1 Resource Consent Application

Otago Regional Council

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: Wakefield Estates Limited, Rockburn Wines Limited, Pisa Holdings Limited, Mark II Limited, Stuart Douglas & Phillipa Mary Hawker, Albany Heights Limited, Chard Farm Trustees Limited

OR Company Name (in full) _____

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

or Name of Incorporation _____

Postal Address: Various - see Page 2 of attached AEE

Post Code _____

Street Address (not a P O box number) _____

Post Code _____

Phone Number: Business _____ Private _____

Mobile _____ Fax _____

Email Address: bob.perriam@gmail.com, mark@mark2.co.nz, stuart@torr.co.nz, jonathan@nzcherrycorp.com, duffyshamrock@xtra.co.nz, richard@45s.co.nz, hamish@chardfarm.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: Richard Cameron, 45 South Ltd

Postal Address: Pisa Holdings Ltd, Level 5, 25 Broadway, Newmarket, Auckland

Post Code 1023

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

Phone Number Business _____ Private _____
Mobile 0224104853 Fax _____
Email Address richard@45s.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 ☐

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 0274598090 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: 95789
_____
_____

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 consent holders)
(BLOCK CAPITALS)

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

Designation Consultant Date 20/12/2019
(e.g., owner, manager, consultant)

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	
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

1. For additional permits in respect of the same site, activity, applicant, time of application, and closely related effect as the first application.

2. 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.

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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: 95789 *Expiry date:* 1st October 2021

2.2 A lapse period of 5 years 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 35 years 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):

- [x] The location of the existing and proposed point(s) of take and all associated infrastructure
- [x] The location of the water measuring device(s) or system(s)
- [x] The total property area boundary
- [x] 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
- [x] 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: 120 litres per second

b. Maximum monthly volume: 255,390 cubic metres per month

c. Maximum annual volume: 1,257,818 cubic metres per year

*Note: Some deemed permits refer to hourly/weekly rates. Water permits are issued in litres per second, m^3 per month and m^3 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. See attached AEE

	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? Various - see AEE

m^3

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: 1300312 N: 5018963

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? Amisfield Burn

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: 157 litres per second

b. Maximum monthly volume: 226,438 cubic metres per month

c. Maximum annual volume: 1,808,577 cubic metres per year

5.4 For which years have these rates and volumes been recorded? 2015-2019

6. Water use and management

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

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

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):
- [x] 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
- [x] 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.

- [x] 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
- [x] No – complete an Application Form 24 – Application for Exemption

WEX application already in the system, as described in AEE

8. Location and Efficiency of Water Use

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

- [x] 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.

- [x] 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 requirements[1].

☑ 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? ~166 ha

b. What is the soil type(s) of the land being irrigated? various - see AEE

c. What will you be irrigating (i.e. crop, pasture etc in ha)? cherries, grapes, pasture

d. What is the target application rate (mm/day and mm/year)? see AEE

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 Drip for grapes and cherries, flood for pasture (currently)

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.*

maintenance or leak detection programme, will the scheme be managed by an external company).

Note: For deemed permits please ensure you have the right to convey water under s417 of the Resource Management Act if that conveyance crosses another party's property, prior to the expiry of the deemed permit.

8.8 Do you intend to install any water distribution infrastructure (for example pipes, storage tanks, open races etc.)?

☑ Yes

☐ No

If yes, in your application please describe the type of infrastructure to be installed and how you intend to ensure that it is maintained in good working order (e.g. do you intend to have a maintenance or leak detection programme, will the scheme be managed by an external company).

Note: For deemed permits please ensure you have the right to convey water under s417 of the Resource Management Act if that conveyance crosses another party's property, prior to the expiry of the deemed permit.

8.9 If you propose to use water for stock and/or dairy shed use – please answer the following:

Note: The Council considers the following values as efficient use of water for stock:

Sheep	*5 litres per day per head*
Beef cattle	*45 litres per day per head*
Dairy cows	*70 litres per day per head*
Deer	*15 litres per day per head*
Dairy shed use	*50 litres per day per head*

8.9.1 What type of animal and numbers of stock will be supplied with water for drinking?

Sheep

Number: 302 Water required: litres/head/day

Beef cattle

Number: 90 Water required: litres/head/day

Dairy cows

Number: Water required: litres/head/day

Other

Number: Water required: litres/head/day

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): Possibly two future worker facilities with lunch rooms

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.

- [x] Yes (attached to application)
- [ ] No (please outline reasons why this has not been provided)

9.9 Describe any positive effects from the take.

- [x] 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:

- [x] A residual flow
- [x] Fish screening on water intakes
- [x] Measures for management where there are low flows
- [x] Flow sharing measures
- [x] 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)
- [x] 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.

- [x] 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.

see AEE Section 5

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

For transfer and replacement of Deemed Permit 95789 on behalf of consent holders

December 2019

Prepared For

Wakefield Estates Limited, Rockburn Wines Limited, Pisa Holdings Limited, Mark II Limited, Chard Farm Trustees Limited, S & P Hawker and Albany Heights Limited

Prepared By

Landpro Ltd
13 Pinot Noir Drive
PO Box 302
Cromwell

Tel +64 3 445 9905

QUALITY INFORMATION

Reference:	L:\18251 - Pisa Holdings Ltd - Deemed Permit Replacement\Docs\Drafts\20190801_18251_95789 DP Replacement_AEE Final.docx
Date:	20 December 2019
Prepared by:	Will Nicolson
Reviewed by:	Zoe McCormack
Client Review:	Various
Version Number:	Final

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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.

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LIST OF APPENDICES

1. INTRODUCTION

1.1 Overview of Proposal

Wakefield Estates Limited, Rockburn Wines Limited, Pisa Holdings Limited, Mark II Limited, Chard Farm Limited, J&J Sinclair, S & P Hawker and Albany Heights Limited jointly hold Deemed Permit 95789, authorising water abstraction from the Amisfield Burn. The current share structure of this permit is detailed below:

Table 1: Deemed Permit 95789 to take water from the Amisfield Burn

Holder	Share	L/s	L/hour	m3/month
Rockburn Wines Limited	2/56	**166.7**[1]	**600,000**[2]	**416,750**
Pisa Holdings Limited	15/56			
Mark II Limited	10/56			
Chard Farm Trustees Limited	7/56			
John Sinclair and Juliana Sinclair	2000 L/day domestic use only			
Stuart Douglas Hawker and Phillippa Mary Hawker	1000 L/day stockwater only			
Albany Heights Limited	8/56			
Wakefield Estates Limited	12/56			
Total	**54/56**[3]			

The purpose of this application is to replace 95789, which is due to expire on October 1st, 2021, and to transfer the consented location of water abstraction to that where water is actually taken from. This application is being made more than 6 months prior to the expiry of the current permit, and so the applicants may continue to operate within the existing permit under s124 of the RMA until the new permit is granted.

[1] No instantaneous rate of take is specified on 95789, therefore the rate of take has been calculated based on the authorised hourly rate specified on the permit.

[2] The permit does not specify whether the Sinclairs and Hawkers takes contribute to the authorised instantaneous, hourly and monthly rates of take. While they don't have shares in the permit, it is assumed that their takes would indeed contribute to the totals.

[3] At around the time when the mining privilege was replaced by Deemed Permit 95789, 2 out of the total 56 shares were transferred to Contact Energy and then surrendered. The recommending report (2002/191) states that "given the surrender of the Contact Energy share(s) the Deemed Permit 95789 can only be issued for 54/56 of the total allocation which is a volume of 416,750 cubic metres per month.

1.2 The Applicant

Applicant Address:

Wakefield Estates Limited *1 Perriam Place,* *RD 3* *Cromwell 9389*	***Rockburn Wines Limited*** *C/o – Crowe Horwath,* *21 Brownston Street,* *Wanaka, 9305*	***Pisa Holdings Limited*** *C/o –* *Level 5,* *25 Broadway,* *Newmarket, Auckland, 1023*
Mark II Limited *C/o – Donaldsons Chartered Accountants Ltd,* *162 Dee Street,* *Invercargill, 9810*	***Stuart Douglas & Phillippa Mary Hawker (Rabbit Enterprises Limited)*** *C/o - Crowe Horwath,* *21 Brownston Street,* *Wanaka, 9305*	***Albany Heights Limited*** *C/o – Adsettbraddock Chartered Accountants,* *Level 5, 1* *10 Symonds Street,* *Auckland, 1010*
Chard Farm Trustees Limited *205 Chard Road,* *RD 1* *Queenstown 9371*		

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 Scheme Overview

Deemed Permit 95789 authorises the abstraction of water from the Amisfield burn at or about NZTM 2000: 1300745E 5018568N. During the 1999 floods, the original consented intake was washed out and the water users re-established their intake at approximately NZTM 2000: 1300312E 5018963N which is approximately 600m upstream of its original location. Mike Kelly at ORC approved this transfer in principle at that time, but the permit was never updated. The permit authorises the take and use of water for irrigation and domestic purposes. It is noted that the applicants require the purpose for the replacement permit to be for irrigation, domestic, frost fighting and stock drinking (the same purposes for which water has been historically taken and used for).

The current abstraction and most of the 9 Mile Race (which conveys water from the Amisfield Burn abstraction point to the water users' properties) is located on land owned by Mt Pisa Station. The property where water abstraction occurs is legally described as Lot 3 DP 343853 as contained in

Certificate of Title 180117 and the joint permit holders have legal rights to use and maintain the 9 Mile Race (and subsidiary branch races) where it is not located on their individual properties.

A full-size map provided in Appendix A presents the full extent of the 95789 water take and conveyance infrastructure while Figure 1 below provides a rough overview of the scheme. Below the abstraction point, the 9 Mile Race flows in a southeasterly direction before turning southwest and traversing the foothills of the Pisa Range. The race crosses multiple watercourses along it's length, and is piped across both the Park Burn and Sawyers Gully (a small tributary of the Park Burn).

