered Owners

Rockburn Wines Limited

Interests

The part formerly held in CT OT16A/941 is subject to a right to the Crown to enter upon the said land and thereon to take, lay, construct, maintain, inspect, repair or re-construct water-races, drains and all other works for the supply of water to the said land and to take water from races so provided for irrigation purposes at a price to be fixed by the Crown and excepting the Crown from liability for any damage caused by any overflow or breakaway of any race or channel.

The part formerly held in CT OT16A/941 is subject to Section 315 Land Act 1924

Saving and excepting all minerals within the meaning of the Land Act 1924 on or under part Section 35 Block 1 Wakefield Survey District

Appurtenant to the part formerly held in CT OT17C/535 is a right of way over part Lot 3 DP 24478 CT OT16B/1161 marked A DP 24478 specified in Easement Certificate 885377.6 - 28.6.1995 at 10.26 am

Appurtenant to the part formerly held in CT OT17C/535 is a right of way over part Lot 2 DP 25665 CT OT17B/54 marked B DP 24478 specified in Easement Certificate 885377.6 - 28.6.1995 at 10.26 am

Appurtenant to the part formerly held in CT OT17C/535 is a water race easement over part Lot 1 DP 25510 (CT OT17C/533) marked a-b DP 25510 specified in Easement Certificate 914599.11 - 21.8.1996 at 1.45 pm (Subject to Section 243(a) Resource Management Act 1991)

Appurtenant to the part formerly held in CT OT17C/535 is a right to convey water over part Lot 1 DP 25510 (CT OT17C/533) marked b-c DP 25510 specified in Easement Certificate 914599.11 - 21.8.1996 at 1.45 pm (Subject to Section 243(a) Resource Management Act 1991)

Appurtenant to the part formerly held in CT OT17C/535 is a right to store water over part Lot 1 DP 25510 (CT OT17C/533) marked D DP 25510 specified in Easement Certificate 914599.11 - 21.8.1996 at 1.45 pm (Subject to Section 243(a) Resource Management Act 1991)

974504.1 Certificate Specifying Mining Rights under s417(2) Resource Management Act 1991 - 8.5.1998 at 9.05 am (affects the land formerly held in CT OT16A/941)

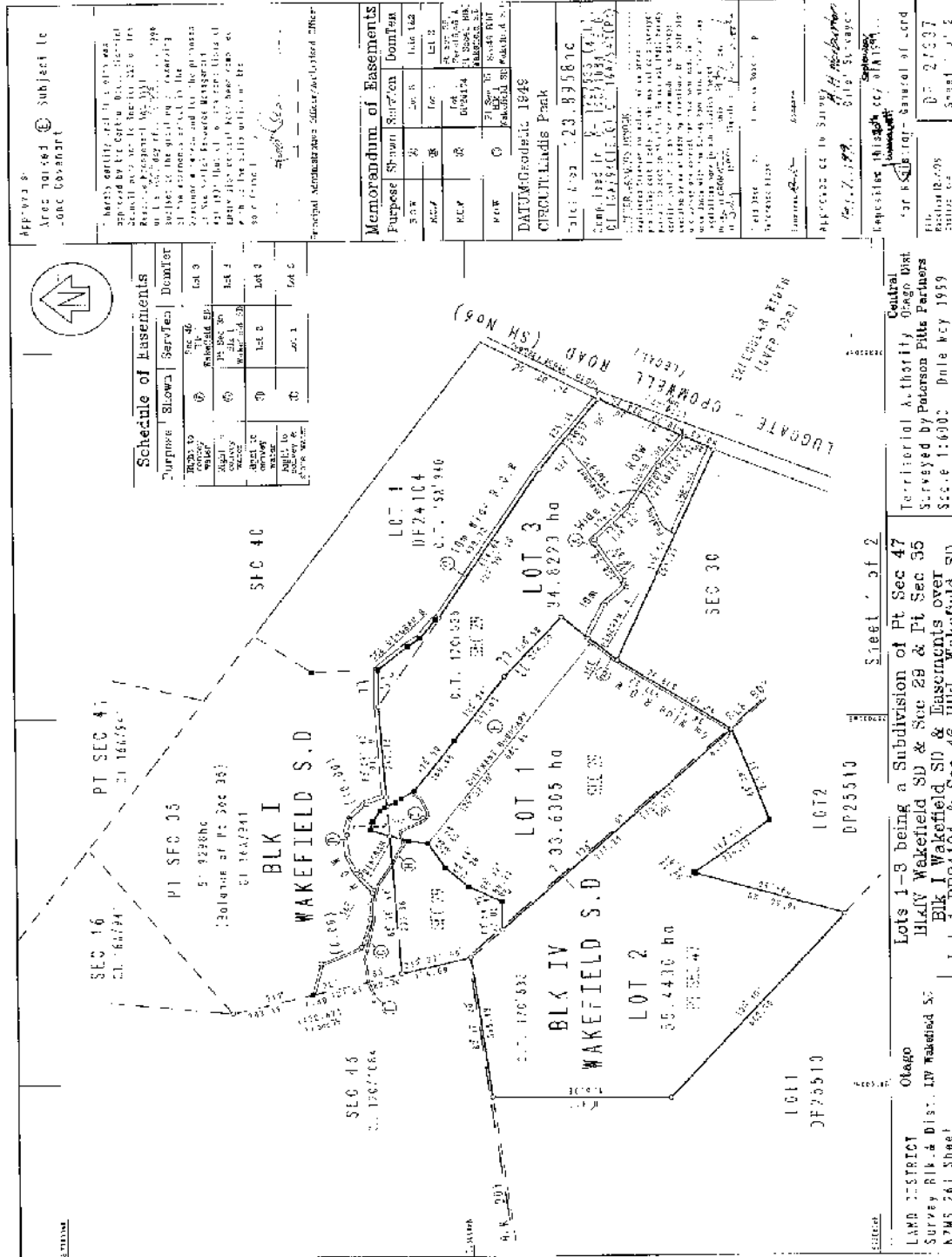
975233.7 Easement Certificate specifying the following easements - 20.9.1999 at 10.49 am

Type	Servient Tenement	Easement Area	Dominant Tenement	Statutory Restriction
Right of way	Lot 3 Deposited Plan 27337 - CT OT19A/537	A DP 27337	Lot 1 Deposited Plan 27337 - herein	Section 243 (a) Resource Management Act 1991
Right of way	Lot 1 Deposited Plan 27337 - herein	B DP 27337	Lot 2 Deposited Plan 27337 - CT OT19A/536	Section 243 (a) Resource Management Act 1991

Identifier**OT19A/535**

Convey & store water	Lot 1 Deposited Plan 27337 - herein	1 DP 27337	Lot 3 Deposited Plan 27337 - CT OT19A/537
----------------------	-------------------------------------	------------	---

Land Covenant in Transfer 979613.1 - 7.12.1999 at 10.54 am
Land Covenant in Transfer 979613.2 - 7.12.1999 at 10.54 am
979613.8 Mortgage to Bank of New Zealand - 7.12.1999 at 10.54 am
7489310.8 Surrender of the right of way marked A on DP 27337 specified in Easement Certificate 975233.7 - 3.8.2007 at 9:00 am
Appurtenant hereto is a right of way created by Easement Instrument 7489310.14 - 3.8.2007 at 9:00 am
The easement created by Easement Instrument 7489310.14 is subject to Section 243 (a) Resource Management Act 1991
Appurtenant hereto is a right to convey water created by Easement Instrument 10570977.1 - 23.9.2016 at 11:13 am



Approved by the City of Chicago, Illinois, on this 15th day of May, 1959.

Mayor
 City Clerk
 City Engineer
 City Surveyor

Approved by the Board of Commissioners of Cook County, Illinois, on this 15th day of May, 1959.

County Clerk
 Board of Commissioners

Approved by the Board of Supervisors of the City of Chicago, Illinois, on this 15th day of May, 1959.

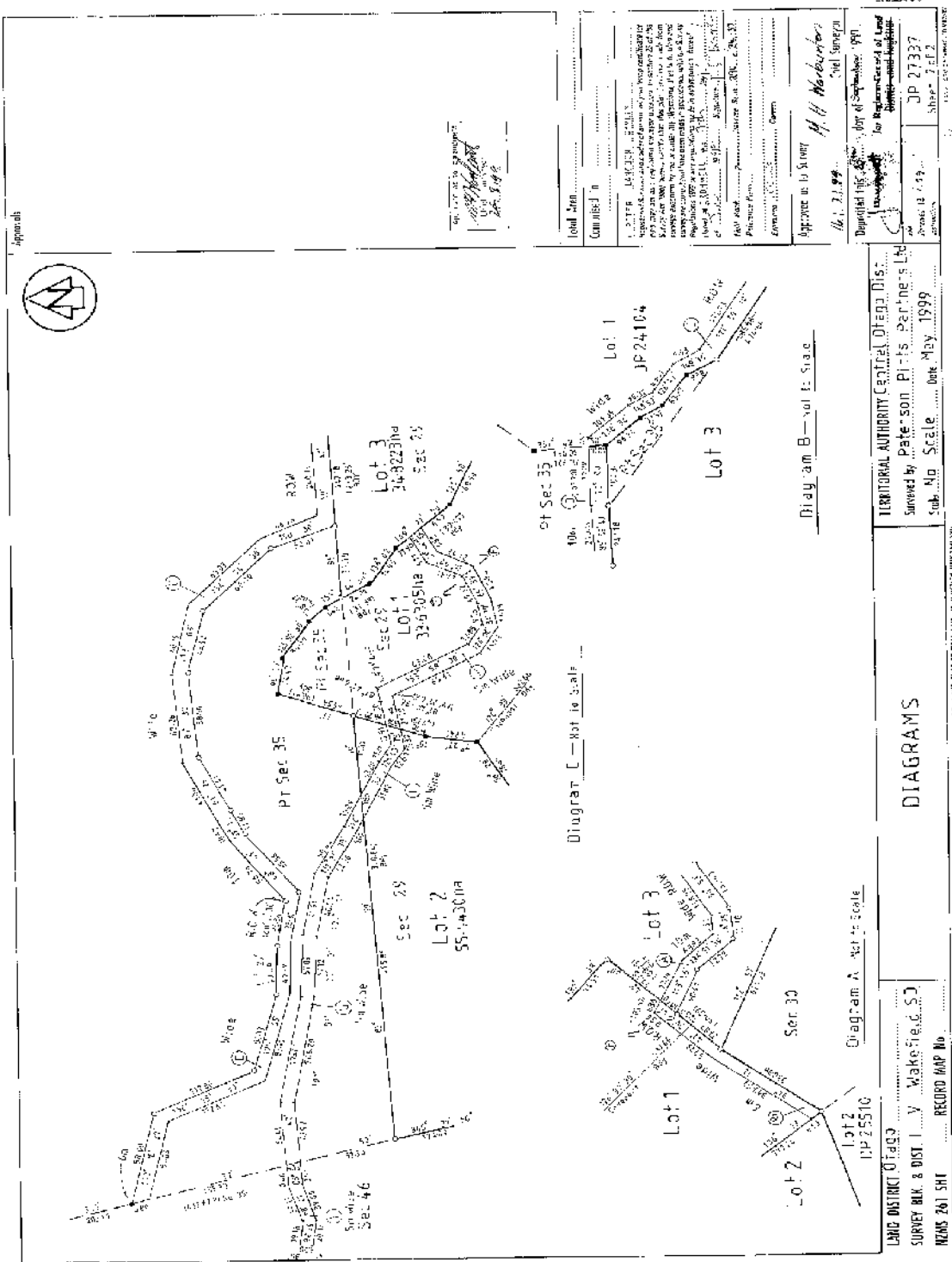
City Clerk
 Board of Supervisors

Approved by the Board of Directors of the City of Chicago, Illinois, on this 15th day of May, 1959.

City Clerk
 Board of Directors

Approved by the Board of Directors of the City of Chicago, Illinois, on this 15th day of May, 1959.

City Clerk
 Board of Directors



Approach

I, the undersigned, being a duly qualified and licensed Surveyor in the State of Michigan, do hereby certify that the foregoing is a true and correct copy of the original survey as shown to me by the owner thereof, and that the same has been compared with the original survey and found to be correct.

Total Area
 Contained in
 I, the undersigned, being a duly qualified and licensed Surveyor in the State of Michigan, do hereby certify that the foregoing is a true and correct copy of the original survey as shown to me by the owner thereof, and that the same has been compared with the original survey and found to be correct.

Dated this 21st day of September, 1999.
 For the State of Michigan
 Surveyor
 J.P. 27337
 Sheet 2 of 2

TERRITORIAL AUTHORITY CAPITAL DIRECT DIS-
 Surveyed by Peterson Plats Partings Ltd
 Sub. No. 3046 Date May 1999

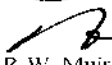
DIAGRAMS

LAND DISTRICT OF FREDERICK
 SURVEY BLK. 8 DIST. 1 V Wakefield SD
 REAS. 261.5HT RECORD MAP No.



**RECORD OF TITLE
UNDER LAND TRANSFER ACT 2017
FREEHOLD
Search Copy**




R. W. Muir
Registrar-General
of Land

Identifier 319229
Land Registration District Otago
Date Issued 03 August 2007

Prior References

OT19A/537

Estate Fee Simple
Area 13.1597 hectares more or less
Legal Description Lot 1 Deposited Plan 378921

Registered Owners

John Douglas Allison and Marilyn Elizabeth Allison

Interests

Saving and excepting all minerals within the meaning of the Land Act on or under part formerly part Section 35 Block I Wakefield Survey District.

The part formerly part Section 35 Block I Wakefield Survey District is subject to a right to the Crown to enter upon the said land and thereon to take, lay, construct, maintain, inspect, repair or re-construct water-races, drains and all other works for the supply of water to the said land and to take water from races so provided for irrigation purposes at a price to be fixed by the Crown and excepting the Crown from liability for any damage caused by any overflow or breakaway of any race or channel.

The part formerly part Section 35 Block I Wakefield Survey District is subject to Section 315 Land Act 1924 Appurtenant to the part formerly Section 29 Block IV Wakefield Survey District is a right of way created by Easement Certificate 885377.6 - 28.6.1995 at 10:25 am

Appurtenant to the part formerly Section 29 Block IV Wakefield Survey District is a water race, right to convey water and right to store water created by Easement Certificate 914599.11 - 21.8.1996 at 1.45 pm

The easements specified in Easement Certificate 914599.11 are subject to Section 243 (a) Resource Management Act 1991

Appurtenant hereto is a right to convey water and a right to convey and store water specified in Easement Certificate 975233.7 - 20.9.1999 at 10:49 am

Appurtenant hereto is a right to convey water created by Transfer 975233.8 - 20.9.1999 at 10:49 am

5041663.1 Gazette Notice (2001/1044) declaring adjoining road (S.H.No. 6) to be limited access road - 11.5.2001 at 9:31 am

5057553.3 Notice pursuant to Section 91 Transit New Zealand Act 1989 - 10.7.2001 at 2:30 pm

5057553.4 Notice pursuant to Section 91 Transit New Zealand Act 1989 - 10.7.2001 at 2:30 pm

Appurtenant hereto is a right of way created by Easement Instrument 7489310.11 - 3.8.2007 at 9:00 am

The easements created by Easement Instrument 7489310.11 are subject to Section 243 (a) Resource Management Act 1991

8686428.5 Surrender of the right of way over part Lot 3 DP 378921 CT 319231 marked M on DP 378921 appurtenant hereto specified in Easement Instrument 7489310.11 - 16.2.2011 at 11:27 am

Subject to a right of way over part marked C on DP 437387 created by Easement Instrument 8686428.8 - 16.2.2011 at 11:27 am