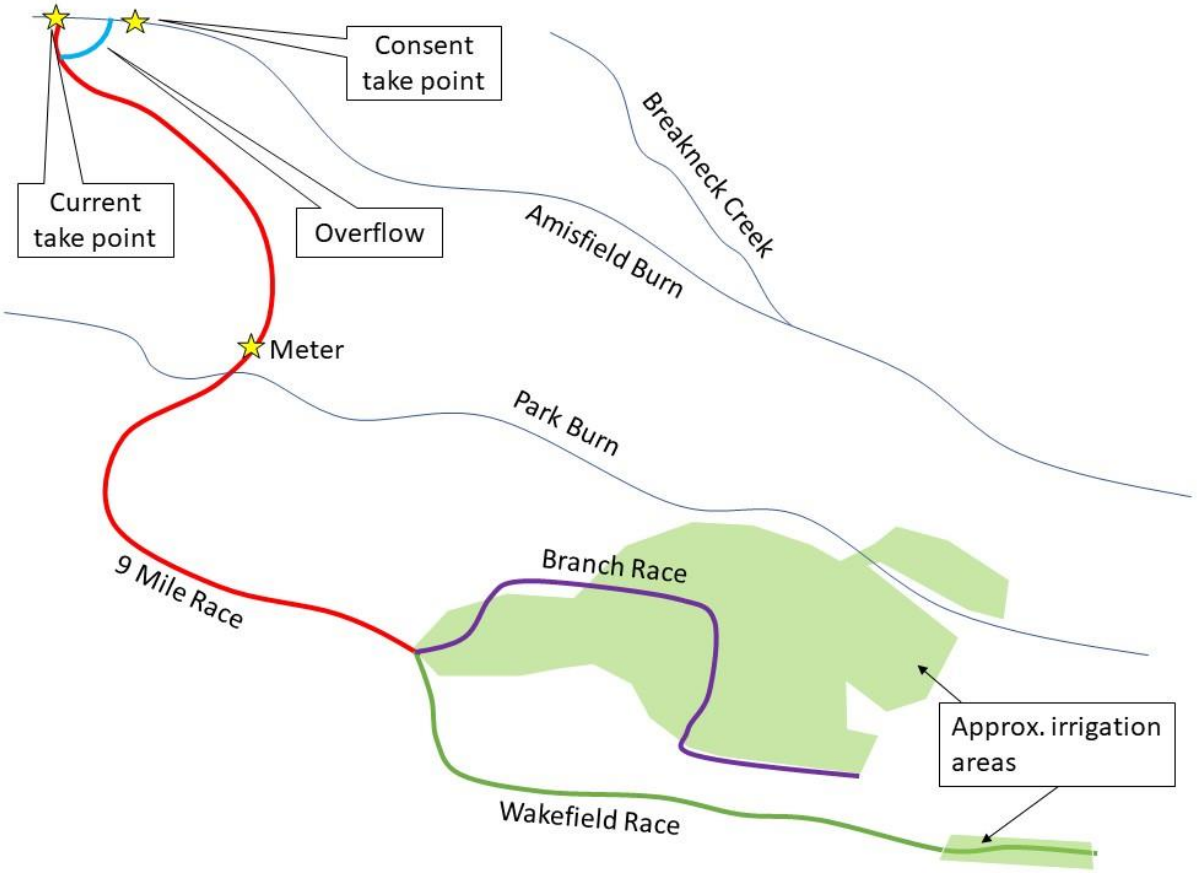


Figure 1: Overview schematic of 95789 water take and use infrastructure

After running for approximately 5 km across Mt Pisa Station land, the 9 Mile Race enters Mark II Limited's property (one of the consent holders) and shortly thereafter the first sub-race (called the Wakefield Race) splits off the 9 Mile Race to deliver water to Wakefield Estates Limited (property located on Clarks Road, near Pisa Moorings). After this point, the main race is referred to as the Branch Race and delivers water to Mark II Limited, Pisa Holdings Limited, Albany Heights Limited, S & P Hawker (Rabbit Enterprises Limited) and Rockburn Wines Limited. Chard Farm Trustees Limited have recently acquired

land in this area and have subsequently attained shares in 95789, and will be sourcing water from the Branch Race via storage reservoirs in the coming irrigation season.

Water is currently stored in reservoirs maintained by Mark II, Rockburn Wines and Pisa Holdings. Any resource consent considerations relating to these reservoirs are outside the scope of this application.

Historically, water authorised to be taken and used by J & J Sinclair was conveyed to their property via the Wakefield Race, however this no longer occurs and is discussed further below.

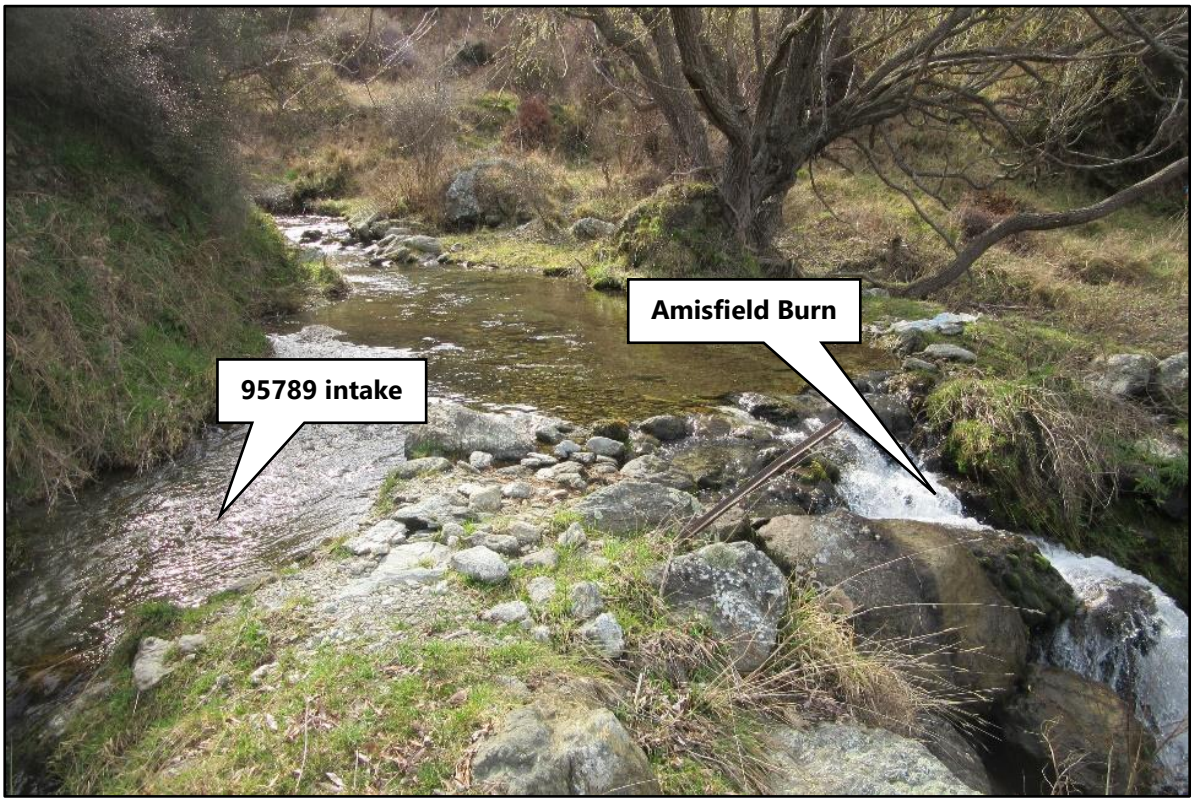


Figure 2: Looking upstream at 95789 intake and the Amisfield Burn (September 2018)

Figure 3: Looking upstream at 95789 intake and the Amisfield Burn (Source: Richard Cameron, Pisa Holdings Limited, November 2018)

Figure 4: View of Amisfield burn downstream of 95789 intake (September 2018)

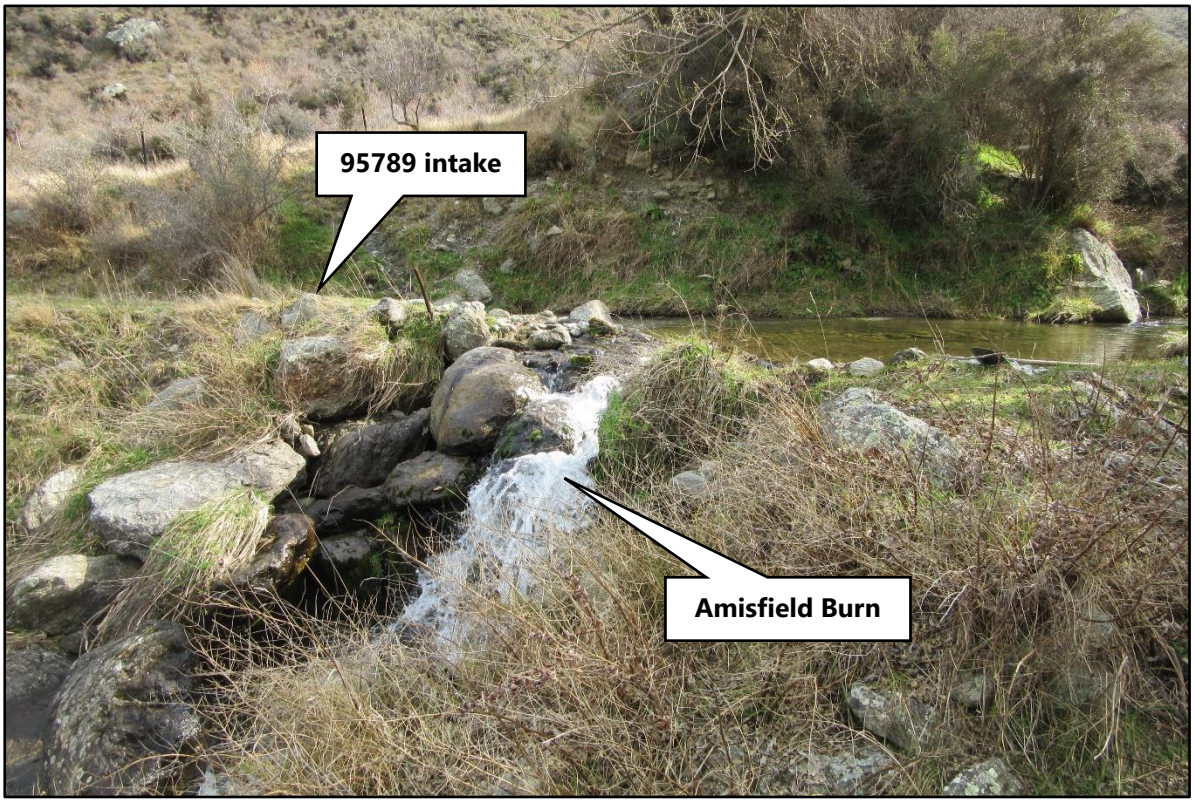


Figure 5: View of Amisfield burn at the 95789 intake (September 2018)

Figure 6: Looking downstream at Amisfield Burn, upstream of 95789 intake (September 2018)

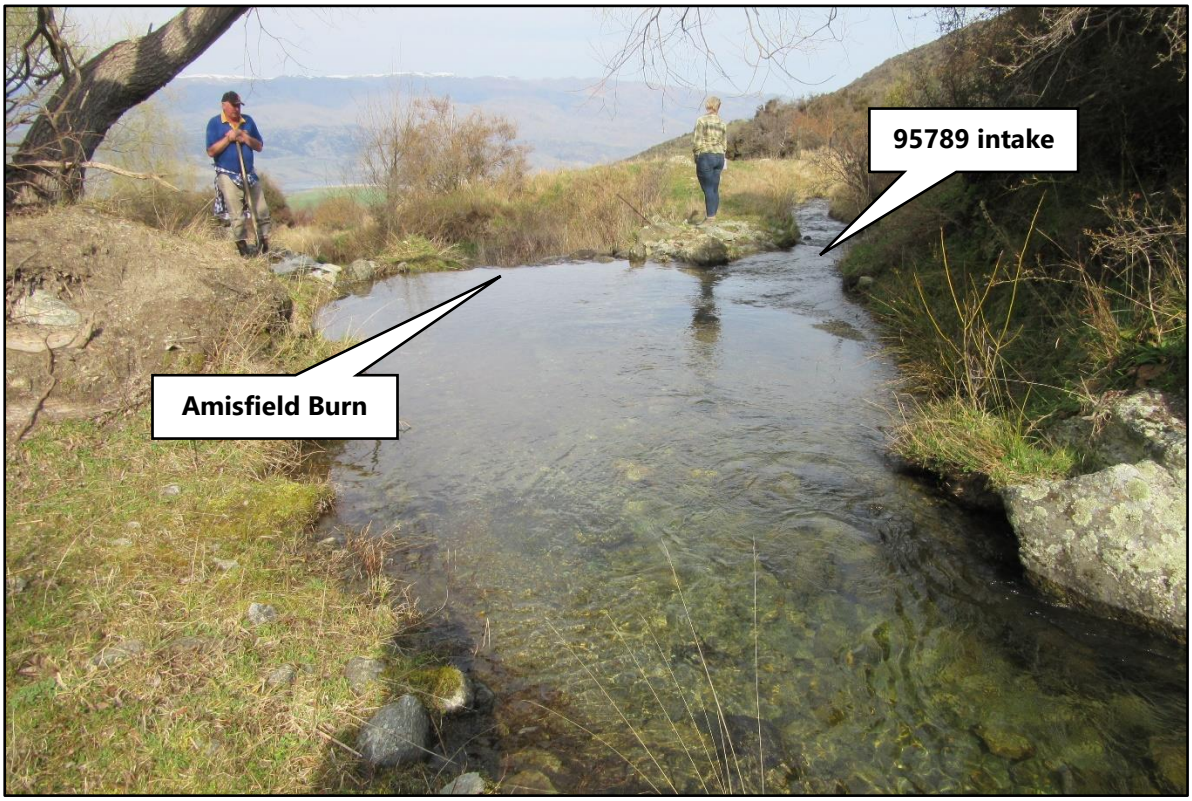


Figure 7: View of Amisfield Burn upstream of intake (September 2018)

Figure 8: View of 9 Mile race flow control and diversion/overflow back to Amisfield Burn, approx. 40m downstream of intake (September 2018)

Figure 9: View of 9 Mile Race (September 2018)

Figure 10: 95789 telemetry monitoring station on 9 Mile Race (September 2018)

The water meter as shown in Figure 10 above is located approximately 2.5 km from the point of take, due to issues with flooding and service. WEX0053 applies but has not yet been granted. This WEX,

subject to granting, will authorise metering at this location. The water meter is located on the 9 Mile Race at approximately NZTM 2000: 1300519E 5017599N.

Figure 11, below, shows the 9 Mile Race water being conveyed across the Park Burn via a pipe at approximately NZTM 2000: 1300381E 5017507N. Figure 12 shows the race water being piped across Sawyers Gully at approx. NZTM 2000: 1300543E 5016717N.

These figures demonstrate that there are no other major intakes to the race that are not metered.

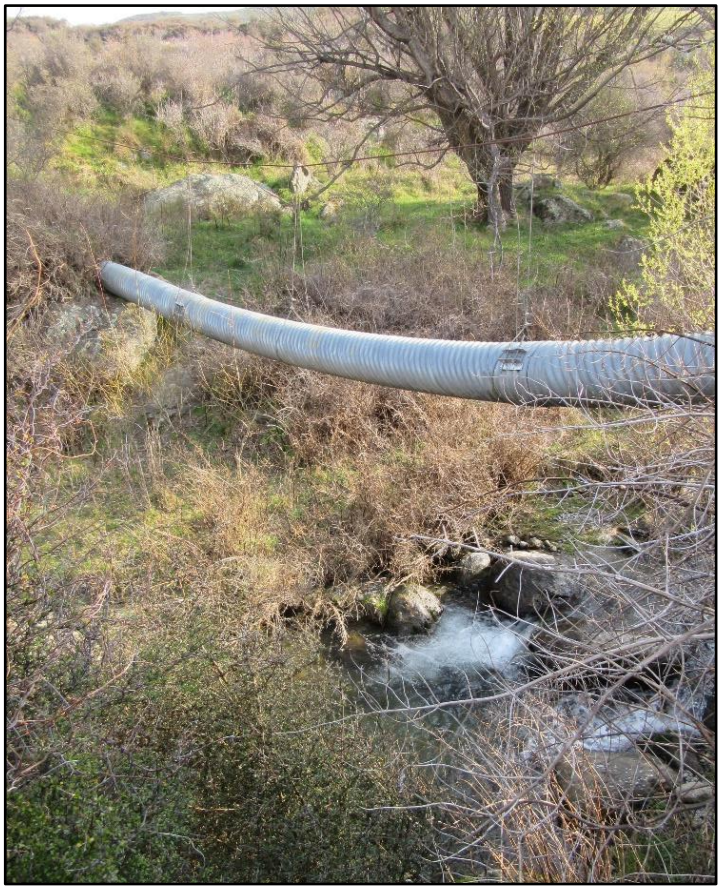


Figure 11: View of 9 Mile Race piped across Park Burn (September 2018)

Figure 12: View of pipe across Sawyers Gully (September 2018)

2.2 Description of Scheme Users

Water is shared between the users on an agreed roster, and used for irrigation of vines, cherries and pasture. Water is used by Stuart and Phillippa Hawker for stock drinking purposes and 95789 specifies that J & J Sinclair hold a domestic share of this permit. Mark II Limited, Rockburn Wines Limited, Albany Heights Limited and Pisa Holdings Limited all have on-site storage. A total of 128.8 ha is currently under irrigation (see water use map, Appendix B).

Some users also hold permits to take water from other sources. These are discussed further below.

Mark II Limited

Mark II Limited is the first property to receive irrigation water from the Branch Race. Currently there are approximately 5 hectares of vineyard, with a further 17 ha of vineyard proposed to be planted and irrigated within the property.

Mark II also holds Deemed Permit 93177 which authorises water abstraction from the Park Burn. There are no records relating to the operation of 93177, and it is understood that the permit has not been exercised for a number of years as the water user was unable to get access to that water (being downhill of their property without pump facilities. Also, the Park Burn is known to dry up (or go to ground), upstream of their intake, particularly during the height of the irrigation season when upstream abstraction is occurring. Due to the lack of exercise of this permit, it is expected that it will have been cancelled by ORC.

The Branch Race enters the water user's property to the north and traverses a gully which is located within the Park Burn catchment. The water race delivers water to an approx. 15,000 m3 storage pond

shared with Albany Heights Ltd and Chard Farm Ltd. Mark II then has the ability to directly irrigate from this pond, or send some of the water to another storage pond (approx. 13,000 m^3 capacity) for later use. This pond will likely be used to provide irrigation water for the proposed vineyard expansion areas, along with treated domestic water for future workers facilities.

Mark II Ltd have invested heavily in infrastructure on the property, with around $15,000/ha on subsoil irrigation ($75,000 total), $50,000/ha on above-ground vineyard works ($250,000 total), $150,000 towards the shared storage pond, another $50,000 on the smaller private pond, and approximately $100,000 on pump infrastructure and electrical connections. Proposed vineyard expansions and associated infrastructure will push the investment total significantly higher.

Rockburn Wines Limited

Rockburn Wines own and manage a large pinot noir vineyard to the northeast of Pisa Holdings Ltd, holding 2 out of 54 shares in 95789. Rockburn Wines also hold discharge permit 98655 and water permit 98527, which respectively authorise the discharge and subsequent re-take of 95789 race water for 4 days per month (subject to a separate application). Per this arrangement, 95789 water discharged to a tributary of the Park Burn can be re-taken at the same take point as deemed permit 98526 (subject to a separate application), then raced to a dam at the northern end of the property.

Rockburn currently frost-fight via helicopter, but plan to install overhead sprinklers in future.

Chard Farm Trustees Limited

Chard Farm Trustees Limited recently purchased land from Mark II Limited, primarily composed of established vineyard along with smaller pockets of land earmarked for future vines. Chard Farm's vineyard to the south of the Park Burn is irrigated via water taken from the storage pond located on Albany Heights Limited's land and shared with Mark II Limited. The area of Chard Farm land to the north of the Park Burn was formerly irrigated by Mark II via Pisa Irrigation Company water, however this is now to be irrigated via 95789 water with the aid of a proposed storage pond. As part of the land sale, Mark II Limited have since transferred 7 out of 54 shares in 95789 to Chard Farm Trustees Limited for the irrigation of the existing and proposed vineyards.

Albany Heights Limited

Albany Heights Limited own a property between Mark II Limited and Pisa Holdings Limited. Albany Heights Limited receive water directly from a large storage pond located on their property which is shared with Mark II Limited and Chard Farm Trustees Limited. Albany Heights currently operate a 2.06 ha pinot noir vineyard, and this storage pond provides all irrigation and frost fighting water to the vineyard. Water is gravity-fed via underground pipe to the vineyard. This pond was constructed in 2002 which is when the vines were also planted.

Much of the property has been dryland and the water user has around 20 sheep that graze the hillside and between the vines in the winter. Future investment will occur in the form of a new ~12,000 m^3 storage pond which will be used solely by the applicant for the irrigation of a new 12.5 ha cherry block. The cherry trees have been ordered and are to be planted on-site in the winter of 2020, while the new storage pond will be constructed either late 2019 or early 2020. Water will be pumped up from the existing dam to the new dam in future and will be filled when the water user is rostered to receive water according to their share on the deemed permit. Once the block has been planted, irrigation lateral pipes and sprinklers will be installed prior to the 2020/21 irrigation season.

Frost fighting occurs as and when required and there are different temperature triggers for when the water user needs to frost fight depending on the stage of the grapes. Frost fighting provisions for the new cherry block will be via frost fan, however underground irrigation may be used in conjunction with the wind machines during more severe frosts.

Current investment in the existing activities at this farm are in the order of $2 million, with future investment in cherries, new storage and associated infrastructure (netting, fencing, transformers, pumps, electrical connections, pipes, sprinklers etc.) being in the order of $3 million.

Hamish, of Chard Farm Limited, manages this vineyard. There are no other water sources available to this property.

Pisa Holdings Limited

Pisa Holdings Limited take water from the Branch Race once it has travelled through the properties of Mark II Limited and Albany Heights Limited. The open race continues along the hillside and terminates in a pond known as 'pond 1'. This pond was recently constructed and holds 13,000 m^3 of water when full.

From pond 1 the user pipes water to all of the irrigable areas planted in cherries via underground pipes. Currently there are 42 ha planted in cherries, with the potential for a further 13 ha to be planted in future. There's a secondary pond called 'pond 2' towards the southern end of the property which holds up to 12,000 m^3 and construction of this pond was completed in 2018. Water is conveyed from pond 1 to pond 2 via underground pipes. Future investment and plans also include the establishment of a third irrigation pond which will likely be located adjacent to the Branch Race, to the northeast of Pond 1 and will hold another 20,000 m^3 of water when full.

Frost fighting is undertaken via helicopters and not via water.