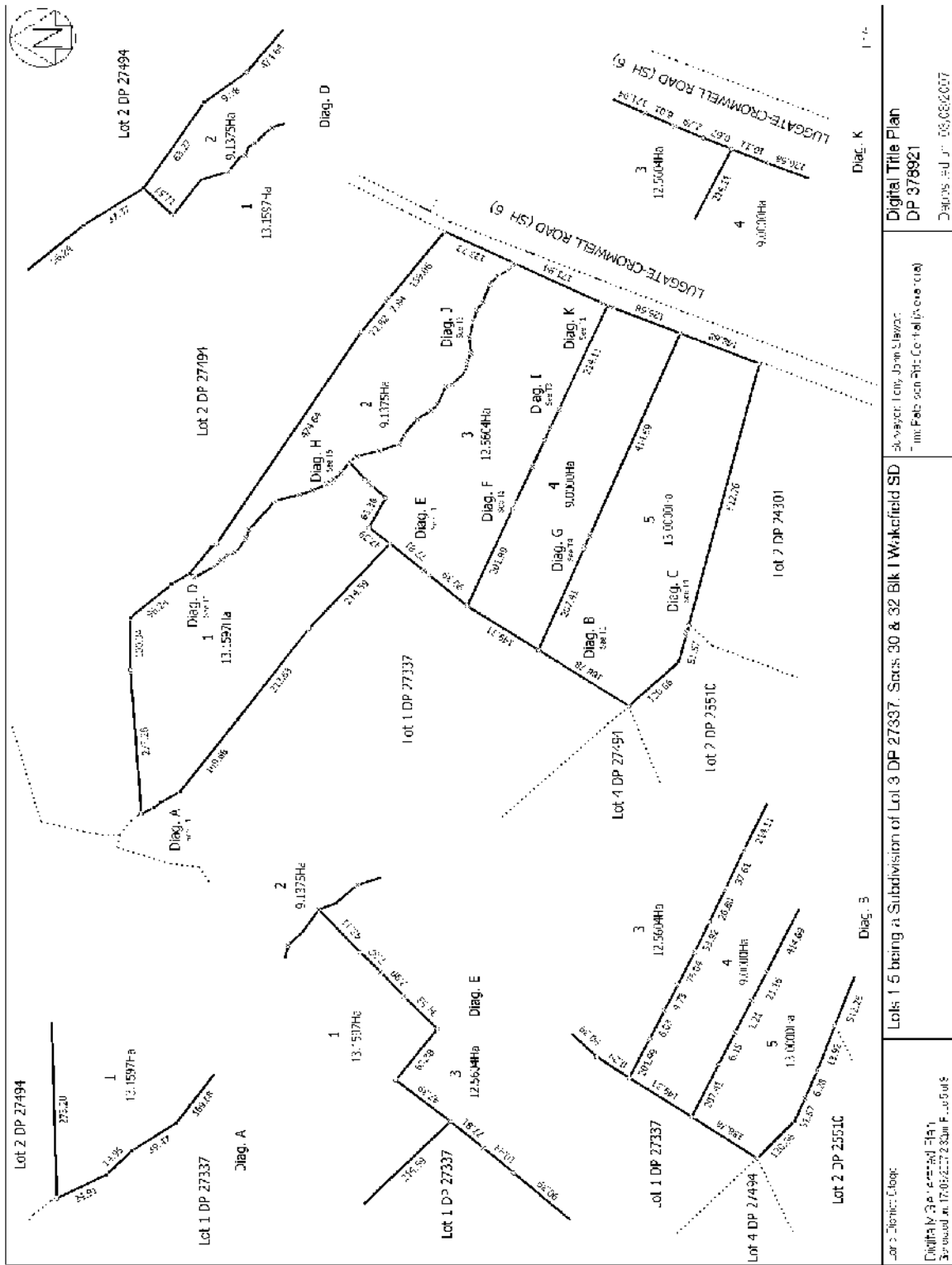
Identifier**319229**

Appurtenant hereto is a right of way created by Easement Instrument 8686428.8 - 16.2.2011 at 11:27 am

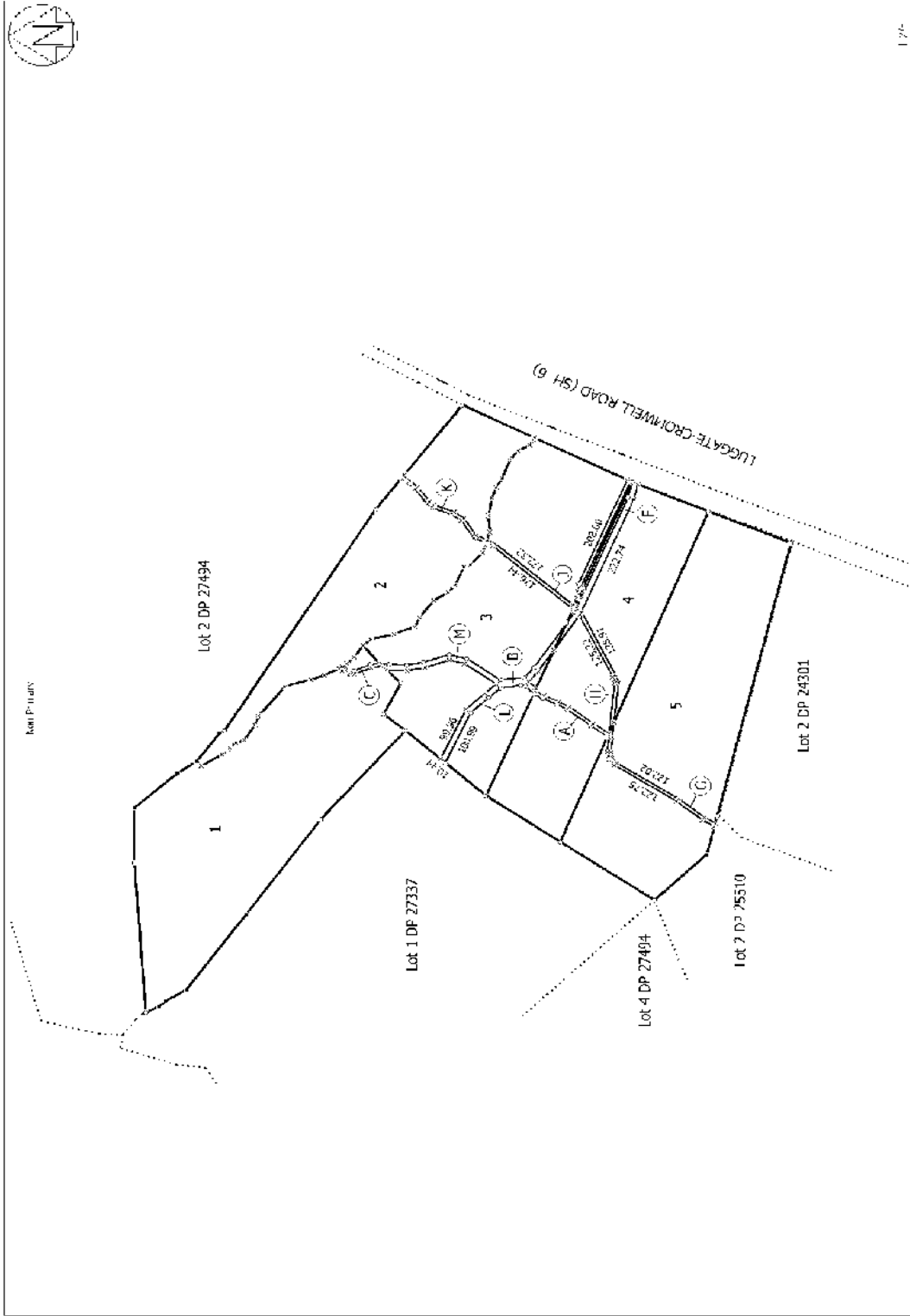
The easements created by Easement Instrument 8686428.8 are subject to Section 243 (a) Resource Management Act 1991

Appurtenant hereto is a right to convey water and a right to convey electricity, telecommunications and computer media created by Easement Instrument 8724095.4 - 20.4.2011 at 9:32 am

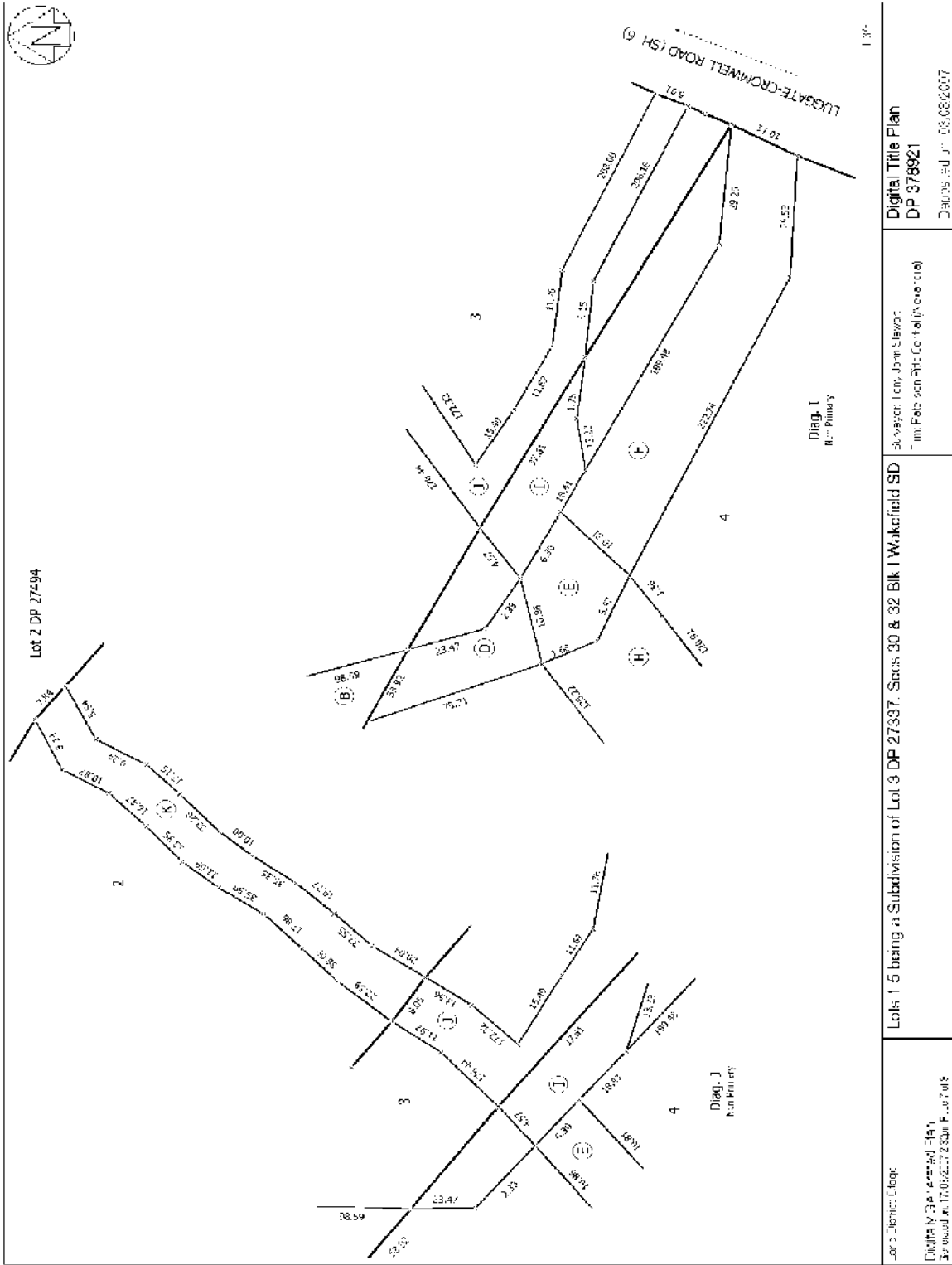
9924648.2 Mortgage to ANZ Bank New Zealand Limited - 16.12.2014 at 3:33 pm



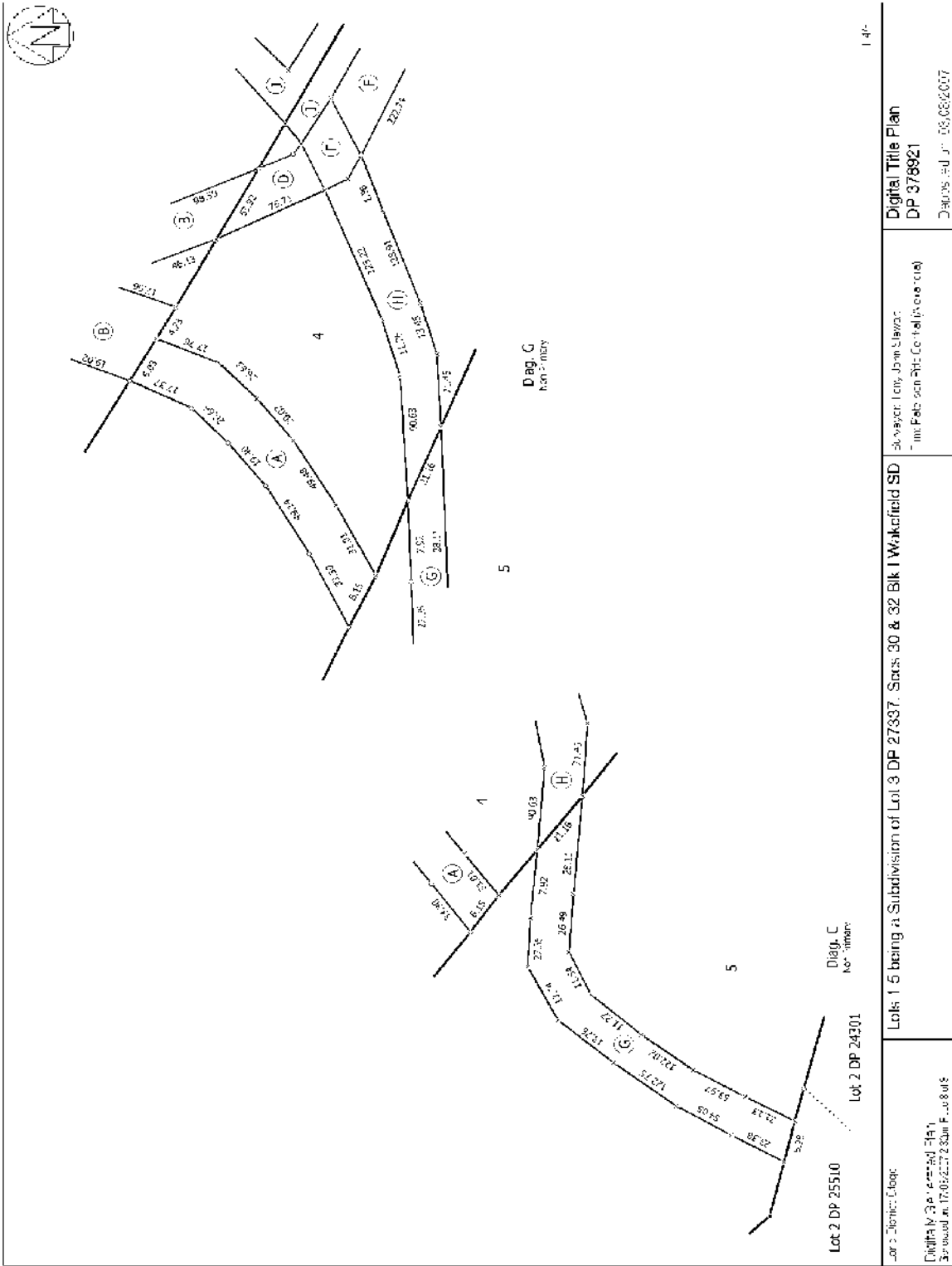
Lot 2 DP 27494 Lot 1 DP 27337 Lot 1 DP 27337 Lot 4 DP 27494 Lot 2 DP 2551C	Lot 1 DP 27337 Lot 4 DP 27494 Lot 2 DP 2551C	Lot 1 DP 27337 Lot 4 DP 27494 Lot 2 DP 2551C	Lot 1 DP 27337 Lot 4 DP 27494 Lot 2 DP 2551C
Lot 1-5 being a Subdivision of Lot 3 DP 27337, Stats. 30 & 32 Blk 1 Wakarusa SD		Digital Title Plan DP 378921	Prepared by: [Name] Date: [Date]



Date of Plan: 03/03/2017 Digital Title Plan DP 378921 Drawn by: J. J. 05/05/2017	Lots 1-5 being a Subdivision of Lot 3 DP 27337, Stats. 30 & 32 Blk 1 Wakarusa SD	Surveyor: Tom, John, Steven Title: Public Land: Central (Private)	1:250
---	--	--	-------



<p>Lot 2 DP 27494</p>	<p>Lot 3 DP 27337, Stats. 30 & 32 Blk 1 Wakfield SD</p>	<p>Digital Title Plan DP 378921</p>
<p>Diag. J R. - Primary</p>	<p>Diag. I R. - Primary</p>	<p>Created: 17/05/2017 2:23pm F... 07:01\$</p>
<p>Lot 1-5 being a Subdivision of Lot 3 DP 27337, Stats. 30 & 32 Blk 1 Wakfield SD</p>	<p>Surveyor: Tom John Slawac</p>	<p>Created: 17/05/2017 05:05:0007</p>

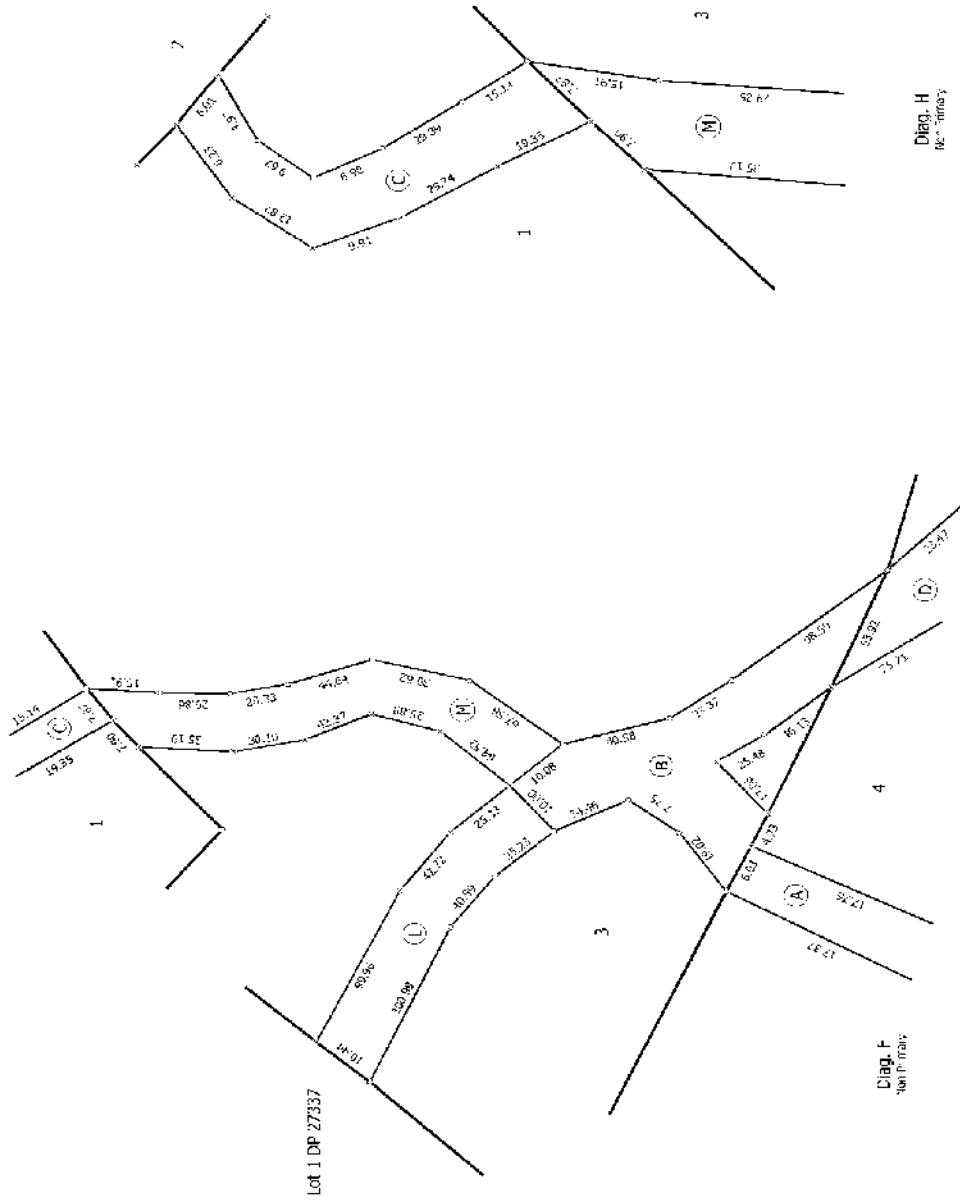


Digital Title Plan
DP 378921
Darius, Ltd J... 05/05/2007

Surveyor: Tom John Slawac
Title Plan No: 378921 (Electronic)

Lot 15 being a Subdivision of Lot 3 DP 27337, Stats. 30 & 32 Bk I Wakfield SD

Lot 2 DP 25510
Lot 2 DP 24301
Diag. C
North arrow



Lot 1 DP 27337 Surveyed on 17/05/2017 2:33pm F... 8 out	Lots 1-5 being a Subdivision of Lot 3 DP 27337, Stats. 30 & 32 Blk 1 Wakfield SD	Surveyor: Tom John Slawson Title: Public Land - Certificate	Digital Title Plan DP 378921 Drawn: JHD J... 05/05/2007
--	--	--	---

Appendix C: Fish survey and residual flow report

Park Burn and Amisfield Burn Ecological Considerations for Residual Flows



PREPARED FOR: LANDPRO LIMITED

DATE: MAY 2019

REPORT NUMBER: 78-2019

Table of Contents

1 Introduction	1
1.1 Consent applicants	1
1.2 Residual Flow Policy	1
2 Methods	2
3 Results	3
3.1 New Zealand Freshwater Fish Database Records	3
3.2 2019 Fish Survey	6
4 Discussion	9
4.1 General Residual Flow Considerations	9
4.2 Residual Flow Recommendations	10
4.2.1 Koaro	10
4.2.2 Upland bully	11
4.2.3 Rainbow trout	12
4.2.4 Brown trout	12
5 Conclusion	14
6 References	15
7 Appendix 1: Site locations and catch	16

LIST OF FIGURES

Figure 1: Take and discharge locations in the Park Burn and Amisfield Burn.....	1
Figure 2: Park Burn and Amisfield fish survey sites, April 2019.	3
Figure 3: Brown trout locations reported in the NZFFD in the Park Burn and Amisfield Burn.	4
Figure 4: Koaro locations reported in the NZFFD in the Park Burn and Amisfield Burn.....	5
Figure 5: Upland bully locations reported in the NZFFD in the Park Burn and Amisfield Burn.	5
Figure 6: No fish present locations reported in the NZFFD in the Park Burn and Amisfield Burn.	6
Figure 7: Brown trout caught at Park Burn site 9.....	7
Figure 8: Fish survey sites with brown trout.....	8
Figure 9: Rainbow trout caught at Park Burn site 11.	8
Figure 10: Looking downstream along the Amisfield Burn from State Highway 6.	9
Figure 11: Amisfield Burn culvert on access track.....	12

1 INTRODUCTION

1.1 Consent applicants

Smallburn Limited, Pisa Holdings Ltd (and other consent holders), Parkburn Water Company Limited and Lowburn Land Holdings Limited Partnership wish to obtain resource consent from the Otago Regional Council to continue abstracting water from the Amisfield Burn and Park Burn for irrigation. The current consents also provide for discharges to water courses for the abstracted water for retakes that are further downstream. The locations of the present takes and discharges are shown in Figure 1. Further details regarding the takes and discharges can be sourced from the corresponding deemed permit replacement applications prepared by Landpro.

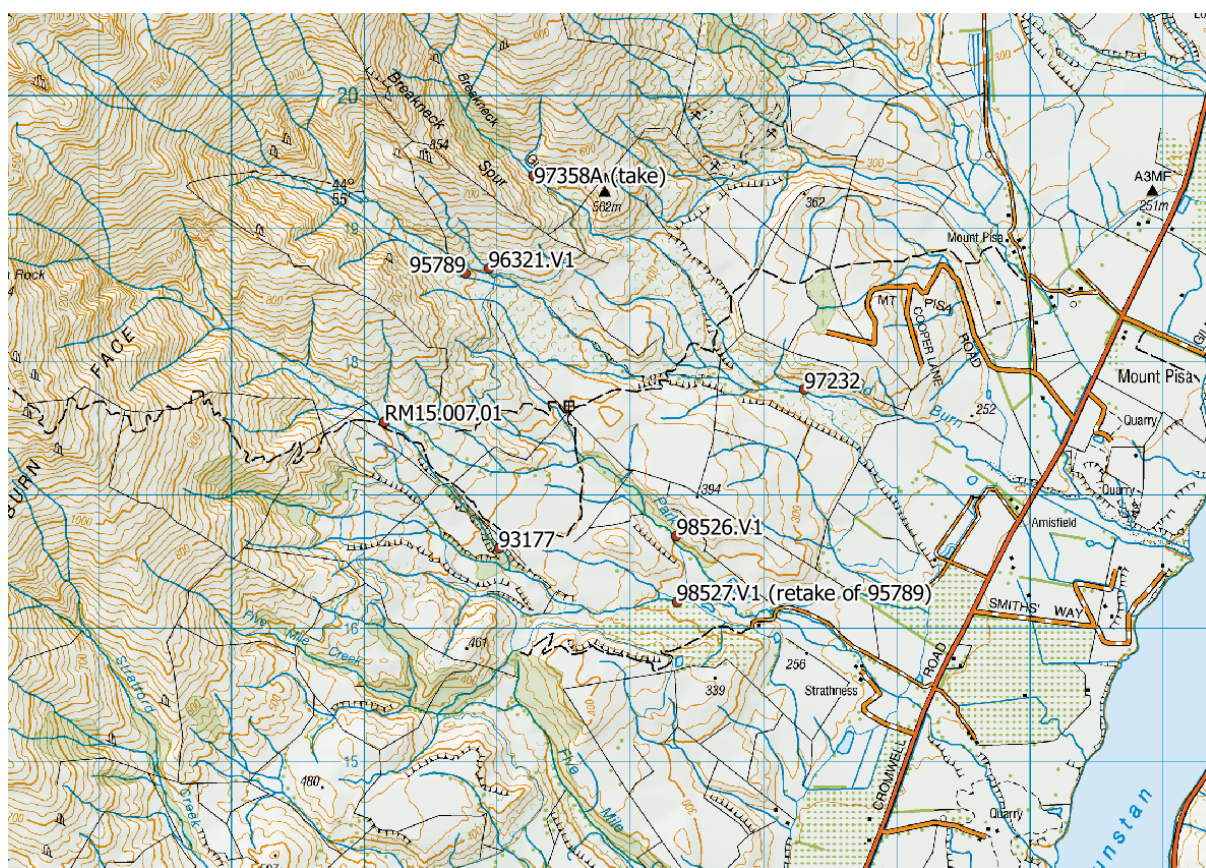


Figure 1: Take and discharge locations in the Park Burn and Amisfield Burn.

The purpose of this report is to provide an assessment of the freshwater fish communities in the Park Burn and Amisfield Burn and to make recommendations for residual flows at the most appropriate locations in these two stream catchments.

1.2 Residual Flow Policy

The Otago Regional Council Water Plan has a residual flow policy – Policy 6.4.7.

6.4.7 The need to maintain a residual flow at the point of take will be considered with respect to any take of water, in order to provide for the aquatic ecosystem and natural character of the source water body.

Explanation

This policy requires an assessment of whether there is any need to apply a condition on any consent to take water requiring the passing of a residual flow at the point of take. Such a residual flow condition may be applied in addition to a minimum flow applied under this Plan.

A residual flow condition may be applied to any take for community water supply purposes, or on a take from a tributary stream that has different flow characteristics from the main stem.

Residual flows will be applied and monitoring arrangements made on a case-by-case basis having regard to any effects on aquatic ecosystem values and the natural character of the source water body.

Principal reasons for adopting

This policy is adopted to enable the taking of water while providing for instream values of the source water body, particularly with respect to community water supplies and takes from tributaries that have different flow characteristics from the main stem under low flow conditions.

2 METHODS

An electric fishing fish survey was conducted at sites in the Park Burn, Amisfield Burn and Breakneck Creek on the 18 April 2019. Electric fishing was conducted using a NIWA EFM 300 back pack electric fishing machine. Fishing was conducted, when possible, along reaches 30-50 m long. Sampling included pool, riffle, run and cascade habitat when present. All fish caught were identified to species level and lengths were measured for all fish captured before they were returned to the stream.

Physical habitat descriptions were made for each site including the size of the stream, the state of the riparian vegetation, flow conditions (e.g., high, low, dry) and the nature of the stream bed substrate.

Water colour and turbidity were also noted at each site. A Garmin GPS was used to record the location of each site.

To provide further data and to assess historic fish communities the New Zealand Freshwater Fish Database (NZFFD) was also searched for fish records for the catchments.

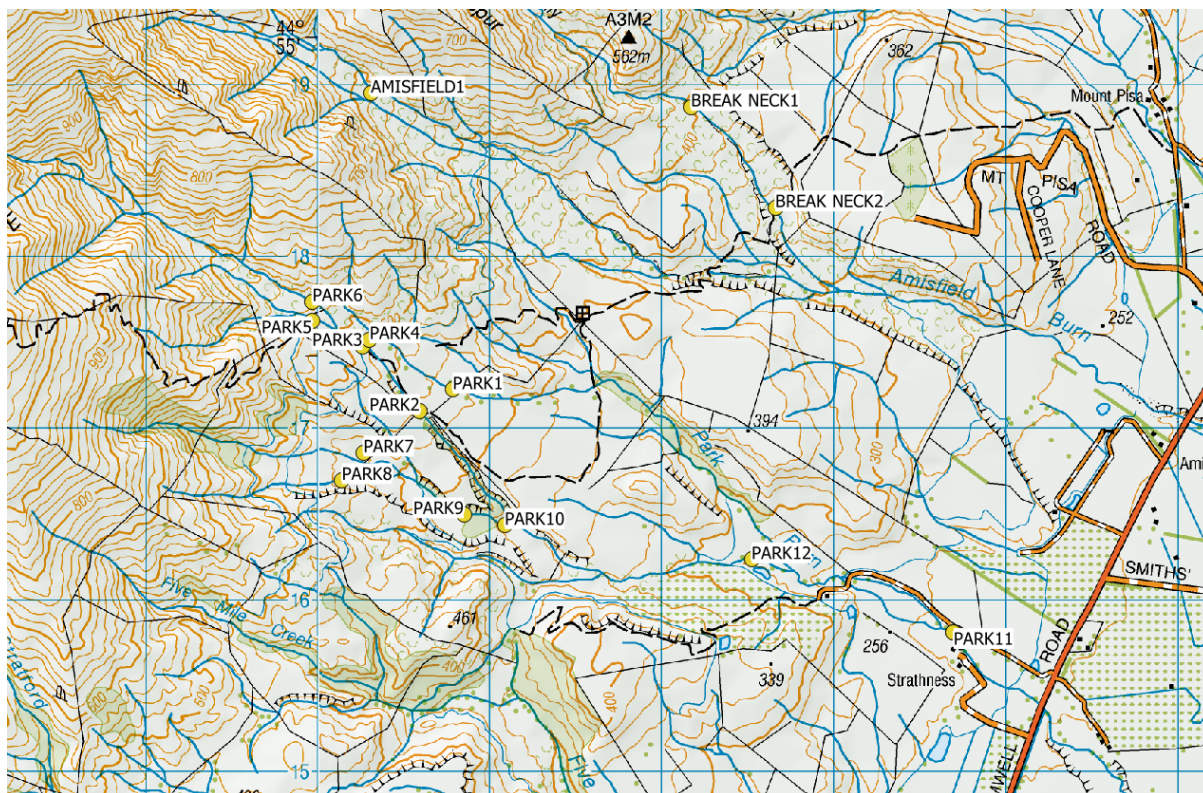


Figure 2: Park Burn and Amisfield fish survey sites, April 2019.

3 RESULTS

3.1 New Zealand Freshwater Fish Database Records

The NZFFD has eight records for the Amisfield Burn. The earliest three are from 1996 and report brown trout, upland bully and koaro present in the stream. Brown trout were present at all three sites (Figure 3) and were noted as abundant at two of the sites, a single large koaro (Figure 4) was caught at one site and upland bully was common at one site (Figure 5). Later surveys in 2001 reported no fish at State Highway 6 (Figure 6) and brown trout and a single koaro were present at the same site as the koaro was found in 1996. In 2018, a further three sites were fished with brown trout present at two sites, upland bully at one and no fish recorded at the most upstream site fished in the Amisfield Burn.

Three records exist for the Park Burn, all of which record brown trout as the only fish species present. Two sites were fished in 1996 and the last in 2018. The first two were in the mid-reaches of the catchment and the most recent situated near the upper most water take.