Irrigated land planted in cherries is estimated to be worth $150,000 per ha (including land value, trees and infrastructure). With around 42 ha already planted in cherries, Pisa Holdings have invested in the order of $6.3 million in orchard development, with a further $300,000 invested in existing dams and ~$20,000 invested in race maintenance to date. With up to 13 ha of cherries still to be planted and a new $250,000 dam proposed, Pisa Holdings may have a total investment in the subject property of close to $9 million.

The current ponds only provide for 14 days buffer of storage, which accounts for days when other shareholders are rostered to take their shares, and when there is not enough to go around.

Pisa Holdings Limited have an on-site weather station which calculates the crop coefficient and daily evaporation to determine when irrigation should occur. There are no other sources of water available to this property.

S Hawker

Stuart Hawker operates a 48 ha property which is partly planted in 18 ha of pinot noir and chardonnay vines. A bore provides irrigation water for the vines and potable drinking water for the house. The bore is located close to the south of the property and the corresponding groundwater permit is held by Number 925 Water Company Limited (RM14.064.01).

The user receives water from a large storage pond located on Albany Heights land and there is an open race which delivers water to this property for stock water.

A 30,000 L storage tank captures this water, and a reticulated gravity-fed supply with water troughs provides water for stock drinking. Any water not drunk by the livestock is used for irrigating a small area of pasture, however there is typically very little available for this purpose. Stock consists of 12 cattle of various stock classes, a few heifers and a couple of calves. The user is also looking to bring on a dozen ewes to the property.

Wakefield Estates Limited

Robert (Bob) Perriam owns Wakefield Estates Limited which is located on the flats of Five Mile Gully at the intersection of Clarks Road and the Luggate-Cromwell Road, generally opposite the entrance to Pisa Moorings. This block of land is a remnant of the original Wakefield Farm which the Perriam family established in 1865. Wakefield Estates Limited run sheep and cattle on the productive irrigated flats, averaging 140 breeding ewes, 50 dry sheep and 20 dry cattle per year.

Water is scheduled to go to this property approx. one week per month during the irrigation season and is gravity fed along a subsidiary race (Wakefield Race) off the 9 Mile Race to the user's property. Given the lack of storage available and the small area of land irrigated and when they are scheduled to receive water, the water user flood irrigates here once a month throughout the irrigation season. The race water enables enough feed to be grown for livestock and provides year-round stock water. It also provides amenity value via irrigated pasture to the water user's new accommodation units located on the other side of Clarks Road. These self-contained units provide accommodation for both visitors to the region and seasonal workers. The irrigated paddocks are directly within view of the new units. Currently pasture is to be maintained and there is potential to plant grapes along the hillside.

Wakefield Estates recently lodged a consent application with ORC to renew an expired groundwater take on the western side of the Luggate-Cromwell Road. The proposed groundwater take is to provide water for irrigation and other uses on both sides of the road, however there is no overlap between the proposed groundwater-irrigated area and the Deemed Permit 95789-irrigated area.

J & J Sinclair

Lastly are J & J Sinclair who own a 4.6 ha lot next to the State Highway, which is completely planted in grapes and leased to Chard Farm Limited. These permit holders hold a domestic share only of Deemed Permit 95789. J & J Sinclair used to own the neighbouring house (Lot 1 DP 311417) and the domestic supply of water was intended for that house. It is noted that the land area retained by J & J Sinclair, subdivided in 2002, does not contain a house and there are no legal arrangements to convey water to the house and that this water has not been delivered to the house for a number of years (see below for further details).

2.3 History of 95789

The history of the current Deemed Permit 95789 dates back to 1866, when Water Race licence 765 Cromwell (WR765Cr) was granted. The original authorisation of WR765Cr was for a take of 1,200,000 L/hour, however when water permit 2904 was issued in 1985 as a replacement for WR765Cr, it was noted that the race capacity was less than half this, and the water right was subsequently lowered to 600,000 L/hour.

Water permits 2904A and 2904B expired in 1995 and were subsequently replaced by Deemed Permit 95789. The main race (WR765Cr, now referred to as the 9 Mile Race) from the Amisfield Burn take point branched into two subsidiary races: BR8746Cr (now referred to as the Branch Race) and BR8537Cr (now referred to as the Wakefield Race).

In the 5 years following the granting of 95789, there were a number of share transfers, including a transfer of 2 of the 56 shares to Contact Energy and subsequent surrender of the shares. Following the surrender of the Contact Energy shares, 95789 was reissued with a volume of 416,750 m^3/month to reflect only 54 out of 56 original shares remaining.

This share structure was further complicated by a history of "ad hoc" domestic and stockwater use of the Amisfield Burn water abstracted under the old licences and permits and then the replacement permit 95789 (subject to this application). In 1974, a '1" pipe domestic use only' supply was transferred to the owners of a property neighbouring a licensed water user, along with a right to use and maintain branch race no. 8746Cr. This is the share now held by J & J Sinclair, and has since been re-written as 2000 L/day domestic use only. At the time of writing the recommending report for Deemed Permit 95789, the reviewer noted that "the shareholders are still not happy with the continuation of the domestic supply to Sinclair's property however the Sinclair's share is a legally transferred share of the water race."

The other current 95789 permit holders have all expressed a desire to cancel the Sinclair's entitlement to water from the existing permit, for the following reasons:

- The Sinclair's haven't taken any 95789 water for well over 5 years, and Policy 6.4.18 of the RPW states that "where a resource consent for the taking of water has not been exercised for a continuous period of 2 years or more, disregarding years of seasonal extremes, the Otago Regional Council may cancel the permit." In this case, the logical course of action would be to cancel only the Sinclair's shares in the permit, as the rest of the permit holders have been using the water.

- The permit states that the Sinclair's share is for "domestic use only", however the Sinclairs subdivided their land a number of years ago, selling the portion of the property containing the residence and then leasing the other subdivided lot to Chard Farm Limited to be used as a vineyard. This lot has been completely planted in grapes for over 9 years (based on historic aerial imagery), and no house has been present on the property during this time. Therefore, there is no viable means by which the Sinclairs can legally use their water.

- Historically the water was piped to the Sinclair's residence, however there are no s417 agreements or easements in place to enable them to convey 95789 water from the Amisfield Burn to their property. The water would need to cross a minimum of 6 properties in order to get to the Sinclair's property.

- If the Sinclairs did eventually decide to build a house on the property, there are far better alternative sources of domestic water available to the property than that provided under 95789. This includes groundwater or reticulated supply from nearby Pisa Moorings. The 95789 race water is not fit for domestic consumption without prior treatment.

Additionally, in 2002, a domestic/stockwater share of 1000 L/day from BR8746Cr was transferred from the Davidsons to the Hawkers. It is not clear, however, how this was reflected in the share structure under the permit, as the Davidsons had 2/56 shares prior to the transfer and were still listed as having

2/56 shares after the transfer. It is therefore assumed that the Sinclair's and Hawker's domestic and stockwater takes contribute to the monthly limit listed on the permit.

2.4 Titles, easements and conveyance rights

The properties on which 95789 water is used or planned to be used are listed as follows:

- Lot 2 DP 526279 as held in Certificate of Title 844471 (Mark II Limited, 82.6 ha)
- Lot 2 DP 490342 as held in Certificate of Title 707767 (Albany Heights Limited, 32.9 ha)
- Lot 1 DP 522616 as held in Certificate of Title 829493 (Chard Farm Trustees Limited, 20.8 ha)
- Lot 5 DP 399543 as held in Certificate of Title 397154 (Chard Farm Trustees Limited, 10.5 ha)
- Lot 1 DP 27337 as held in Certificate of Title OT19A/535 (Rockburn Wines Limited, 33.6 ha)
- Lot 4 DP 27494 as held in Certificate of Title OT19A/907 (Rabbit Enterprises Limited, 48.2 ha)
- Lot 3 DP 481936 as held in Certificate of Title 677068 (Pisa Holdings Limited, 122.5 ha)
- Lot 1 DP 453152 as held in Certificate of Title 580085 (Wakefield Estates Limited, 6 ha)
- Lot 2 DP 453152 as held in Certificate of Title 580085 (Wakefield Estates Limited, 1 ha)
- Lot 3 DP 453152 as held in Certificate of Title 580086 (Wakefield Estates Limited, 6.3 ha)
- Lot 4 DP 453152 as held in Certificate of Title 580086 (Wakefield Estates Limited, 2.3 ha)

Copies of the above listed titles are provided in Appendix B.

As noted earlier, the 9 Mile Race, Wakefield Race and Branch Race traverse a number of properties not owned by the consent holders. A summary of these properties and associated conveyance rights is provided below, with copies of applicable documents provided in Appendix B.

- 9 Mile Race:
    - Crosses Mt Pisa Station Holdings Limited land (Lot 3 DP 343853, COT 180117). S417 rights registered against this title via Instrument Number 10994522.1.
    - Crosses Mark II Limited land (Lot 2 DP 526279). S417 rights registered against this title via Instrument Number 10994522.1.
- Wakefield Race:
    - Crosses Smallburn Limited land (Lot 4 DP 481936). S417 rights registered against this title via Instrument Number 10994522.2.
- Branch Race:
    - Crosses Mark II Limited (Lot 2 DP 526279), Albany Heights Limited (Lot 2 DP 490342), and Pisa Holdings Limited land (Lot 3 DP 481936). S417 rights registered against these titles via Instrument Number 10994522.3.

2.5 Water infrastructure overview

Water distribution and storage infrastructure relating to the application includes the intake, main water race and branch races, piped sections across watercourses, and the various storage ponds operated by the applicants. This is summarised in the below table.

Table 2: Water infrastructure summary

Infrastructure	Description	Average dimensions (approx.)	Materials	Estimated efficiency
Water races	• 9 Mile race – just over 6 km, running from Amisfield Burn to the start of the Wakefield race. • Wakefield race – just under 4 km long, running from the 9 Mile race to SH6. • Branch race – approx. 3 km long, from the end of the 9 Mile race to Pisa Holdings' southernmost orchard.	Various	Earth/clay	≥90% (up to 10% losses)
Storage ponds	5 existing storage ponds operated by the applicants within the command area.	• Albany Heights pond: average length 69 m, average width 51 m, approx. max. capacity 15,000 m^3 (Shared with Mark II & Chard Farm) • Mark II pond 2: average length 98 m, average width 40 m, approx. max capacity 13,000 m^3. • Rockburn pond: average length 64 m, average width 48 m, average depth 2.5 m; outlet location: NZTM 1303122E 5015958N. • PHL pond 1: 13,000 m^3 capacity, average length 70 m, average width 64 m. • PHL pond 2: 12,000 m^3 capacity, average length 70 m, average width 55 m.	Earth/clay	≥95% (up to 5% losses)
Piped race sections	In order to avoid mixing with other watercourses, the race is piped across the Park Burn and Sawyers Gully (details provided earlier).	• Park Burn pipe: 300 mm diameter, 20 m length. • Sawyers Gully pipe: 600 mm diameter, 10 m length.	Park Burn pipe: steel, Sawyers pipe: iron.	95-100%

2.6 Abstraction history and allocation sought

Abstraction under Deemed Permit 95789 has been recorded since September 2015, with manual recording between 2015 and 2017 and telemetry from this point on. As the figure below indicates, the applicants have never reached their authorised maximum abstraction rate of 166.7 L/s. Note that no take data was captured between April 2016 and January 2017 due to the installation of a telemeter in late 2016.

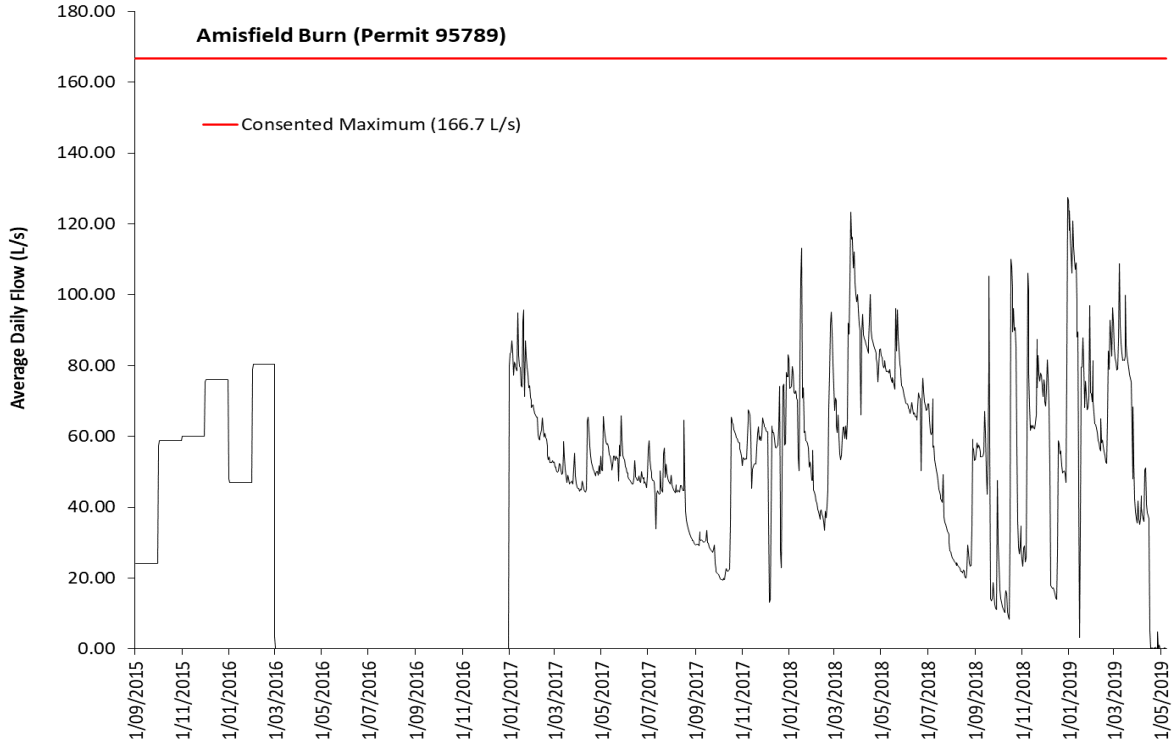


Figure 13: 95789 abstraction records showing average daily rate of take from the Amisfield Burn, along with the consented maximum.

As can be seen, the average daily rate of take has rarely exceeded 120 L/s, which likely reflects the maximum carrying capacity of the water race and intake. It should be noted, however, that Figure 12 presents the *average* daily rate of take, meaning there have been times when the maximum instantaneous rate of take has considerably exceeded 120 L/s.

The race intake essentially acts as an open diversion channel from the main stem of the Amisfield Burn (see Figures 2-7), with limited control over abstraction volumes provided via a manually inserted "gate" along with an associated overflow channel/bywash (Figure 8). This means that the rate of take is, to a certain extent, influenced by natural flow levels in the Amisfield Burn – particularly during times of low flow. The pattern of abstraction since the installation of the telemeter, however, shows that the applicants do have a certain level of control over abstraction volumes: evidenced by a the highest rates of take in mid to late summer and a reduction in abstraction from mid winter through to early/mid spring. It is typically during this time that maintenance occurs to the water race and intake.

Abstraction occurs continuously throughout the year, primarily due to one of the permit holders (the Hawkers) needing the water for stock drinking and a number of other users filling their dams outside of the irrigation season. Only very infrequently does abstraction stop altogether, at times when

maintenance of the race or calibration of the meter is required. A summary of maximum abstraction rate of take, monthly and annual volumes is as follows:

- Maximum rate of take: 157 L/s (17/4/2018)
- Maximum monthly volume: 226,438 m^3/month (February 2019)
- Maximum annual volume: 1,808,577 m^3/year (2017/18 water year)

Note that abstraction records provided by ORC only extend to early May 2019, therefore the 2018/19 water year records are only partially complete. The water meter (WM1214) has been verified within the last 12 months.

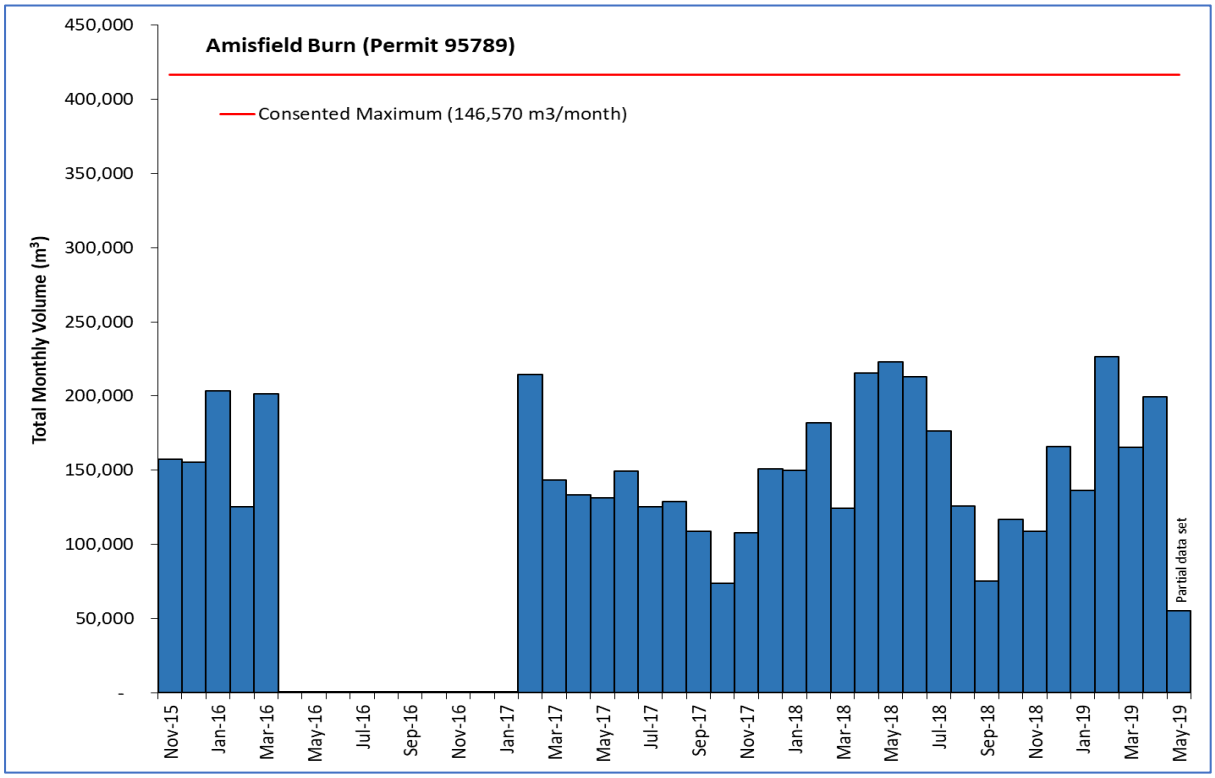


Figure 14: 95789 monthly abstraction records from the Amisfield Burn

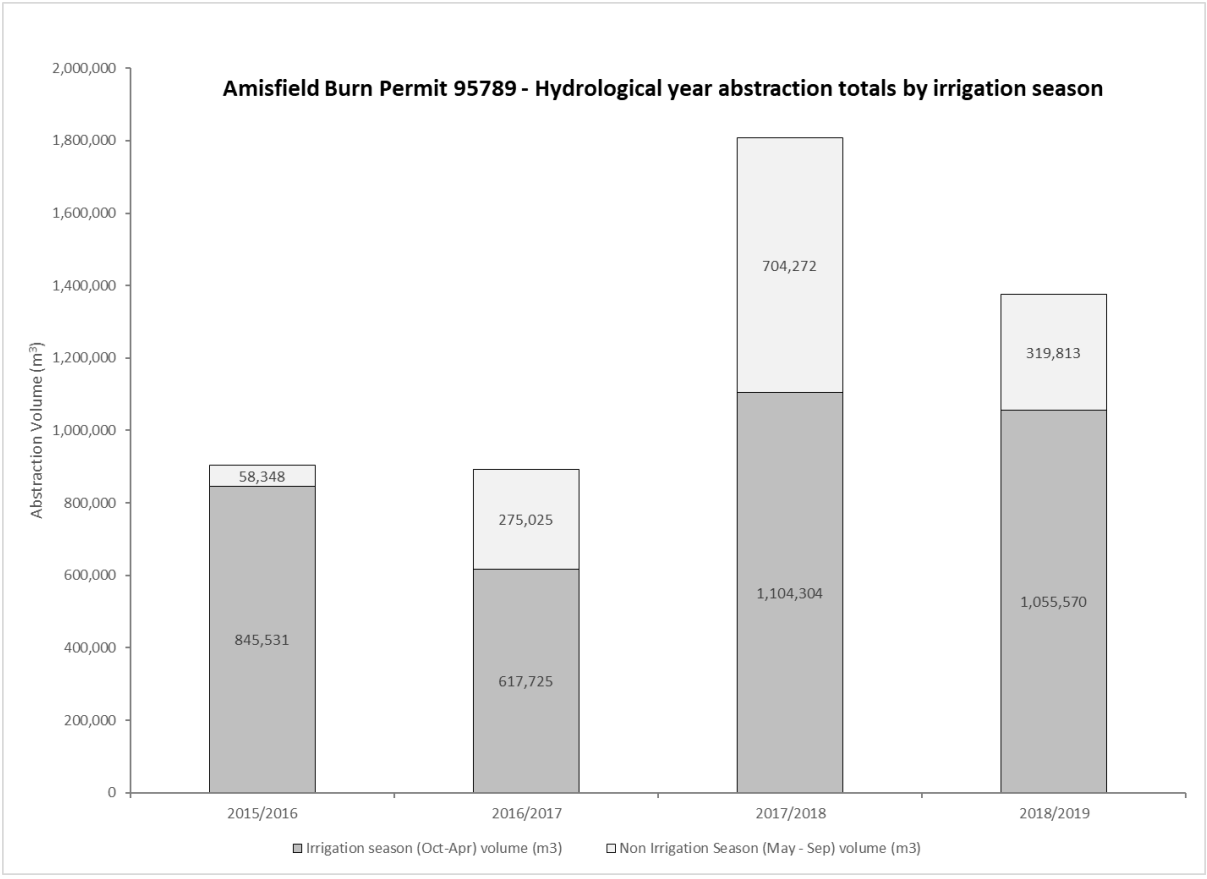


Figure 15: 95789 hydrological year abstraction records from the Amisfield Burn, broken down into abstraction within and outside of the irrigation season (October-April)

Based on the abstraction record over the past 5 years, the applicants propose a revised maximum rate of take of 120 L/s from the Amisfield Burn. This better reflects the carrying capacity of the water take infrastructure, the demand for water, and the natural flows of the creek itself. While it is apparent from the historic use data that 120 L/s is not always required, there have also been days when abstraction has exceeded this rate and there are times during the year (such as during frost-fighting events) when a higher instantaneous rate of take is critical to maintaining crop integrity and protecting valuable harvests.