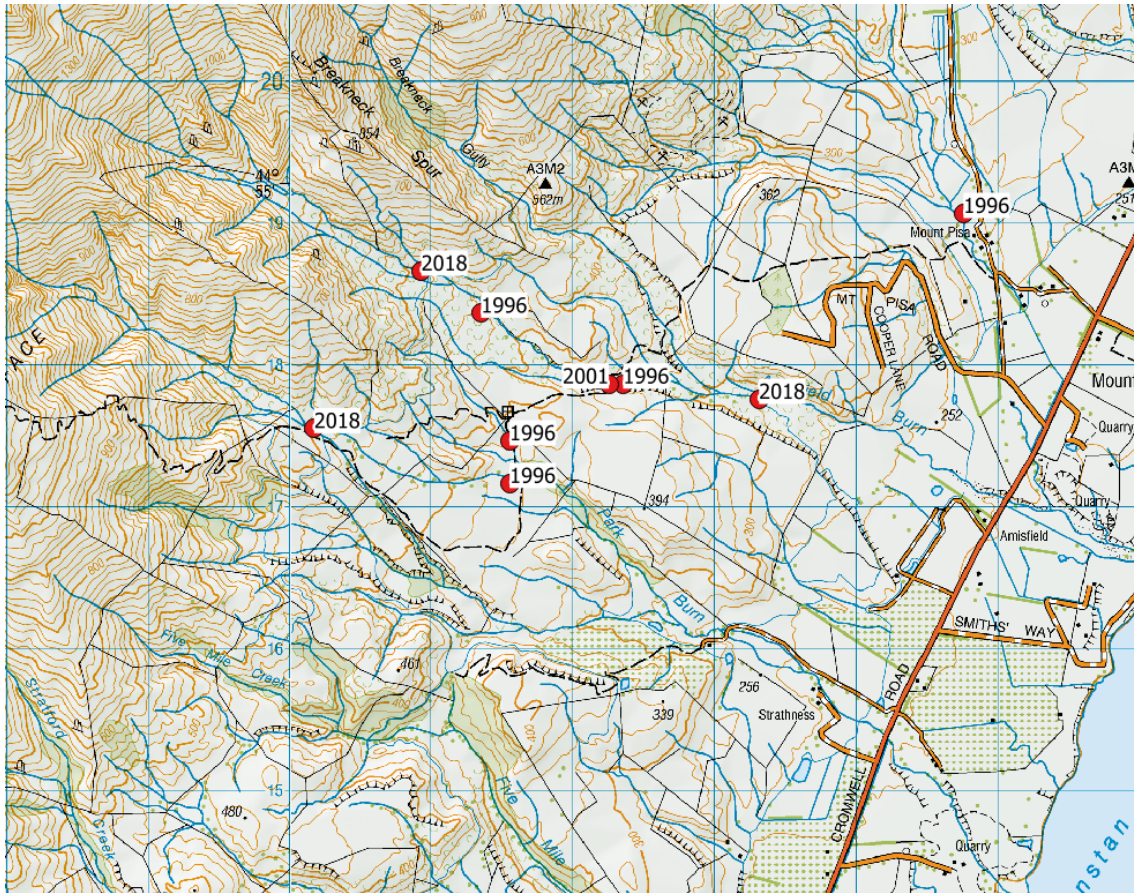


Figure 3: Brown trout locations reported in the NZFFD in the Park Burn and Amisfield Burn.

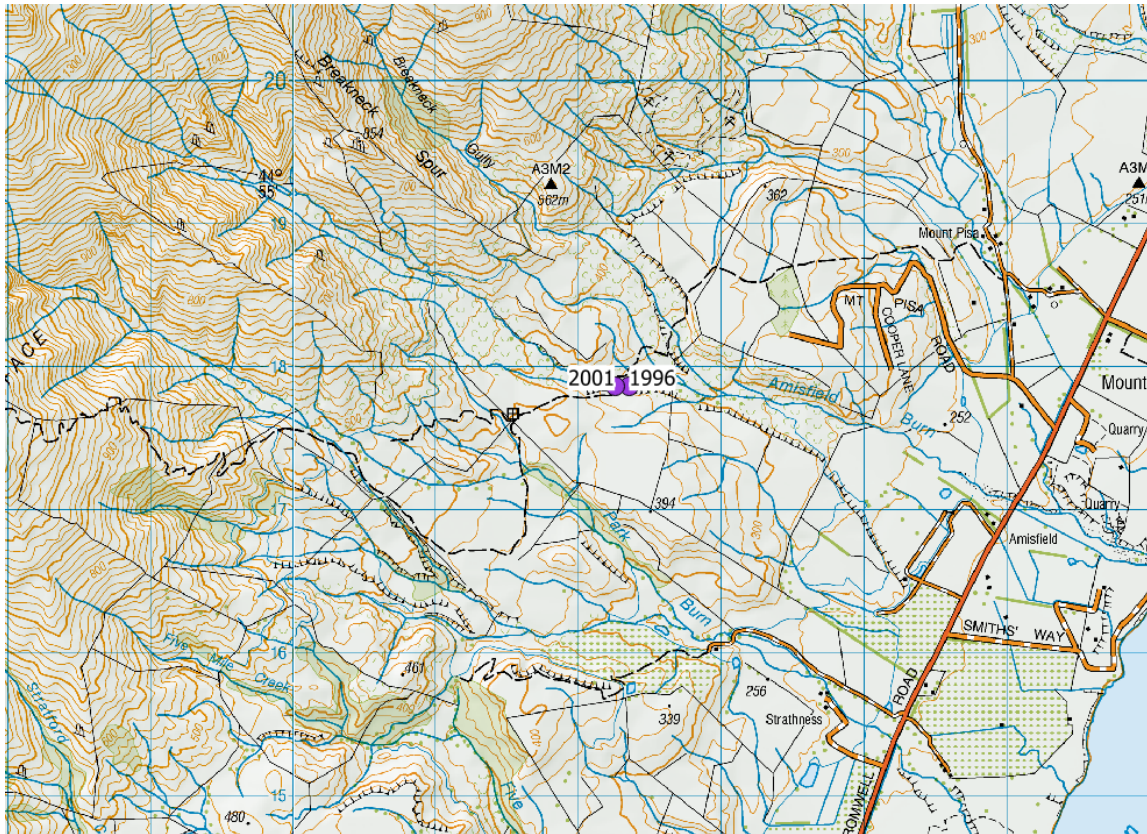


Figure 4: Koaro locations reported in the NZFFD in the Park Burn and Amisfield Burn.

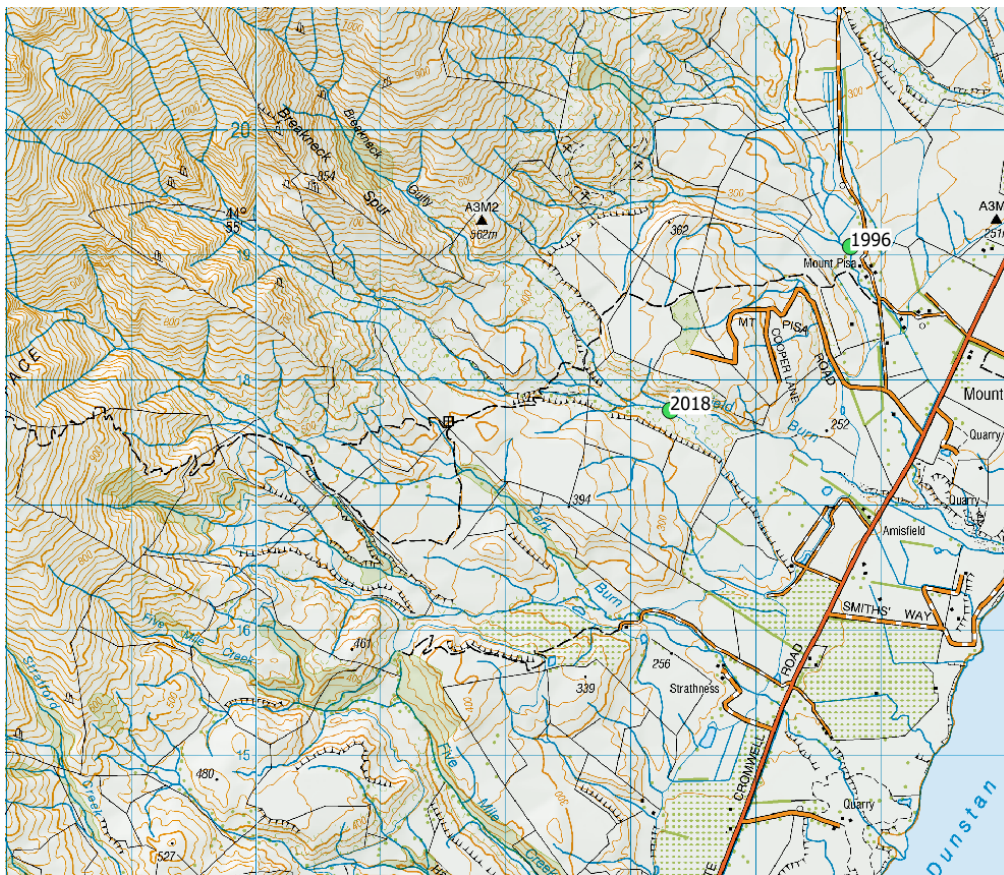


Figure 5: Upland bully locations reported in the NZFFD in the Park Burn and Amisfield Burn.

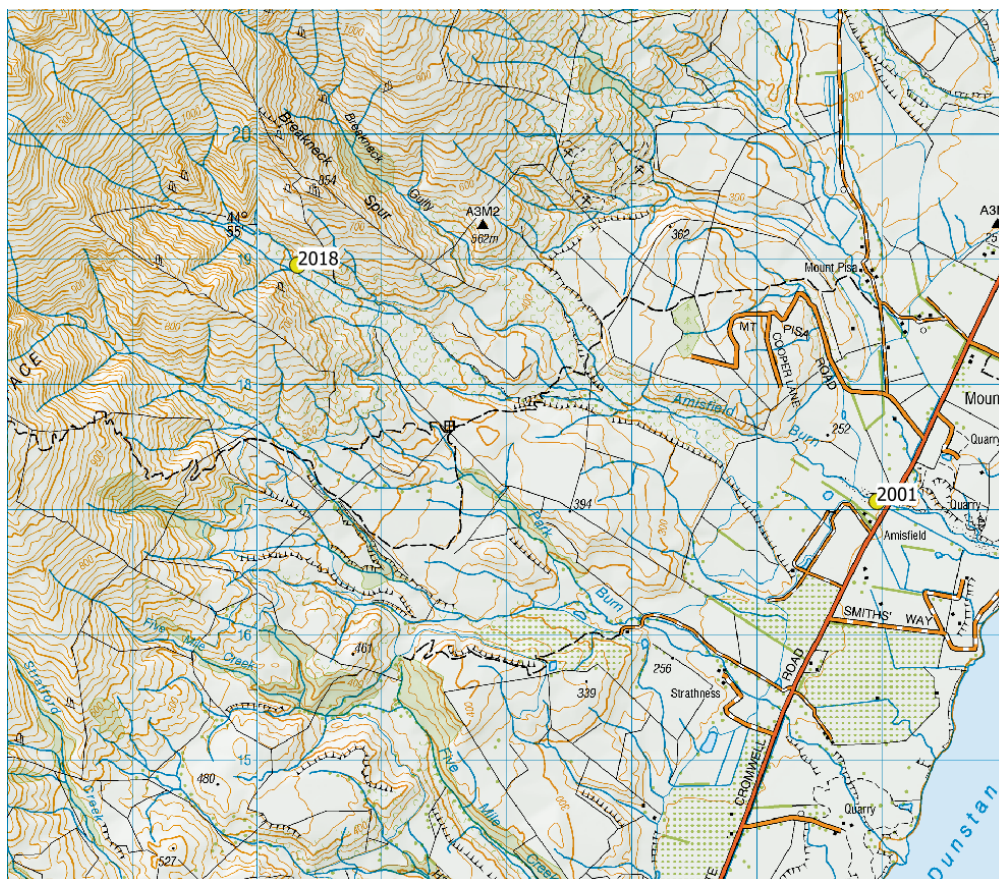


Figure 6: No fish present locations reported in the NZFFD in the Park Burn and Amisfield Burn.

The NZFFD records indicate that brown trout are common in the Amisfield Burn. Native fish, koaro and upland bully, are rare in the catchment. In the Park Burn the limited records indicate brown trout are present but no other fish have been recorded. Two key findings are that fish were absent from the upper Amisfield Burn and to date the fish surveys have not located Clutha flathead galaxiids a critically threatened native fish (Dunn et al 2018).

3.2 2019 Fish Survey

The fish survey concentrated on the Park Burn as there are few existing records for this catchment. Twelve sites were visited in the Park Burn and a further three in Amisfield Burn and Breakneck Creek (Figure 2).

The fish surveys caught brown trout at the two Breakneck Creek sites (a tributary branch of the Amisfield Burn), and at the Park Burn sites 1, 4, 6, 9 and 11 (Figure 8). A single rainbow trout was caught at Park Burn site 11 (Figure 9). No native fish were caught at any sites. Amisfield Burn Site 1 and Park Burn sites 2, 3, 5, 7, 8, 10 and 12 had no fish present. Only the Park Burn site 2 was dry. Sites 3 and 5 in the head waters were sites on a small seepage stream with high macrophyte cover and little useable habitat for fish. Park Burn Sites 7 and 8 were small head water streams with very small flows.

Both these streams were in an area being developed for pasture and the riparian vegetation was highly modified by the clearance of rosehip briar and other shrubs to allow pasture development. Park Burn Sites 10 and 12 were reaches of stream with good flow that appeared to be supplemented by upstream water discharges. Site 11 in the lower reaches of Park Burn was a straightened modified channel that had reduced the habitat diversity. Further downstream, the Park Burn was flowing at the State Highway 6.

Amisfield Burn at the State Highway 6 bridge was dry and no water could be seen in an upstream or downstream direction (Figure 10). This stream section also appears to be straightened and had reduced habitat diversity.



Figure 7: Brown trout caught at Park Burn site 9.

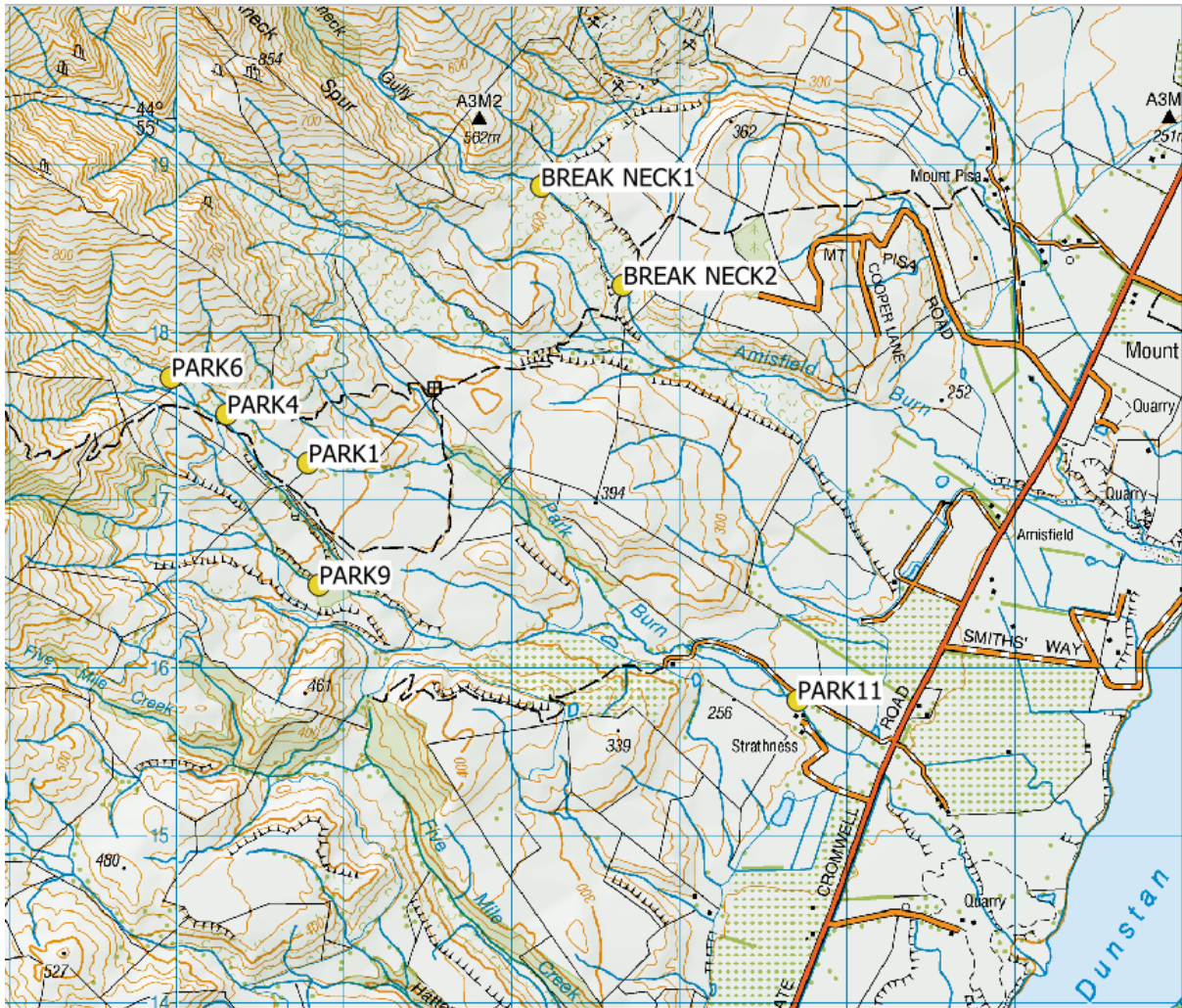


Figure 8: Fish survey sites with brown trout.



Figure 9: Rainbow trout caught at Park Burn site 11.



Figure 10: Looking downstream along the Amisfield Burn from State Highway 6.

4 DISCUSSION

4.1 General Residual Flow Considerations

The combination of NZFFD records and fish survey results from this fish survey provide key ecological information for the two catchments:

- The Clutha flathead galaxias, a critically threatened fish (Dunn et al 2018) as not been found in either the Park Burn or the Amisfield Burn;
- No fish have been recorded in either the 2018 fish survey nor during this survey upstream of the upper Amisfield Burn abstraction site;
- Brown trout are the most common fish species recorded in both stream catchments;
- Rainbow trout are very rare and appear restricted to the lower Park Burn;
- Native fish, koaro and upland bully have only been reported from the Amisfield Burn;

- Koaro is the only migratory native fish that has fish passage requirements; and
- No native fish have been reported in the Park Burn.

A further significant consideration for the Park Burn and Amisfield Burn is the natural summer low flow conditions. Stream gauging studies conducted by Landpro Limited (Landpro 2019a, b) have found that lower reaches of both the Park Burn and Amisfield Burn lose surface water to ground and the surface flow naturally declines in the lower reaches. A concurrent gauging run of the Amisfield Burn found the stream loses 210 L/s to ground and the study concluded that under natural flow conditions (i.e. no water abstraction) the stream would be dry along the reach 1400 m downstream of State Highway 6 to the confluence with the Clutha River (Landpro 2019a). The flow loss to groundwater is substantially higher than the 7dMALF for the Amisfield Burn. Therefore, a connecting flow cannot be provided even when natural flows are provided. A residual flow at any abstraction point in the Amisfield Burn will not be able to create a stream that flows from above the abstractions to the Clutha River and fish passage is not available during the summer low flow period. For the Amisfield Burn and Breakneck Creek the requirement for a residual flow at any take point will only be needed to address ecological issues at the point of take, not downstream habitat and connectivity issues, as these cannot be provided for naturally.

A similar study in the Park Burn also found a losing reach in the lower Park Burn. The maximum loss rate was not determined due to a lack of access to the lower reaches. Anecdotal comments from landowners indicate the Park Burn also does not flow to the Clutha River confluence during summer. Therefore, the residual flow conditions should recognise that a connecting flow to the Clutha River is unlikely during summer low flow conditions in Park Burn.

A further consideration with the residual flows at the take points is the nature of the water take. The upper most water takes in Amisfield Burn and Park Burn were visited, and these are simple rock weirs that divert flow into water races. The weirs are not water-tight and a substantial portion of the flow in both streams passes downstream rather than into the take. Therefore, residual flows, although not measured nor required are provided at some of the take points due to these leaky intake structures.

4.2 Residual Flow Recommendations

4.2.1 Koaro

Koaro has been reported twice in the Amisfield Burn in 1996 and 2001. This fish is currently ranked as a threatened fish with the rank of *At Risk Declining* (Dunn et al 2018). The ranking also notes that koaro are only declining in some areas and other areas are believed to maintain stable or increasing

populations. Populations in tributary streams of Lake Dunstan are potentially increasing in abundance as the creation of Lake Dunstan has provided new rearing habitat for lake dwelling larval koaro and as a result the adult populations in the tributaries is expected to increase. However, given the expansion of the koaro in the Lake Dunstan is considered a potential threat to the remaining Clutha flathead galaxiid populations in the Pisa Range streams and the Lindis River catchment provision for extra koaro habitat and fish passage for upstream migrating koaro is potentially contrary to conservation efforts for the Clutha flathead galaxiid. In addition, the migratory period of juvenile koaro moving upstream from Lake Dunstan is unknown. Without knowledge of the migration period setting residual flows to provide for upstream migration of koaro during the summer low flow period may be unnecessary as migrations occur at other times of year. The presence of occasional koaro also indicates that at times individuals are able to enter and migrate well upstream in the Amisfield Burn (i.e. past abstraction point 97232). However, given the low abundance of koaro, the natural fish passage limitations in the Amisfield Burn and conservation concern regarding the impacts of an increasing koaro population around Lake Dunstan no residual flow requirements are recommended for the provision of habitat for adult koaro in Amisfield Burn.

4.2.2 Upland bully

Upland bully has been caught in two sites in the Amisfield Burn. It is not considered a threatened fish (Dunn et al 2018) and nationally is widespread species that frequently occupies a range of rivers and streams. It is recognised as preferring low water velocity habitats and can be very abundant in some rivers that experience low summer low flows. However, it does not occupy steep gradient streams and this is a likely limiting factor in the Park Burn and Amisfield Burn where it will be limited to the low gradient lower reaches.



Figure 11: Amisfield Burn culvert on access track.

4.2.3 Rainbow trout

A single rainbow trout was caught during the April 2019 fish survey and rainbow trout have not been reported in earlier fish surveys in Park Burn and Amisfield Burn. The fish was caught in the Park Burn at Site 11 and the lack of other rainbow trout indicates that a spawning population is not present. It is possible that the rainbow trout arrived in the Park Burn via the Pisa Irrigation Scheme bywash discharge that is located less than 500 m downstream of Site 11. The Pisa Irrigation Company take water from the Clutha River and juvenile rainbow trout will be present in the Clutha River. Given rainbow trout are absent from the Amisfield Burn and very rare in the Park Burn (i.e. unlikely to present spawning habitat) they are not considered in the residual flow assessment. Given the rainbow trout are very rare and only a single small juvenile was encountered during the survey and they have not been reported before rainbow trout are not considered to be a recreational fishing value in the Park Burn.

4.2.4 Brown trout

Brown trout are widespread in both the Amisfield Burn and Park Burn and the residual flow requirements are considered here together. The brown trout caught in both streams include young-

of-the year (YOY) juveniles and adult fish up to 210 mm long. The populations appear to be self-supporting stunted brown trout populations and as a result neither stream is likely to have any recreational fishing activity. The lack of brown trout at the upper Amisfield Burn and the low density of brown trout at the upper most Park Burn sites surveyed indicate that the populations are not large or even present upstream of the top water takes despite the stream providing good habitat at these abstractions. Therefore, there is no requirement to provide for downstream movement of brown trout from the upper reaches in either Amisfield Burn, Breakneck or Park Burn.

Both streams are considered too small to have an upstream spawning runs of brown trout from Lake Dunstan. However, if spawning runs do occur these will commence in autumn as irrigation demand decreases and stream flow increases. Even under an un-modified flow condition upstream migration from Lake Dunstan will only be possible once the natural drying reaches in the lower parts of Amisfield and Park burns are rewetted. Small residual flows at water abstraction points will not prevent this drying reach from occurring in summer, however, as this occurs in summer it will not impact on any late autumn spawning migration.

The setting of residual flows in the Park Burn is complicated by the discharge of irrigation water to the Park Burn and the downstream retaking of water. This creates reaches of the stream that have low summer flows and then downstream reaches that that have high flows. The downstream reaches require no residuals but if residuals were imposed at the upper take points this water would flow downstream in the higher flowing reaches further increasing the flow in these high flow reaches.

Despite the various existing flow manipulations brown trout were widespread in the Park Burn, although not caught at all survey sites and various reasons are likely for their absence. The small tributaries of the Park Burn (sites 3, 5, 7, 8) are too small to provide habitat for fish and the absence can be considered natural habitat limitations. Sites in the lower Park Burn (sites 10 and 12) had large flows on the survey date, but are subject to varying flows as abstractions, discharges and natural flow losses interact creating a lower reach of the stream with very variable flow and habitat quality. At these sites that are between upstream discharge points and downstream retake points the summer flows can provide abundant habitat but lower natural flows in winter possibly limit the available habitat and also limit the trout population. It is likely, that brown trout are present at sites 10 and 12 as they are present upstream and downstream of these sites but occur at low densities due to poor habitat (e.g., a muddy bed stream at Site 12) and the high flow conditions and poor habitat reduces the capture probability. Providing a residual flow in the lower Park Burn that connects the stream to

Lake Dunstan in summer would have to be sufficient to exceed the measured losses to groundwater. Consideration should also be given to the flow gain the bywash discharge from the Pisa Irrigation Scheme to lower Park Burn creates as this provide a flow increase in the lower reaches and can provide a boost to the provision of fish passage in the lower Park Burn.

Brown trout were present in the upper reaches of Park Burn (site 6) above the top take point. However, the density was low in this natural stream area with only three juvenile brown trout (78-97 mm long) caught in a 80 m² survey area. Downstream of the upper most take the survey (site 4) caught seven juvenile brown trout in 80 m². The flow is reduced at this site, but the habitat provided supports brown trout, and in higher density than in the unmodified reach above the take. Therefore, a residual flow of the upper most take appears un-necessary.

Therefore, for the Park Burn catchment the existing flows and the flows currently passing the take points are considered sufficient to maintain the brown trout population. No additional residual flows are recommended.

Brown trout in the Amisfield Burn have not been reported from upstream of the top take point (95789 & 96321). However, sampling in the mid-reaches and in Breakneck Creek have found brown trout to be common or abundant (below 96320). The size range includes fish up to 210 mm and with a good range of juvenile fish being captured. This demonstrates there is a stream resident population of brown trout in the Amisfield Burn and Breakneck Creek within the reaches affected by water abstraction, despite brown trout being absent from the upper unmodified stream. The natural summer low flow and natural drying reach will isolate this population from Lake Dunstan. Providing a residual flow at the most downstream take point (97323) will still not provide a connecting flow to Lake Dunstan as the water loss to groundwater is well excess of the natural 7dMALF. Therefore, the lack of brown trout at the upper take and the inability to provide a connecting flow to Lake Dunstan means that residual flows will provide no gains for the brown trout populations

5 CONCLUSION

Fifteen fish survey sites were visited in April 2019 and additional data from the New Zealand Freshwater Fish database to assess the residual flow requirements at water abstraction points in the two catchments. Additional hydrological information on natural stream flows was also used to provide context on the natural fish passage availability in the two streams.

The Amisfield and Park burns are occupied by four freshwater fish. Koaro and rainbow trout have only been recorded very rarely and at a single location each. Given conservation concerns regarding the expansion of koaro populations in the upper Clutha area and its rarity in the Amisfield and Park burns no residual flows are proposed to provide for this fish species. Rainbow trout are also very rare, having been recorded only once in the Park Burn providing a residual flow for rainbow trout is not considered necessary.

Upland bully has been recorded at two locations in the Amisfield Burn. Upland bully prefer low water velocity habitats and have no migratory life history stages. The limited distribution in the Amisfield Burn and their preference for low water velocity habitat means no residual flow at any take points are proposed to provide for upland bully.

Brown trout is widespread in both catchments, although the fish surveys indicate the streams are occupied by self-supporting, stunned populations that will have no sports fishery value. The low density of brown trout in the upper Park Burn and the lack of brown trout in the upper Amisfield Burn indicate even in un-modified reaches that appear to have good brown trout habitat the populations are small or absent. In the reaches affected by water takes and supplementary flows (due to water discharges for downstream retakes) the brown trout population varies in density and size classes present. However, even sections with reduced flows support brown trout, with only the complete dried reaches having no trout. Out migration from both the Amisfield and Park burns to Lake Dunstan for juvenile trout is restricted by natural drying reaches in the lower reaches of both streams. These loss of water to groundwater in both streams is significant and residual flows at the most downstream takes points unlikely to prevent the drying. It is considered that providing residual flows at take point (which are generally leaky) will not improve the brown trout population to any degree nor provide a sports fishing resource. Therefore, no residual flows are proposed to provide for brown trout.

6 REFERENCES

- Dunn, N. R., Allibone, R.M., Closs, G.P., Crow, S.K., David, D.O., Goodman, J.M., Griffiths, M., Jack, D.C., Ling, N., Waters, J.M., Rolfe, J.R. (2018). Conservation status of New Zealand freshwater fish. New Zealand threat classification series 24. Wellington, Department of Conservation.
- Landpro (2019a). Hydrological assessment prepared for water users of the Amisfield Burn: Smallburn Limited, Pisa Holdings Ltd, and Lowburn Land Holdings Ltd. Technical comment
- Landpro (2019b). Hydrological assessment prepared for the water users of the Park Burn: Smallburn Limited and Parkburn Water Company

7 APPENDIX 1: SITE LOCATIONS AND CATCH

Site	Latitude	Longitude	Area fished (m ²) and stream type	Species caught
Breakneck Ck 1	-44.921214	169.226331	80 (stream)	Brown trout (length 76-194 mm)
Breakneck Ck 2	-44.919712	169.202826	80 (stream)	Brown trout (length 63 – 209 mm)
Amisfield Burn 1	-44.919712	169.202826	100 (stream)	Nil
Park Burn 1	-44.93542	169.207828	100 (stream, low flow)	Brown trout (219 mm)
Park Burn 2	-44.936458	169.205328	Nil (dry stream)	Nil
Park Burn 3	-44.932926	169.201339	10 (seepage)	Nil
Park Burn 4	-44.932591	169.201885	80 (stream)	Brown trout (length 67-80 mm)
Park Burn 5	-44.930475	169.203034	20 (seepage)	Nil
Park Burn 6	-44.93047	169.197807	80 (stream)	Brown trout (length 77-97 mm)
Park Burn 7	-44.938495	169.201039	Nil (Natural very small stream))	Nil
Park Burn 8	-44.939884	169.199353	Nil (Natural very small stream)	Nil
Park Burn 9	-44.941969	169.208203	30 (small stream	Brown trout (78-205 mm)
Park Burn 10	-44.942637	169.211188	50 (high flow small stream	Nil
Park Burn 11	-44.949328	169.243865	100 (stream)	Brown trout (length 104, 151 Rainbow trout (length 127 mm)
Park Burn 12	-44.945027	169.22924	80 (stream high flow)	Nil

Appendix D: Park Burn hydrology investigation

TECHNICAL COMMENT

Date: 28 May 2019

Our Ref: 18249; 18454

To: Zoe McCormack, Senior Planner, Landpro Ltd

From: Christina Bright, Environmental Scientist, Landpro Ltd

Subject: Hydrological assessment prepared for the water users of the Park Burn; Smallburn Limited and Rockburn Wines Limited.

1 Background

Smallburn Limited and Rockburn Wines Limited wishes to obtain resource consent from the Otago Regional Council to continue abstracting water from the Park Burn for pasture and crop irrigation. The consent numbers relevant to this assessment of the Park Burn are RM15.007.01, 94394, 98527.V1 and 98526.V1. A summary of these consents is provided in Table 1.

The purpose of this report is to provide a hydrological assessment of the Park Burn. Specifically, to:

- Estimate the natural loses and gains of a preidentified reach of the Park Burn; and
- Determine the flow of a spring fed tributary of the Park Burn.



LANDPRO

Make the most of your land

 **Cromwell**
13 Pinot Noir Drive
PO Box 302
Cromwell 9342
+64 3 445 9905

 **Gore**
23 Medway Street
Gore 9710
+64 3 208 4450

 **New Plymouth**
46 Vivian Street
New Plymouth 4342
+64 6 769 5631

0800 023 318
info@landpro.co.nz
www.landpro.co.nz



Table 1: Summary of permits relevant to hydrological assessment of Park Burn.