An assessment of the volumes of water required for irrigation purposes has been provided later in this report and is based on recommendations from Aqualinc, 2017[4], with a further allowance for stock drinking, domestic and frost fighting purposes. The frost fighting season is from September to November and March-May for late-season grape varietals (discussed later), and irrigation occurs from September to April. The applicants expect to continue taking water throughout the year to allow for stock drinking requirements and enable water harvesting, which will place less pressure on the creek during times of low natural flow. The annual and monthly limits proposed (see Section 6.6) will ensure that water cannot be taken at the maximum instantaneous rate continuously.

[4] McIndoe I, Brown P, Rajanayaka C, K.C. B, 2017, *Guidelines for Reasonable Irrigation Water Requirements in the Otago Region. Otago Regional Council, 2.* Aqualinc Research Limited

3. DESCRIPTION OF EXISTING ENVIRONMENT

3.1 Land Use and Topography

The water take and conveyance infrastructure associated with Deemed Permit 95789 traverses the flanks of the Pisa Range, with the intake located at an elevation of approx. 585 metres above sea level (masl) and the lowest point of the water race network terminating at around 200 masl. Most of the land on which the water is used is located between 360 and 280 masl, with irrigated land owned by Wakefield Estates Limited ranging from approx. 225 to 200 masl.

Much of the land within the study area is classified within the New Zealand Land Cover Database as Low Producing Grassland, with lower elevation areas classified as High Producing Exotic Grassland and pockets of Orchards or Vineyards. Most of the irrigation areas are already established vineyards, cherry orchards and pasture, while proposed vineyards and orchards are to be located within relatively species-poor, High Producing Exotic Grassland. It should be noted that this land only becomes high producing once a regular source of water is applied. Viticulture and horticulture contribute greatly to the national and local economy, in both GDP and creating employment for vineyard and horticultural workers, as well as the contractors required for the establishment of vines and orchards.

With regards to the general pastoral uses, this is comparatively small-scale and a remnant of Wakefield Estates Limited history in the area having previously been one of the largest landholdings in the region. Pasture grown here supports a few livestock, and the applicant is disadvantaged at their locality in that opportunities for additional storage that utilises gravity are slim. If the applicant is able to convert to spray, then they can use their share of the water accordingly.

Topography varies across the irrigation areas, with vines and cherries situated on higher terraces at the foothills of the Pisa Range overlooking Lake Dunstan. These typically occupy the northern facing slopes in order to optimise sunshine hours and maximise growing/ripening potential.

Wakefield Estates Limited is located on the flats of 'Masons Gully', which seldom supports flowing surface water. The property is opposite the Luggate-Cromwell Road and Pisa Moorings Road intersection, and the landowner has potential future opportunities to expand their existing vineyard (not subject to this application) across to this area of land on the north eastern face of the Sugar Loaf.

3.2 Climate

The climate around 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 study area encompasses a range of Aqualinc mean annual rainfall (MAR) classes, with the intake located within the 650 mm/year band, the race running from 650 mm/year down to 350 mm/year, and irrigation land located in either the 450 mm/year band or 350 mm/year.

Potential evapotranspiration at the site is significant during the growing season: approx. 620-640 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 underestimate. 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 both cherries and grapes, and can dramatically compromise crop viability if managed poorly. GrowOtago indicates that most of the properties serviced by 95789 water experience approximately 9-12 spring frosts each year (7-8 in September, 2-3 in October and 0-1 in November).

Data for autumn frosts (which also necessitate frost-fighting in the case of vineyards) is not available from GrowOtago. However, based on NIWA[5] (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 Mt Pisa as in Alexandra, there would be an estimated 9 autumn frosts (12/34*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 appropriate for limit-setting if appropriate.

3.3 Soils and geology

SMap-designated soils (Landcare Research/Manaaki Whenua, 2019) within the 95789 irrigated areas are summarised in a map provided in Appendix C.

The GNS Science New Zealand Geology Web Map indicates that virtually all of the land within the irrigation areas is underlain by either Middle Quaternary glacial outwash deposits (muddy to sandy gravel), Manuherikia Group claystone and siltstone, or Early Quaternary till deposits (pebbly to boulder gravel, sand, silt and mud). The geology uphill of the irrigated areas is primarily composed of much older Wanaka lithologic association TZIV schist.

3.4 Surface water hydrology and ecology

3.4.1 Amisfield Burn

3.4.1.1 Hydrology

The headwaters of the Amisfield Burn originate in the Pisa Range at an elevation of approximately 1880 masl, just adjacent to the Pisa Range Ridge Track. The Burn picks up numerous small tributaries as it

[5] NIWA, 2015. The climate and weather of Otago.

descends the steep eastern face of the Pisa Range, with the formerly confined bedrock channel opening out into a shallower-gradient channel composed of loose gravels on the terraces and alluvial fans above Lake Dunstan. Breakneck Creek joins the Amisfield Burn approximately 3.5 km upstream of the Lake Dunstan confluence.

There are two other permits downstream of the applicants' water take: one held by Smallburn Limited (96321.V1) and one held by Lowburn Landholdings Limited Partnership (97232). All three parties (combined consent holders of 97589 as one party) share Amisfield Burn water, as dictated by the historic priorities. Permit 95789 holds the highest priority, however water has historically been allowed to flow past the intake in order to provide for downstream users Smallburn Limited and Lowburn Landholdings Limited Partnership.

Figure 16: Looking up towards the Amisfield Burn catchment (September 2018)

Figure 17: Amisfield Burn upstream of 95789 abstraction point (September 2018)

Figure 18: Amisfield Burn downstream of 95789 abstraction point (September 2018)

Figure 19: Looking upstream at the Amisfield Burn below State Highway 6 (September 2018)

The Otago Regional Council (ORC) has maintained a flow monitoring station just upstream of the 95789 take point since October 2013. This continuous record, shown in the below figure, exemplifies a typical steep headwater stream, with rapid response event-specific hydrographs. In winter and through to the end of spring, the creek is fed primarily by snowmelt.

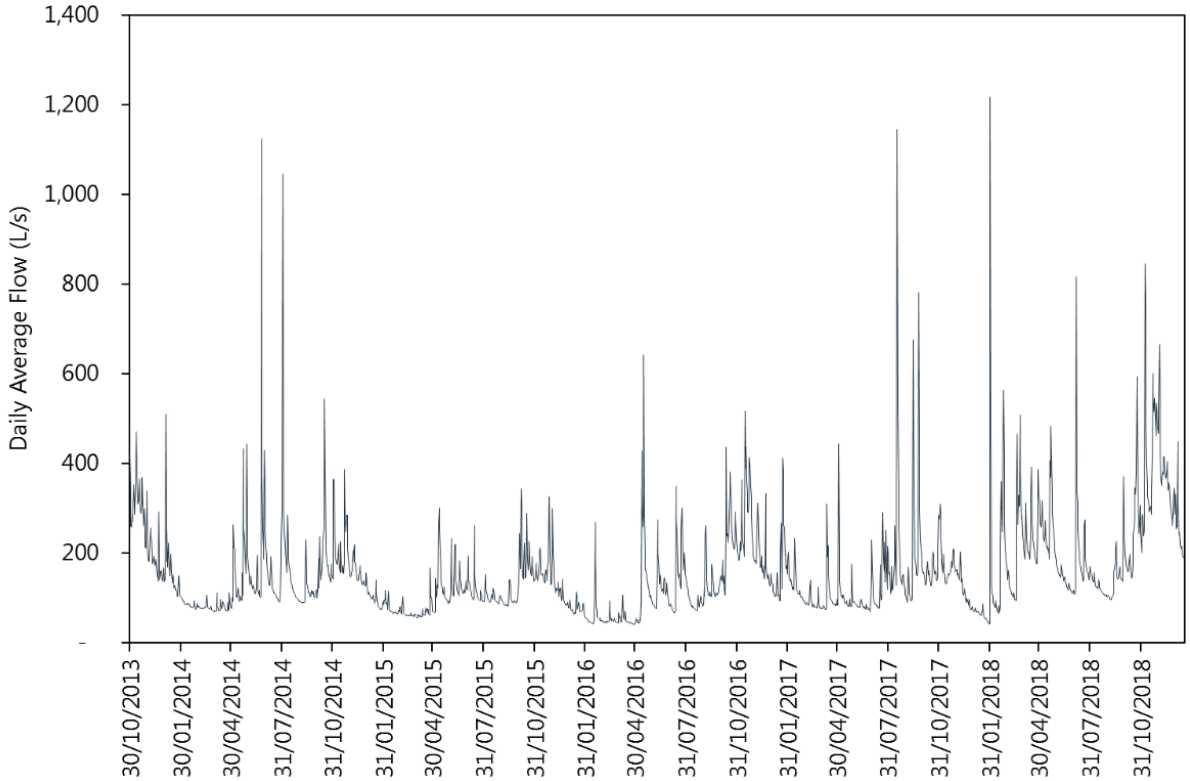


Figure 20: Amisfield average daily flow, measured above the uppermost point of take and unaffected by abstraction (Source: ORC)

Based on these results, the 7-day mean annual low flow (MALF) for the Amisfield Burn upstream of all abstractions is 65 L/s, with a mean flow of 162 L/s.

Stream gauging was undertaken by Landpro Limited in January 2019 to determine the natural flow conditions of the Amisfield Burn (see Appendix D for full report) throughout its lower reaches. As the below figure shows, 5 gaugings were undertaken on the main stem of the Amisfield Burn, with the first gauging site located 3 metres upstream from the 95789 point of take. In order to simulate natural flows, all abstractions on the Amisfield Burn and associated tributaries were ceased 24 hour prior to and during the gauging exercise.

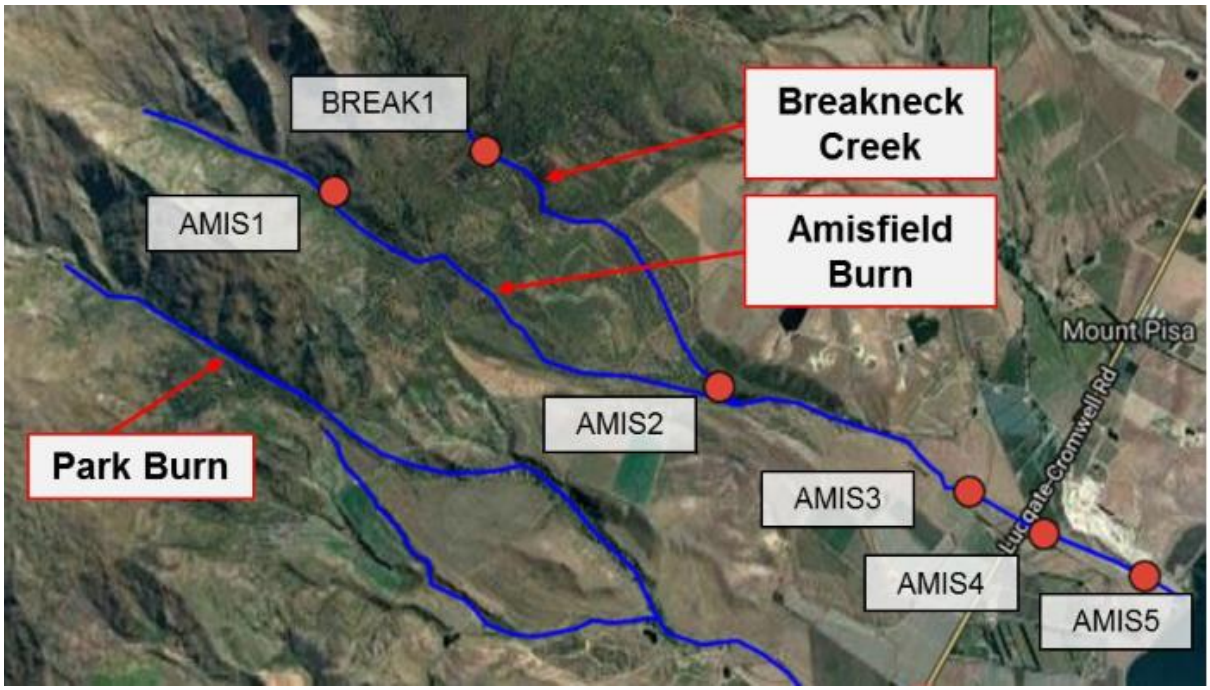


Figure 21: Amisfield Burn flow gauging locations (January 2019)

Results from the gauging exercise are presented in the below table.

Table 3: Flow gauging results (January 2019)

Easting (NZTM 2000)	Northing (NZTM 2000)	Date	Measured flow (L/sec)	†Gauging uncertainty flow range (L/sec)	Site Name
1300319	5019044	15/01/2019	140.6	134-147	AMIS1
1301316	5019364	15/01/2019	54.9	53-57	BREAK1
1302972	5017853	15/01/2019	210.6	203-218	AMIS2
1304670	5017233	15/01/2019	152.7	147-158	AMIS3
1305196	5016969	15/01/2019	72	70-74	AMIS4

As indicated in the attached report, gauging took place during a period of slightly above-average flows in the creek, likely more typical of the spring transition into summer rather than midsummer. Table 3 clearly shows that the Amisfield Burn is a naturally losing stream, with considerable surface water loss to the loose alluvial gravels that predominate the lower reaches. The survey identified a net loss of 210 L/s between the Amisfield Burn/Breakneck Creek confluence and the final gauging location (AMIS5) well above Lake Dunstan, where the creek had run dry. This is despite gauging taking place during an

uncharacteristically wet summer, and suggests that the Amisfield Burn would naturally go to ground much further up-channel than what was observed in January.

It should be noted that the losing nature of the Amisfield Burn is typical of similar streams draining the eastern face of the Pisa Range, with similarly losing reaches found via Landpro gauging exercises in the nearby Park Burn, Stratford Creek, Schoolhouse Creek, the Albert Burn, and Poison Creek (relevant flow gauging reports can be made available upon request).

Figure 22: Amisfield Burn d/s of confluence with Breakneck Creek (AMIS2, January 2019)

Figure 23: Amisfield Burn upstream of Lake Dunstan confluence (AMIS5); left: looking upstream & right: looking downstream (January 2019)

Temperature records obtained from ORC (as a proxy for flow monitoring data) for two locations in the lower reaches of the Amisfield Burn (2013-14 & 2018-19) reinforce the conclusion that the creek naturally loses water to the underlying gravels in late summer and early autumn (see Section 4.2 of the attached hydrology report, Appendix D).

The Amisfield Burn bed upstream of the point of take is composed of sand with pebbles, with the channel bounded by a bedrock outcropping on the true right side. Downstream, the bed typically consists of boulders and cobbles.

3.4.1.2 Aquatic ecology

In April 2019 Richard Allibone of Water Ways Consulting Limited was retained to undertake aquatic surveys and subsequently develop residual flow recommendations for several deemed permit water takes from the Amisfield Burn and Park Burn (see Appendix E). The following summarises the findings presented in that report.

New Zealand Freshwater Fish Database records

Eight records for the Amisfield Burn are registered on the New Zealand Freshwater Fish Database (NZFFD):

- The earliest three (1996) records report brown trout at all three sites, a single large koaro at the middle site, and a single upland bully in a lower tributary of the Amisfield Burn (see Figure 24).
- 2001 surveys reported no fish at State Highway 6 and brown trout and a single koaro were present at the same site as the koaro was found in 1996.
- In 2018, three Amisfield Burn sites were fished with brown trout present at the lower two sites, upland bully at the lowest site, and no fish recorded at the uppermost survey site. Note that the uppermost survey site is effectively the same location as the 95789 intake, and is above the waterfall on the Amisfield Burn just below the take point.

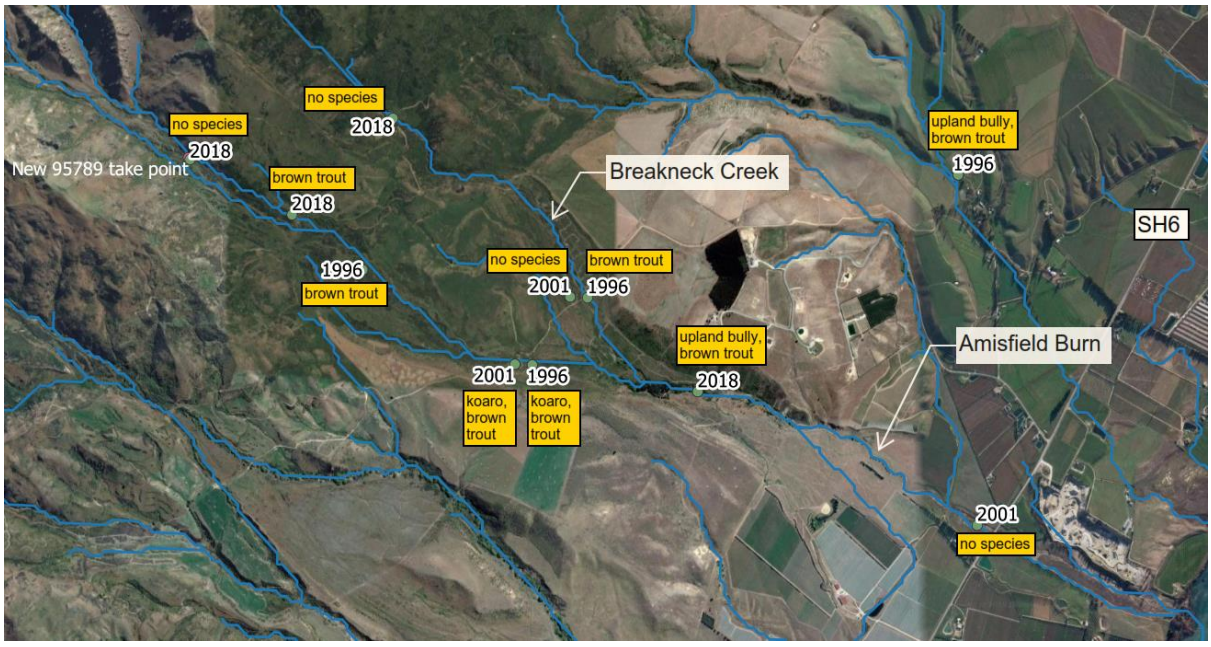


Figure 24: NZFFD records for the Amisfield Burn

The NZFFD records indicate that brown trout are common in the Amisfield Burn, while native fish (koaro, upland bully) are rare. It is worth emphasising that the uppermost 2018 survey, located in the vicinity of the abstraction point, did not find any fish species present. It is also worth noting that no critically threatened Clutha flathead galaxiids have been located in the catchment. All of the pre-2018 surveys were conducted by Department of Conservation (DoC).

2019 Fish survey

Water Ways Consulting Ltd conducted three surveys on the Amisfield Burn and Breakneck Creek in April 2019 to fill in any data gaps in the historic fish survey record (see below figure). The surveys found brown trout at the two Breakneck Creek sites, while the Amisfield Burn survey site (just upstream of the point of take) did not record any fish. No additional surveys of the lower reaches of the creek were possible, as the creek bed was dry at State Highway 6.

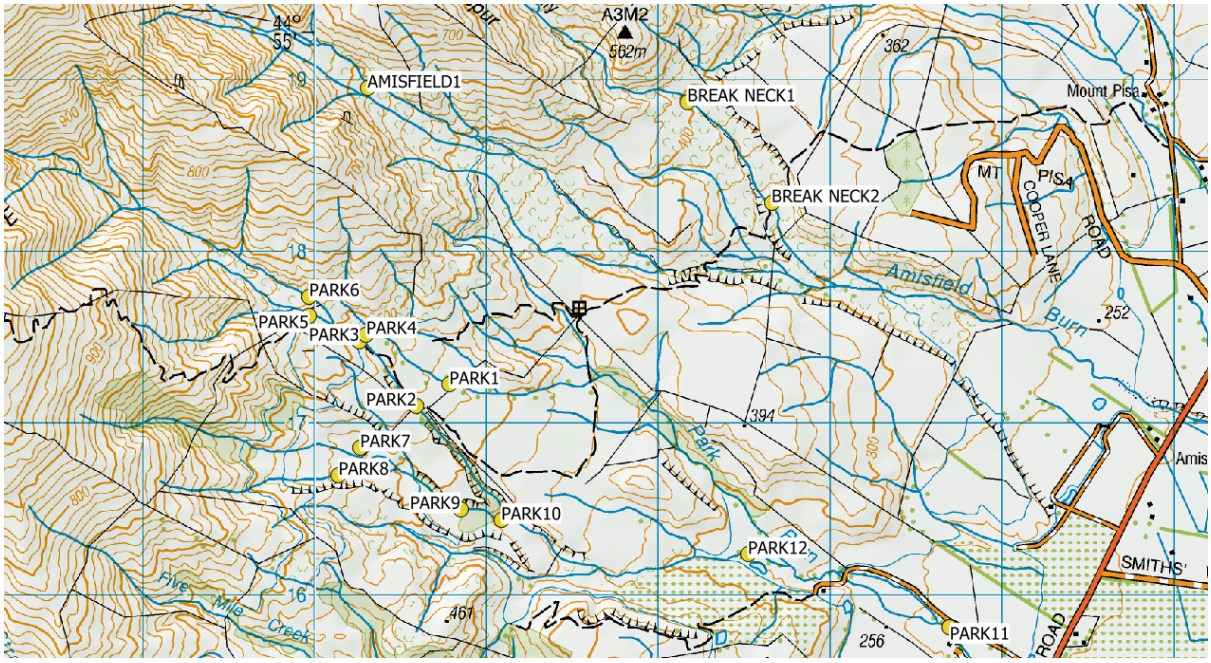


Figure 25: 2019 fish survey locations (Source: Water Ways Consulting Ltd)

3.4.1.3 Schedule 1 values

Schedule 1 of the RPW records values associated with waterbodies in the Otago Region. The Amisfield Burn is identified in Schedule 1A, with ecosystem values listed as "weedfree" (absence of aquatic pest plants) and "rarefish" (presence of indigenous fish species threatened with extinction). In relation to the "rarefish" designation, the Amisfield Burn is identified within the Schedule as "significant habitat for koaro."