Permit	Permit holder	Creek	Consented Rate of take/volume	Location of intake (NZTM 2000)
RM15.007.01	Smallburn Limited	Park Burn	222 L/s, 800m ³ /hr, 19,200m ³ /day, 572,000m ³ /month, 2,816,817m ³ /year	1300148E 5017551N
94394	Smallburn Limited	Park Burn	100,000 L/hr (27.8 L/s)	1300148E 5017551N
98526.V1	Rockburn Wines Limited	Park Burn	112 L/s (combined with 98527.V1)	1302341E 5016695N
98527.V1 (retake of 95789)	Rockburn Wines Limited	Tributary of Park Burn	112 L/s (combined with 98526.V1)	1302342E 5016200N

Figure 1 shows the location of the creek in relation to the Smallburn Limited, and Rockburn Wines Limited properties and other significant watercourses in the vicinity.

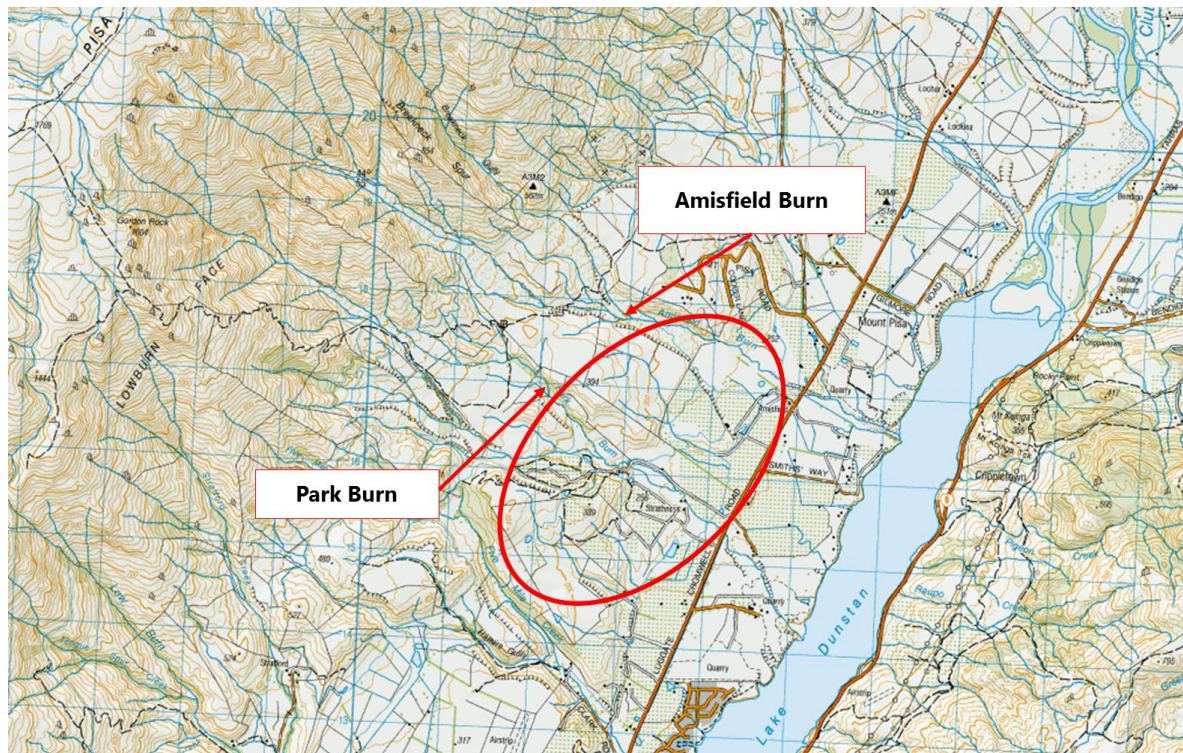


Figure 1 Site location map in relation to surface water bodies and general location of properties (red circle). [Source: NZ topo map]

2 Catchment Description

The properties are located in the Clutha River catchment in central Otago and flows in a general north to south direction with a catchment area of 21,022 km². The catchment drains a significant area of the Otago region with its headwaters characteristically mountainous, bordering the Southern Alps in the far north-west, gradually becoming more rolling through the midsections and in contrast the lower reaches of the catchment are dominated by alluvial plains and lowland. The Park Burn Catchment is situated in the northern Upper Clutha Catchment and drains directly to Lake Dunstan, an artificial lake constructed as the result of damming the Clutha River at Clyde. The area receives a mean annual rainfall of approximately 430 mm.

The Clutha River is the second longest river in New Zealand and the longest in the South Island, stretching 338 kilometers. The Clutha has a mean annual flow of 575 m³/s of which around 75% is derived from the main lake catchments in the north of the catchment, including lakes Hawea, Wanaka and Wakatipu. Flow rates range between 120,000 L/s (minimum) and 1,250,000 L/s (maximum) throughout the year. There are approximately 24 natural and artificial lakes within the Clutha Catchment, and therefore flow rates vary significantly.

2.1 Localised hydrology

The permit holders irrigate land northwest of Lake Dunstan along the Pisa Range. The Park Burn flows from the northwest to the southeast through the Lowburn Face of Pisa Range terminating at Lake Dunstan. The stream traverses steep land in the headwaters of the creek with river terraces and gorges, falling onto relatively flat to rolling land at the foothills of the range.

The hydrology of the Park Burn is fed primarily by runoff from the surrounding Pisa Range, and in winter and spring runoff is snow melt driven. The Park Burn originates high up in a gully approximately 1,700 meters above sea level (mamsl) where it drains down to 200 mamsl at its confluence with Lake Dunstan.

There has been no previous flow monitoring carried out on the Park Burn and no continuous monitoring records. Although records are available for the nearby Amisfield catchment where since October 2013, a continuous flow monitoring site has been maintained by the Otago Regional Council above the upper most point of take in that catchment. The Amisfield Burn is located parallel to the Park Burn and, on all accounts, the two catchments are very similar. The Amisfield Burn continuous record shows the creek follows the typical behavior of steep headwater streams, with fast to respond event specific hydrographs (Figure 2). Based on this record, basic flow statistics have been determined (Table 2).

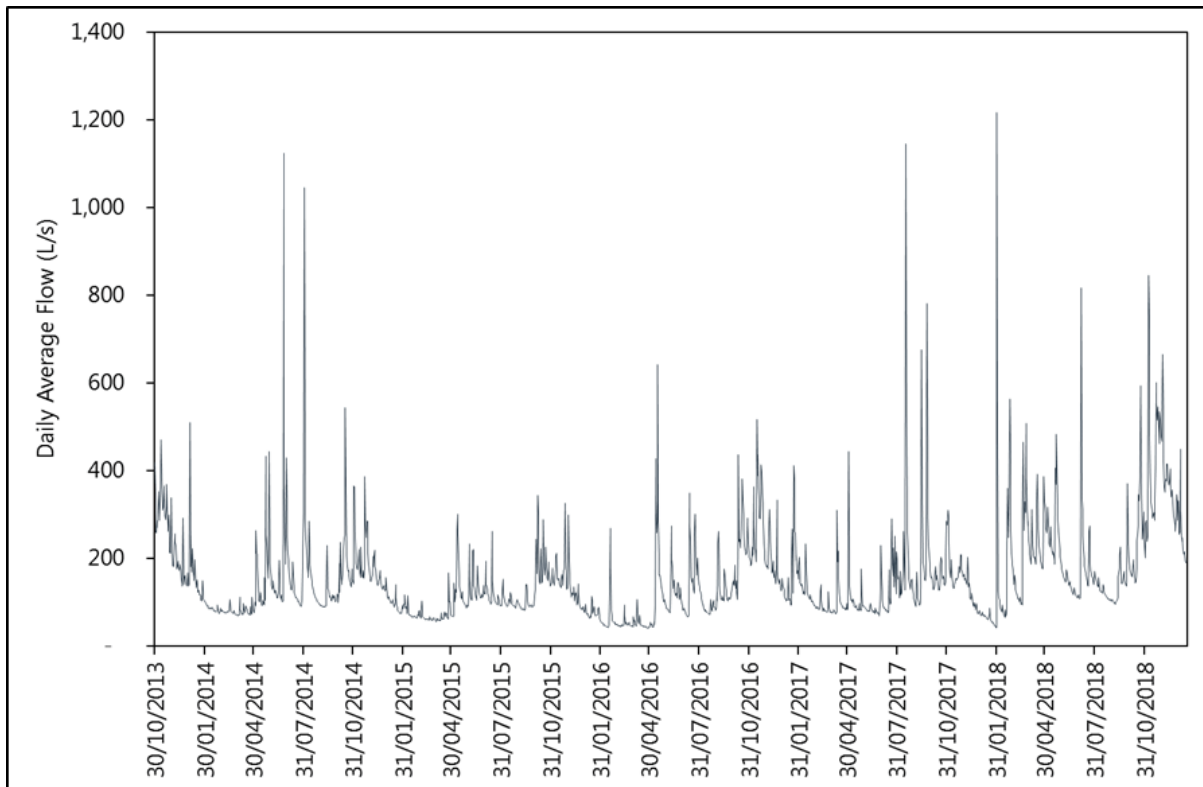


Figure 2: Daily flow for Amisfield Burn monitoring site located in upper reaches of the catchment, unaffected by abstraction.

The Otago Regional Council also maintain flow monitoring sites on the Low Burn, located nearby. The flow statistics for the Low Burn are also shown in Table 2.

Table 2: Flow statistics for the Amisfield Burn and Low Burn. [Source: ORC, data records]

Site Name	7-day mean annual low flow (L/s)	Mean flow (L/s)
Amisfield Burn (upstream of all abstraction)	65	162
Low Burn at Chinamans Gully	84*	304*

*Affected by upstream irrigation takes

3 Data Collection and Results

3.1 Site flow assessments

A series of flow gaugings were undertaken on the 16 January 2019 by Landpro Limited to determine the quantity of water flowing at various sites throughout the Park Burn. A total of six reaches were selected. These were located upstream from the upper most water take, through the middle reaches of the Park Burn, and in the lower catchment on the lowland alluvial gravels. A flow assessment was also

conducted on a tributary that met the Park Burn mid-way down, anecdotally said to be spring fed. For the duration of the survey and for 24 hours prior the applicants ceased taking water from their respective points of take, this enabled the survey to identify where in the catchment loses of water to the sub-surface zone were occurring.

The data was collected in accordance with the National Environmental Monitoring Standard: Open Channel Flow Measurement. This data, included in the appendices, has been used on an as-is basis.

3.2 Results

3.2.1 Gauging sites

PARK1:

Flow gauging site approximately 2 metres upstream from point of take diversion. Both the true left and right sides of the creek are predominately grass with scrub. Bed consisted of cobble sized rocks largely covered in algae.

PARK2:

Flow gauging site downstream from point of take diversion. The true left bank is low consisting of low-lying grass whereas the true right bank is much higher with scrub. River bed was predominately covered in weed. Step-pool type geomorphology up stream with fallen tree branches.

PARK3:

Flow gauging site mid-way down Park Burn. True left and right banks are low with grazed grass. Willow trees downstream. River bed composed of boulders and cobbles with minimal algae covering. Downstream fallen trees observed.

PARK4:

True right and left bank are low lying predominately grassy with stream edge being less well defined and relatively swampy. River bed consisted of boulders and cobbles with high algae covering.

PARK5:

Flow gauging site on an unnamed tributary approximately 500 metres upstream from Park Burn confluence. True left and right sides of stream very swampy with low lying grass. River bed was sandy with silt, few pebbles with algae covering.

PARK6:

Flow gauging site approximately 10 meters downstream from state highway 6 crossing. True left and right side of stream well overgrown with grass and woody vegetation. River bed composed of few boulders, primarily pebbles and cobbles.

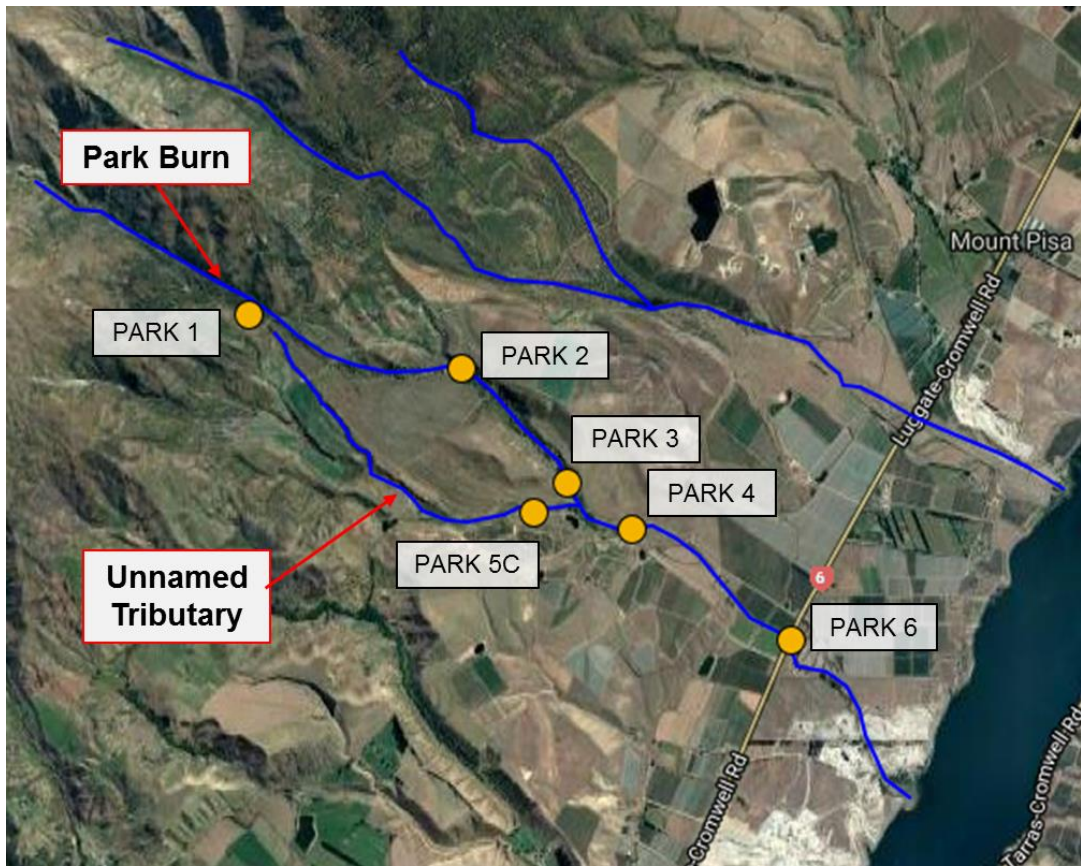


Figure 3: Location of flow gauging sites in the Park Burn Catchment.

3.2.2 Site Photos



Figure 4: Park Burn upstream of upper point of take (PARK1), left: looking upstream and right: looking downstream.



Figure 5: Park Burn downstream from upstream point of take (PARK2), left: looking upstream and right: looking downstream.



Figure 6: Park Burn upstream unnamed tributary (PARK3), left: looking upstream and right: looking downstream.



Figure 7: Park Burn downstream unnamed tributary (PARK4), left: looking upstream and right: looking downstream.



Figure 8: Park Burn downstream State Highway 6 (PARK6), left: looking upstream and right: looking at stream bed in downstream direction.



Figure 9: Park Burn unnamed tributary, upstream of confluence with Park Burn (PARK5C), left: looking upstream and right: looking at stream bed in downstream direction.

3.2.3 Measured Flow

Table 3: Field measurements for Park Burn.

Easting (NZTM 2000)	Northing (NZTM 2000)	Date	Measured flow (L/sec)	†Gauging uncertainty range (L/sec)	flow	Site Name
1300141	5017562	16/01/2019	92.4	90 – 95		Park1
1301722	5017250	16/01/2019	113.5	110 – 117		Park2
1302532	5016438	16/01/2019	83.5	80 - 87		Park3
1303013	5016126	16/01/2019	85.9	83 - 89		Park4
1302290	5016214	16/01/2019	10.1	10 - 11		Park5C
1304218	5015366	16/01/2019	43.5	42 – 45		Park6

†As with many flow measurements there is a degree of uncertainty and New Zealand Standards use ISO5168:2005 and ISO748:2007 to report on the accuracy of gaugings.

4 Hydrology Assessment

4.1 Flow Assessment

At the time of the site visit (16 January 2019), daily average flow at the nearest rated flow site which located in the upper reaches of the Amisfield Burn was 184 L/s while the Low Burn (another nearby rated flow site at Chinamans Gully) was approximately 348 L/s. These flows are only slightly above the mean flow of the Amisfield Burn and Low Burn (144L/s and 267L/s respectively) indicating the assessment was carried out during a period of slightly above average flow conditions, likely typical of the spring transition into summer.

To identify potentially losing/gaining reaches of the Amisfield Burn, flow measurements were collected longitudinally down the Park Burn main stem, and included a gauging on an unnamed tributary of the Park Burn believed to be spring fed. A differential gauging approach was used to identify differences in flow that related to either a gain or loss of water.

A losing or gaining reach as identified in this assessment refers to the assumption that flow is interacting with the hyporheic zone (sub-surface zone) due to factors such as topography, geology, and geomorphology that control the movement of water, including flow and wetted perimeter. The assessment assumes that this hyporheic water may or may not be specifically linked to groundwater as groundwater level data is not available or not included as part of this assessment. This zone of sub-surface and surface water exchange (hyporheic zone) is relatively active where water ways traverses step gullies passing down to river valleys and alluvial lowlands. In these types of environments, the hyporheic zone can be more substantial, and the typically porous alluvial media may extend for a larger depth, creating more space for underflow into the sub-surface environment to occur. Under hot dry weather conditions, this water rarely returns to the surface due to intense evaporation processes that occur as water comes to the surface.

Results of the flow gaugings undertaken on the Park Burn suggest that flow in the lower reaches of the Park Burn interacts with the hyporheic zone and fine loose alluvial gravels, and that this provides a mechanism for water loss to the sub-surface zone. The survey identified a net loss of 70 L/s between the confluence of the Park Burn with the unnamed tributary and below the State Highway 6 as summarized in Figure 3.

General survey findings:

- Gauging was carried out above the upper point of take in the Park Burn Catchment and determined flow to be 92 L/s. Flow increased to 114 L/s downstream, below the confluence of

the main stem Park Burn and other unnamed smaller tributaries. This was an expected gain in flow as this is typical behavior as water runs off the hills, and under the current environmental conditions these smaller tributaries have a small quantity of water to contribute. These small tributaries contributed approximately 21 L/s.

- As the creek traversed the less steep terrain of the alluvial plain, losses of water were measured between the foothills and the state highway. A total of 30 L/s was unaccounted for approximately 1.2km downstream from where the gain in flow was observed.
- A small gain was measured approximately 600m downstream from the first observed loss. This site is located downstream of the confluence of the Park Burn with an unnamed tributary that had a measured flow of 10 L/s. The addition of 10 L/s from the unnamed tributary had minimal impact on the Park Burn main stem flow, and likely is the result of a small increase in flow. There is an unaccounted loss of this 10L/s in the Park Burn mainstem and is likely due to the swamp like nature of this tributary and its confluence with the Park Burn.
- Flow measured below the State Highway 6 crossing was substantially lower than the measured flow upstream, and a measured loss of 42 L/s was recorded.
- Because of the quarry located downstream of the state highway, flows further downstream of the state highway crossing were not determined, and therefore whether flows reached the Clutha or not on this day is unknown. Given the disturbed nature of this area from quarry activities, and susceptibility of the alluvial gravels to absorb water, it is unlikely the 44 L/s measured below the state highway made it to Lake Dunstan. This is supported by similar work undertaken in the Amisfield Burn where it was possible to access the lower reaches. In this situation it was found that an even greater amount of flow was completely lost to the gravels. The underlying geology of Amisfield Burn and Park Burn are the same which supports the conclusion that flow in Park Burn does not reach Lake Dunstan under these conditions.

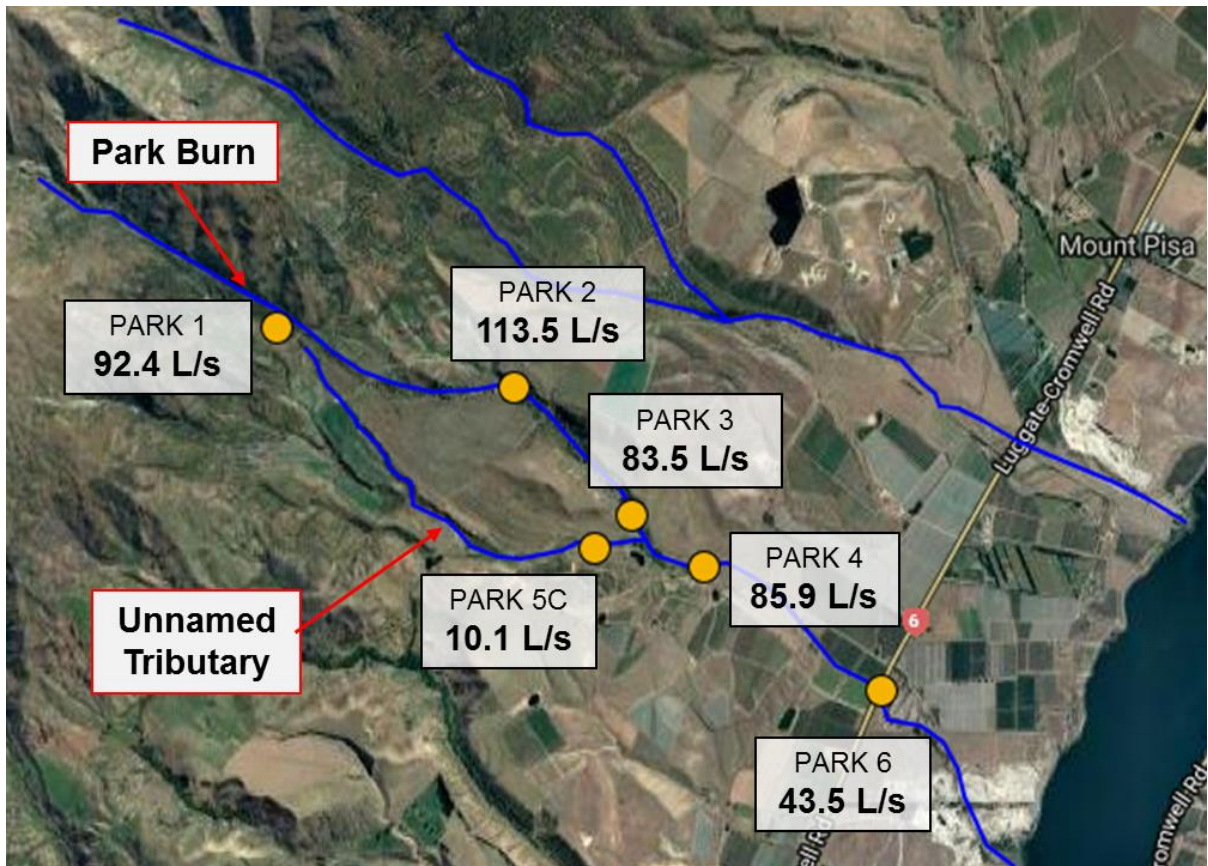


Figure 10: Flow gauging sites with measured flows.

The geology of the catchment is variable, with schist geology in the upper headwaters, and loess and alluvium in the lower reaches (Figure 14). Loess and fine alluvial gravels are typically quite porous and therefore can leak surface water to the sub-surface zone or groundwater zone, and therefore likely promote the interaction of surface water with the sub-surface zone in the Park Burn catchment in the lower reaches. explaining the observed water loses.

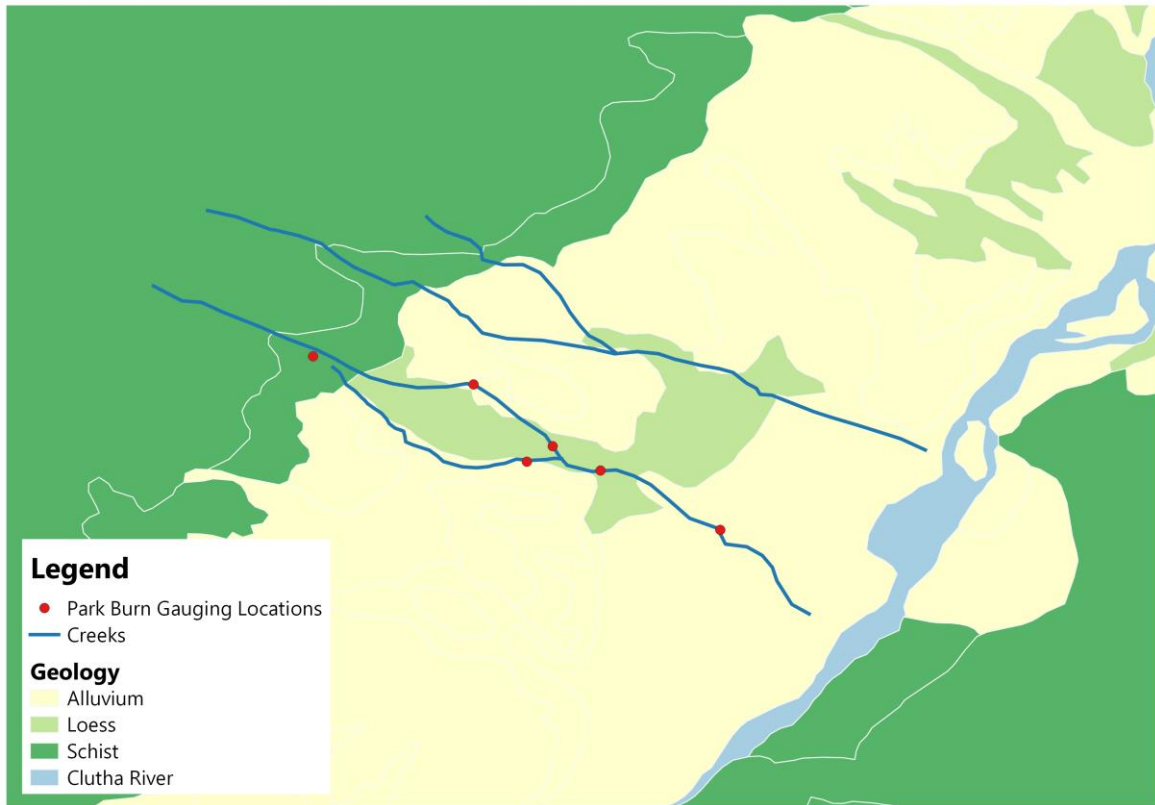


Figure 11: Geology of the Park Burn Catchment (source: MfE Geology).

4.2 Temperature Records

Temperature is often used as a tracer for groundwater surface water interactions, as temperature can be used to identify locations of exchange between surface water and groundwater. Air temperature is commonly used as a comparison to identify the thermal behavior of a stream. Flow affects water temperature due to the difference in the thermal capacity of water and air, and therefore a larger volume of water, deeper water, and faster moving water will dampen the effects of the surrounding air temperature and incoming solar radiation. Likewise, rainfall patterns can help understand the thermal behavior of streams.

A series of water temperature records exists for the Amisfield Burn Catchment, a neighboring catchment that is topographically similar to the Park Burn. The temperature records that are available for the Amisfield Burn can be used to make inferences about the Park Burn. There are three records of temperature for the Amisfield Burn:

- Upstream flow monitoring site (2013 – current)
- State Highway 6 Bridge (2018 – current)
- Amisfield Burn Quarry (2013 – 2014)

An in depth investigation was carried out in the Amisfield Burn using these temperature records to assess the validity of using temperature monitoring data as a proxy to determine when the stream is dry in the lower reaches and understand flow losses in the catchment. It was expected that one or both of the following metrics could be used to predict the absence of water in the lower reaches of the stream:

- Daily maximum temperature measured at the downstream site (quarry or State Highway). Very high temperatures are likely to indicate water is not present; and or,
- Daily temperature range (i.e. max. minus min. temperature) at the downstream site. The presence of water is expected to moderate temperature extremes, and therefore large variations in temperature during the course of a day may indicate that the stream is dry.

The investigation suggested that both the maximum daily temperature and the daily temperature range have potential as predictors of when the stream is dry downstream in the Amisfield Burn Catchment, and in summary:

- Absolute and daily temperature records are significantly higher downstream than upstream, particularly during summer and autumn;
- Higher temperatures would be expected downstream regardless of wet or dry conditions due to longer flow path, lower altitude and gravel bed, affecting the thermal regime of the stream in the lower reaches;
- Bimodal or multimodal behavior present in the 2013-14 record of daily max temperature and daily temperature range suggest the affect of dryness was more extreme in this season;
- Predicted dry spells occur primarily in late summer and early autumn, and coincide with period of low upstream flows, low rainfall, and high air temperatures, also coinciding with a general trend of decreasing abstraction at this time of year; and
- Predicted dryness coincides with natural low flows in the upper reaches of the Amisfield Burn, and warmer upstream temperatures.

The Park Burn likely behaves in a similar way to the Amisfield Burn based on similarities in topography and geology. Typically when observations of dryness are made in the Amisfield Burn, dryness is also observed in the Park Burn.

5 Conclusion and Recommendation

It is likely that there are natural flow losses in the Park Burn Catchment, as the predicted dry behavior determined by the temperature record analysis in the Amisfield Burn catchment responds to upstream low flows and warm water temperatures, higher air temperature and low rainfall, all of which increase

thermal capacity and promote dry conditions. The stream gauging survey identified that when abstraction is not occurring in the catchment, the geomorphology of the river channel promotes flow losses, as wide gravel channels with alluvial bed morphology allows losses to subsurface zones; the wetted perimeter in the lower reaches was much narrower than the outermost boundaries of the alluvial channel with exposed dry alluvial rock. This coupled with the temperature analysis suggest that any discussions relating to residual flow recommendations and water permit abstraction limits must consider the potential for natural flow losses. It is likely that abstraction in the catchment exacerbates natural flow losses, and a staggered residual flow at the beginning and end of the irrigation season (note, temperature extremes are more likely to occur late in the irrigation season) may prove beneficial to the thermal regime of the stream.

6 Appendices

Gauging Raw Data

Park Burn – Site PARK1

Discharge Measurement Summary												Date Generated: Wed Apr 10 2019	
File Information						Site Details							
File Name		20190116_PARK1.WAD				Site Name		PARK1					
Start Date and Time		2019/01/15 08:40:18				Operator(s)		CEB					
System Information						Units (Metric Units)			Discharge Uncertainty				
Sensor Type		FlowTracker				Distance		m		Category		ISO	Stats
Serial #		P3911				Velocity		m/s		Accuracy		1.0%	1.0%
CPU Firmware Version		3.9				Area		m ²		Depth		0.4%	1.4%
Software Ver		2.30				Discharge		m ³ /s		Velocity		1.0%	3.1%
Mounting Correction		0.0%								Width		0.1%	0.1%
Method										Method		1.8%	-
# Stations										# Stations		2.0%	-
Overall										Overall		3.0%	3.5%
Summary													
Averaging Int.		40		# Stations		26							
Start Edge		LEW		Total Width		1.300							
Mean SNR		38.2 dB		Total Area		0.213							
Mean Temp		11.03 °C		Mean Depth		0.164							
Disch. Equation		Mean-Section		Mean Velocity		0.4342							
				Total Discharge		0.0924							
Measurement Results													
St	Clock	Loc	Method	Depth	% Dep	MeasD	Vel	CorrFact	MeanV	Area	Flow	% Q	
0	08:40	0.00	None	0.000	0.0	0.0	0.0000	0.00	0.0000	0.000	0.0000	0.0	
1	08:42	0.10	0.6	0.090	0.6	0.036	-0.0068	1.00	-0.0034	0.005	0.0000	0.0	
2	08:43	0.15	0.6	0.100	0.6	0.040	0.0296	1.00	0.0114	0.005	0.0001	0.1	
3	08:45	0.20	0.6	0.130	0.6	0.052	0.0693	1.00	0.0494	0.006	0.0003	0.3	
4	08:47	0.25	0.6	0.120	0.6	0.048	0.0530	1.00	0.0611	0.006	0.0004	0.4	
5	08:49	0.30	0.6	0.160	0.6	0.064	0.0841	1.00	0.0685	0.007	0.0005	0.5	
6	08:50	0.35	0.6	0.180	0.6	0.072	0.1199	1.00	0.1020	0.009	0.0009	0.9	
7	08:51	0.40	0.6	0.180	0.6	0.072	0.5768	1.00	0.3483	0.009	0.0031	3.4	
8	08:52	0.45	0.6	0.180	0.6	0.072	0.5490	1.00	0.5629	0.009	0.0051	5.5	
9	08:54	0.50	0.6	0.210	0.6	0.084	0.4033	1.00	0.4761	0.010	0.0046	5.0	
10	08:55	0.55	0.6	0.200	0.6	0.080	0.5651	1.00	0.4842	0.010	0.0050	5.4	
11	08:56	0.60	0.6	0.200	0.6	0.080	0.7171	1.00	0.6411	0.010	0.0064	6.9	
12	08:57	0.65	0.6	0.200	0.6	0.080	0.7342	1.00	0.7256	0.010	0.0073	7.9	
13	08:58	0.70	0.6	0.190	0.6	0.076	0.6530	1.00	0.6936	0.010	0.0068	7.3	
14	09:00	0.75	0.6	0.200	0.6	0.080	0.6484	1.00	0.6507	0.010	0.0063	6.9	
15	09:01	0.80	0.6	0.180	0.6	0.072	0.6459	1.00	0.6471	0.010	0.0061	6.7	
16	09:02	0.85	0.6	0.210	0.6	0.084	0.6556	1.00	0.6507	0.010	0.0063	6.9	
17	09:04	0.90	0.6	0.210	0.6	0.084	0.0331	1.00	0.3443	0.011	0.0036	3.9	
18	09:06	0.95	0.6	0.220	0.6	0.088	0.4190	1.00	0.2260	0.011	0.0024	2.6	
19	09:07	1.00	0.6	0.180	0.6	0.072	0.6030	1.00	0.5110	0.010	0.0051	5.5	
20	09:08	1.05	0.6	0.170	0.6	0.068	0.5847	1.00	0.5938	0.009	0.0052	5.6	
21	09:10	1.10	0.6	0.170	0.6	0.068	0.4608	1.00	0.5227	0.009	0.0044	4.8	
22	09:11	1.15	0.6	0.190	0.6	0.076	0.4202	1.00	0.4405	0.009	0.0040	4.3	
23	09:12	1.20	0.6	0.180	0.6	0.072	0.4753	1.00	0.4477	0.009	0.0041	4.5	
24	09:14	1.25	0.6	0.160	0.6	0.064	0.3740	1.00	0.4246	0.009	0.0036	3.9	
25	09:14	1.30	None	0.000	0.0	0.0	0.0000	0.00	0.1870	0.004	0.0007	0.8	

Rows in italics indicate a QC warning. See the Quality Control page of this report for more information.

Park Burn – Site PARK2

Discharge Measurement Summary

Date Generated: Wed Apr 10 2019

File Information

File Name 20190116_PARK2.WAD
 Start Date and Time 2019/01/15 09:54:10

Site Details

Site Name PARK2
 Operator(s) CEB

System Information

Sensor Type FlowTracker
 Serial # P3911
 CPU Firmware Version 3.9
 Software Ver 2.30
 Mounting Correction 0.0%

Units (Metric Units)

Distance m
 Velocity m/s
 Area m²
 Discharge m³/s

Discharge Uncertainty

Category	ISO	Stats
Accuracy	1.0%	1.0%
Depth	0.4%	2.2%
Velocity	1.1%	2.3%
Width	0.1%	0.1%
Method	1.8%	-
# Stations	2.2%	-
Overall	3.2%	3.3%

Summary

Averaging Int.	40	# Stations	23
Start Edge	LEW	Total Width	3.200
Mean SNR	42.9 dB	Total Area	0.364
Mean Temp	13.54 °C	Mean Depth	0.114
Disch. Equation	Mean-Section	Mean Velocity	0.3118
		Total Discharge	0.1135

Measurement Results

St	Clock	Loc	Method	Depth	% Dep	MeasD	Vel	CorrFact	MeanV	Area	Flow	% Q
0	09:54	0.00	None	0.000	0.0	0.0	0.0000	0.00	0.0000	0.000	0.0000	0.0
1	09:54	0.15	0.6	0.060	0.6	0.024	0.0000	1.00	0.0000	0.005	0.0000	0.0
2	09:55	0.30	0.6	0.090	0.6	0.036	0.0010	1.00	0.0005	0.011	0.0000	0.0
3	09:56	0.45	0.6	0.080	0.6	0.032	0.2163	1.00	0.1086	0.013	0.0014	1.2
4	09:59	0.60	0.6	0.080	0.6	0.032	0.2863	1.00	0.2513	0.012	0.0030	2.7
5	10:00	0.75	0.6	0.100	0.6	0.040	0.3290	1.00	0.3076	0.014	0.0042	3.7
6	10:02	0.90	0.6	0.090	0.6	0.036	0.3177	1.00	0.3233	0.014	0.0046	4.1
7	10:03	1.05	0.6	0.100	0.6	0.040	0.3028	1.00	0.3102	0.014	0.0044	3.9
8	10:04	1.20	0.6	0.090	0.6	0.036	0.4648	1.00	0.3838	0.014	0.0055	4.8
9	10:06	1.35	0.6	0.080	0.6	0.032	0.5177	1.00	0.4912	0.013	0.0063	5.5
10	10:07	1.50	0.6	0.090	0.6	0.036	0.5175	1.00	0.5176	0.013	0.0066	5.8
11	10:08	1.65	0.6	0.070	0.6	0.028	0.4838	1.00	0.5006	0.012	0.0060	5.3
12	10:09	1.80	0.6	0.100	0.6	0.040	0.4292	1.00	0.4565	0.013	0.0058	5.1
13	10:11	1.95	0.6	0.100	0.6	0.040	0.6186	1.00	0.5239	0.015	0.0079	6.9
14	10:12	2.10	0.6	0.100	0.6	0.040	0.5744	1.00	0.5965	0.015	0.0089	7.9
15	10:13	2.25	0.6	0.120	0.6	0.048	0.4045	1.00	0.4894	0.017	0.0081	7.1
16	10:15	2.40	0.6	0.160	0.6	0.064	0.2910	1.00	0.3477	0.021	0.0073	6.4
17	10:16	2.55	0.6	0.180	0.6	0.072	0.2302	1.00	0.2606	0.026	0.0066	5.9
18	10:17	2.70	0.6	0.210	0.6	0.084	0.3028	1.00	0.2665	0.029	0.0078	6.9
19	10:19	2.85	0.6	0.200	0.6	0.080	0.2267	1.00	0.2647	0.031	0.0081	7.2
20	10:20	3.00	0.6	0.200	0.6	0.080	0.2448	1.00	0.2357	0.030	0.0071	6.2
21	10:22	3.15	0.6	0.190	0.6	0.076	0.0192	1.00	0.1320	0.029	0.0039	3.4
22	10:22	3.20	None	0.000	0.0	0.0	0.0000	0.00	0.0096	0.005	0.0000	0.0

Rows in italics indicate a QC warning. See the Quality Control page of this report for more information.

Park Burn – Site PARK3

Discharge Measurement Summary

Date Generated: Wed Apr 10 2019

File Information

File Name 20190116_PARK3.WAD
 Start Date and Time 2019/01/15 12:21:46

Site Details

Site Name PARK3
 Operator(s) CEB

System Information

Sensor Type FlowTracker
 Serial # P3911
 CPU Firmware Version 3.9
 Software Ver 2.30
 Mounting Correction 0.0%

Units (Metric Units)

Distance m
 Velocity m/s
 Area m²
 Discharge m³/s

Discharge Uncertainty

Category	ISO	Stats
Accuracy	1.0%	1.0%
Depth	0.4%	3.4%
Velocity	1.3%	4.9%
Width	0.1%	0.1%
Method	2.1%	-
# Stations	2.4%	-
Overall	3.6%	6.0%

Summary

Averaging Int.	40	# Stations	21
Start Edge	LEW	Total Width	2.000
Mean SNR	39.1 dB	Total Area	0.287
Mean Temp	17.19 °C	Mean Depth	0.144
Disch. Equation	Mean-Section	Mean Velocity	0.2910
		Total Discharge	0.0835

Measurement Results

St	Clock	Loc	Method	Depth	% Dep	MeasD	Vel	CorrFact	MeanV	Area	Flow	% Q
0	12:21	0.00	None	0.000	0.0	0.0	0.0000	0.00	0.0000	0.000	0.0000	0.0
1	12:22	0.10	0.6	0.130	0.6	0.052	0.0275	1.00	0.0137	0.007	0.0001	0.1
2	12:24	0.20	0.6	0.160	0.6	0.064	0.1151	1.00	0.0713	0.015	0.0010	1.2
3	12:25	0.30	0.6	0.220	0.6	0.088	0.4913	1.00	0.3032	0.019	0.0058	6.9
4	12:26	0.40	0.6	0.200	0.6	0.080	0.1861	1.00	0.3387	0.021	0.0071	8.5
5	12:28	0.50	0.6	0.180	0.6	0.072	0.0765	1.00	0.1313	0.019	0.0025	3.0
6	12:29	0.60	0.6	0.150	0.6	0.060	0.0181	1.00	0.0473	0.017	0.0008	0.9
7	12:30	0.70	0.6	0.180	0.6	0.072	0.1877	1.00	0.1029	0.017	0.0017	2.0
8	12:31	0.80	0.6	0.180	0.6	0.072	0.3433	1.00	0.2655	0.018	0.0048	5.7
9	12:32	0.90	0.6	0.180	0.6	0.072	0.4361	1.00	0.3897	0.018	0.0070	8.4
10	12:33	1.00	0.6	0.190	0.6	0.076	0.6606	1.00	0.5483	0.019	0.0101	12.1
11	12:34	1.10	0.6	0.200	0.6	0.080	0.5759	1.00	0.6182	0.020	0.0121	14.4
12	12:36	1.20	0.6	0.160	0.6	0.064	0.4349	1.00	0.5054	0.018	0.0091	10.9
13	12:37	1.30	0.6	0.170	0.6	0.068	0.2080	1.00	0.3214	0.017	0.0053	6.4
14	12:38	1.40	0.6	0.170	0.6	0.068	0.0294	1.00	0.1187	0.017	0.0020	2.4
15	12:40	1.50	0.6	0.080	0.6	0.032	0.3791	1.00	0.2042	0.013	0.0026	3.1
16	12:41	1.60	0.6	0.100	0.6	0.040	0.4016	1.00	0.3903	0.009	0.0035	4.2
17	12:42	1.70	0.6	0.080	0.6	0.032	0.3553	1.00	0.3784	0.009	0.0034	4.1
18	12:43	1.80	0.6	0.080	0.6	0.032	0.2369	1.00	0.2961	0.008	0.0024	2.8
19	12:45	1.90	0.6	0.060	0.6	0.024	0.2912	1.00	0.2640	0.007	0.0018	2.2
20	12:45	2.00	None	0.000	0.0	0.0	0.0000	0.00	0.1456	0.003	0.0004	0.5

Rows in italics indicate a QC warning. See the Quality Control page of this report for more information.

Park Burn – Site PARK4

Discharge Measurement Summary												Date Generated: Wed Apr 10 2019					
File Information						Site Details											
File Name			20190116_PARK4.WAD			Site Name			PARK4								
Start Date and Time			2019/01/15 13:14:02			Operator(s)			CEB								
System Information						Units (Metric Units)			Discharge Uncertainty								
Sensor Type			FlowTracker			Distance			m			Category		ISO		Stats	
Serial #			P3911			Velocity			m/s			Accuracy		1.0%		1.0%	
CPU Firmware Version			3.9			Area			m ²			Depth		0.4%		2.7%	
Software Ver			2.30			Discharge			m ³ /s			Velocity		1.3%		1.7%	
Mounting Correction			0.0%									Width		0.1%		0.1%	
												Method		2.2%		-	
												# Stations		2.6%		-	
												Overall		3.8%		3.3%	
Summary																	
Averaging Int.		40		# Stations		19											
Start Edge		LEW		Total Width		1.800											
Mean SNR		41.0 dB		Total Area		0.269											
Mean Temp		19.61 °C		Mean Depth		0.149											
Disch. Equation		Mean-Section		Mean Velocity		0.3196											
				Total Discharge		0.0859											
Measurement Results																	
St	Clock	Loc	Method	Depth	% Dep	MeasD	Vel	CorrFact	MeanV	Area	Flow	% Q					
0	13:14	0.00	None	0.000	0.0	0.0	0.0000	0.00	0.0000	0.000	0.0000	0.0					
1	13:15	0.15	0.6	0.130	0.6	0.052	0.0136	1.00	0.0068	0.010	0.0001	0.1					
2	13:17	0.20	0.6	0.130	0.6	0.052	0.0445	1.00	0.0290	0.007	0.0002	0.2					
3	13:18	0.30	0.6	0.140	0.6	0.056	0.0695	1.00	0.0570	0.014	0.0008	0.9					
4	13:19	0.40	0.6	0.140	0.6	0.056	0.0831	1.00	0.0763	0.014	0.0011	1.2					
5	13:20	0.50	0.6	0.160	0.6	0.064	0.1513	1.00	0.1172	0.015	0.0018	2.0					
6	13:21	0.60	0.6	0.200	0.6	0.080	0.1611	1.00	0.1562	0.018	0.0028	3.3					
7	13:22	0.70	0.6	0.190	0.6	0.076	0.2432	1.00	0.2021	0.020	0.0039	4.6					
8	13:24	0.80	0.6	0.170	0.6	0.068	0.2679	1.00	0.2555	0.018	0.0046	5.4					
9	13:25	0.90	0.6	0.190	0.6	0.076	0.3547	1.00	0.3113	0.018	0.0056	6.5					
10	13:26	1.00	0.6	0.170	0.6	0.068	0.4808	1.00	0.4177	0.018	0.0075	8.8					
11	13:28	1.10	0.6	0.120	0.6	0.048	0.5802	1.00	0.5305	0.015	0.0077	9.0					
12	13:29	1.20	0.6	0.110	0.6	0.044	0.7459	1.00	0.6630	0.012	0.0076	8.9					
13	13:30	1.30	0.6	0.160	0.6	0.064	0.5572	1.00	0.6515	0.014	0.0088	10.2					
14	13:32	1.40	0.6	0.180	0.6	0.072	0.6613	1.00	0.6092	0.017	0.0104	12.1					
15	13:33	1.50	0.6	0.180	0.6	0.072	0.4375	1.00	0.5494	0.018	0.0099	11.5					
16	13:34	1.60	0.6	0.200	0.6	0.080	0.3253	1.00	0.3814	0.019	0.0072	8.4					
17	13:36	1.70	0.6	0.150	0.6	0.060	0.2483	1.00	0.2868	0.018	0.0050	5.8					
18	13:36	1.80	None	0.000	0.0	0.0	0.0000	0.00	0.1241	0.008	0.0009	1.1					
Rows in italics indicate a QC warning. See the Quality Control page of this report for more information.																	

Appendix E: Aqualinc calculations and walkthrough

Site: Rockburn Wines Ltd							Sub-region: Central and Lakes District								
Land use	Soil type	Area (ha)	MAR Zone	Smaps PAW	Aqualinc PAW	peak daily demand (mm/day)	peak daily demand (m ³)	maximum monthly demand (mm/month)	maximum monthly demand (m ³)	90%ile annual demand (mm/year)	90%ile annual demand (m ³)	100%ile annual demand (mm/year)	100%ile annual demand (m ³)		
Existing 1	Vineyard	Molyneux	3.30	350	36	40	2.4	79.9	75	2,475	258	8,514	329	10857.00	
Existing 2	Vineyard	Waenga	21.40	350	55	60	2.4	517.9	75	16,050	248	53,072	332	71048.00	
Proposed	Vineyard	Waenga	1.70	350	55	60	2.4	41.1	75	1,275	248	4,216	332	5644.00	
Total		26.4					639		19,800		65,802		87,549		

Aqualinc calculations walkthrough

Aqualinc volumes were calculated using irrigated hectare summaries provided by the applicant and include both existing irrigated areas and future areas intended for irrigation following the deemed permit replacement process (see Appendix A for the water use/property map).

Frost fighting

ORC's resource consent application Form 4 recommends a maximum of 3mm/hour (30 m³/ha) and a maximum frost fighting duration of 10 hours per event. As discussed in the main body of this report, climate data for Central Otago suggests a an average total of 12 spring frost events (September – November) and a total of 9 autumn frost events that have the potential to impact grape harvest, therefore frost fighting volumes have been calculated and integrated into the total volumes sought as follows:

- Up to 26 ha of vineyard (24.7 ha existing and 1.7 ha proposed) may feature overhead sprinkler systems for frost fighting in future (currently frost-fighting is undertaken via helicopter, which is a far less sustainable means of frost control).
- Daily frost fighting maximum: $30 \times 10 \times 26 = 7,800 \text{ m}^3$.
- Monthly and annual volumes sought were calculated similarly, but monthly volume was calculated assuming a maximum of 8 frost days in any one month (based on NIWA climate data) and annual volume was calculated assuming a maximum of 21 frost days. Monthly frost fight volume = $7,800 \times 8 = 62,400 \text{ m}^3$. Annual frost fight volume = $7,800 \times 21 = 163,800 \text{ m}^3$.

As part of the calculations, it was assumed that no irrigation water is required during frost events.