3.4.2 Park Burn

While the 95789 water race crosses the Park Burn, it does so via perched pipelines as so there is no interaction with this watercourse (see Section 2.1).

3.4.3 Lake Dunstan/Te Wairere

Lake Dunstan/Te Wairere is part of the Clutha River/Mata-Au catchment. The Clutha originates at Lake Wānaka to the northeast, ultimately discharging into the Pacific Ocean near Balclutha to the southeast. The Clutha was significantly altered in the mid-late 20th Century by the construction of hydroelectric dams. This includes the Clyde Dam, which was completed in the early 1990s, forming Lake Dunstan/Te Wairere.

The levels of Lake Dunstan are artificially managed for power generation; typically reaching a daily minimum in the late evening due to electricity consumption during the day, and then refilling during the night. Lake levels are monitored at Cromwell and are available on the ORC's website. This shows

that the daily variation in water levels is in the order of 0.5 m, while in the longer term (last 6 months), the level has been managed within a range of ~194.0 ± 0.5 masl (ORC, 2019).

Based on data for October 2018-March 2019 obtained from the ORC website, summer flows in the Clutha River/Mata-Au typically ranged from 200-350 m^3/s below the Cardrona River confluence (upstream of the site near Wānaka), and 200-600 m^3/s downstream at Clyde (ORC, 2019). These values ignore short-term peaks and troughs which are attributed to dam operations and/or flood events. The increase in flow between Wanaka and Clyde is largely due to the Kawarau River, which joins the Clutha at Cromwell.

3.4.3.1 Schedule 1 values

Table 4, below, summarises the values listed for the Clutha River/Mata-Au between Lake Wanaka and Alexandra. This includes the stretch closest to the applicants' properties, but note that some of these values may only be associated with other parts of the River/Lake.

Table 4: Values for the Clutha River/Mata-Au between Lake Wānaka and Alexandra (including Lake Dunstan/Te Wairere)

Ecosystem values	Kāi Tahu values	Other values
• Size (large waterbody supporting high numbers of particular species or a variety of habitats) • Bedrock and gravel beds • Areas for spawning and juvenile fish development for trout and salmon • Riparian vegetation • Significant presence of trout, eel and salmon • Presence of indigenous fish species. In particular, tributaries are a significant habitat for flathead galaxid • Presence of a significant range of indigenous waterfowl.	• Kaitiakitanga (the exercise of guardianship); • Mauri (life force); • Waahi tapu/Waiwhakaheke (sacred places and values); • Waahi taoka (a treasured resource); • Mahika kai (places where food is procured or produced); • Kohanga (nursery/spawning areas for native fish or birds); • Trails (sites and water bodies which were part of traditional routes); • Cultural materials (sources of traditional weaving materials and medicines).	Cromwell's potable water supply is sourced from bores reliant on Lake Dunstan/Te Wairere near Cromwell. Clyde also sources its water further downstream. The Cromwell Bridge is a registered historic place.

4. ACTIVITY CLASSIFICATION

Abstractions from surface water are addressed by rules in the Regional Plan: Water for Otago (RPW). Rule 12.2.2.2 of the RPW permits the taking of surface water at the specified location but limits the maximum abstraction volume that can be taken to 25,000 L/day/landholding. As the applicants are seeking to renew a take that has a greater quantity of water than this, a Water Permit is required.

Table 5: Summary of activity status

Consent No.	Activity Description	Regional Plan: Water for Otago		
		Permitted Rule Breached	Relevant Rule	Classification
95789	To take and use water from the Amisfield Burn	12.1.2.5	12.1.4.5	Restricted Discretionary

Overall, the proposal is classified as a **restricted discretionary** activity. Section 104B of the Resource Management Act sets out the criteria for which discretionary activities will be determined by the consent authority. In accordance with Section 104B, consent may be granted or declined or be granted with conditions imposed pursuant to Section 108 of the RMA.

4.1 Associated Permitted Activities

In accordance with Schedule 4 of the RMA, an application must now describe and demonstrate compliance with any permitted activity that is part of the proposal and describe any other resource consents required for the proposal to which an application relates.

The Hawker's water take for stock drinking water purposes is in accordance with the provisions of Section 14 of the RMA, permitting the take and use of water for the reasonable needs of an individual's animals for stock drinking. This is reflected in Rule 12.1.2.1 of the RPW, which states:

The taking and use of surface water for domestic needs or the needs of animals for drinking water is a permitted activity providing:

a) No take is for a volume greater than 25,000 litres per day; and
b) No take is at a rate greater than 0.5 litres per second in the North Otago, Maniototo or Central Otago subregions…; and
c) The taking or use does not have an adverse effect on the environment

As discussed in Section 6.6, less than 0.5 litres per second and less than 25,000 L/day is required for stock water, therefore the take and use of Amisfield Burn water for stock drinking is a permitted activity.

All of the consent holders have out-of-stream storage ponds located near to existing water races on their properties which enables the storage of water for irrigation and stock drinking purposes. These storage ponds are not subject to rules of the RPW and are not considered 'large dams'. Mark II Limited does have a pond on their property which may be located in the bed of a waterbody in a gully and may therefore be required to apply for consent to authorise this activity, however this is separate to the current application.

Other considerations include instream works required as part of the maintenance or re-instatement of a water intake as permitted by Rule 13.5.1.1. With regards to instream works relating to storm events, Rule 13.5.1.2 applies. There are a number of conditions of these rules and so long as the applicant complies by these conditions, no resource consent is required to authorise these activities. These rules and conditions are outlined in Table 6 below.

Table 6: Summary of instream bed disturbance rules

Rule 13.5.1.1	***Rule 13.5.1.2***
The disturbance of the bed of any lake or river, or any Regionally Significant Wetland, 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, providing:*	*The disturbance of the bed of any river for the purpose of clearing any material that has accumulated as a result of a storm event, excluding alluvium, in order to maintain the flood carrying capacity of the bed of the river, and any resulting discharge or deposition of bed material, is a permitted activity, providing:*
(a) Except in the case of the demolition or removal of a structure, the structure is lawfully established; and *(b) There is no increase in the scale of the existing structure; and* *(c) If work is undertaken between 1 May and 30 September inclusive, the Department of Conservation and the relevant Fish and Game Council will be notified as soon as reasonably practicable in advance; and* *(d) The bed or wetland disturbance is limited to the extent necessary to undertake the work; and* *(e) The bed or wetland disturbance does not cause any flooding or erosion; and* *(f) The time necessary to carry out and complete the whole of the work within the wetted bed of the lake or river does not exceed 10 hours in duration; and* *(g) All reasonable steps are taken to minimise the release of sediment to the lake or river during the disturbance, and there is no conspicuous change in the colour or visual clarity of the water body*	*(a) The bed disturbance is limited to the extent necessary to clear the debris; and* *(b) The bed disturbance does not cause any flooding or erosion; and* *(c) The time necessary to carry out and complete the whole of the work within the wetted bed does not exceed 10 hours in duration; and* *(d) All reasonable steps are taken to minimise the release of sediment to the lake or river during the activity, and there is no conspicuous change in the colour or visual clarity of the water body beyond a distance of 200 metres downstream of the disturbance; and* *(e) No lawful take of water is adversely affected as a result of the bed disturbance; and* *(f) The site is left tidy following completion of the activity.*

Rule 13.5.1.1	Rule 13.5.1.2
beyond a distance of 200 metres downstream of the disturbance; and *(h) No lawful take of water is adversely affected as a result of the bed or wetland disturbance; and* *(i) The site is left tidy following completion of the activity*	

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 applicants do 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. Parties who ORC might consider to be affected may include other water users on the Amisfield Burn, comprising Smallburn Limited (96321.V1) and Lowburn Landholdings Limited Partnership (97232). The revised rate of take proposed in this application may, however, satisfy any issues those parties might have with the proposal. It is also worth noting that all deemed permit holders on the Amisfield Burn and Park Burn have prepared their replacement applications concurrently to facilitate more efficient affected party consultation amongst the users.

As discussed earlier, the applicants have proposed that J & J Sinclair and their shares be removed from the permit due to the reasons specified in Section 2.3. For these same reasons, the Sinclairs are not considered an affected party, particularly as:

- They have not used 95789 water for well over 5 years;
- They have no ability to use 95789 water in the manner specified in the permit (domestic use); and,
- They do not have any legal or physical means of conveying 95789 water to their property.

Due to the presence of both native fish and sportfish in the catchment, DoC, iwi, and Fish & Game (F&G) may be considered affected by the proposal. However, due consideration should be given to the ecological assessment of the Amisfield Burn conducted earlier this year by Water Ways Consulting Limited, discussed in Section 3.4.1.2 and attached in Appendix E:

- With regards to native fish, only two surveys have identified the presence of koaro in the Amisfield Burn – a single specimen in 1996 and again in 2001, both in the same location. The report notes that "*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." Upland bully has also been found in the Amisfield Burn downstream of the Breakneck Creek confluence, however it is not considered a threatened fish and prefers low gradient, low water velocity habitats – thereby limiting it to the lower reaches of the creek.

- With regards to sportfish, no rainbow trout have ever been recorded in the Amisfield Burn. Brown trout are widespread throughout, with findings indicating that these are self-sustaining, stunted populations that do not provide any recreational fishing activity. There also appears to be very little or no brown trout presence at or above the 95789 point of take.

Overall, it is considered that this application will be processed non-notified. Iwi are considered to be affected by the proposal due to their interest in water in Otago, however the other parties are considered to be interested only, and the proposal will not adversely affect the instream values under the existing environment, given that the status quo is to remain.

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 within the study area include the Clutha River and groundwater. Both of these sources may provide viable irrigation and stock drinking water for the applicants, 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 (~5 km) and up a steep ascent (~180 m elevation gain). Many of the existing permit holders have also attempted to secure access to groundwater, but have been unsuccessful in finding a viable source.

In contrast, the existing Amisfield Burn abstraction is long-established and the conveyance and storage infrastructure is already in place (at considerable cost to keep these in working condition). This source represents the most practical means of taking water for the applicants' properties, given that it is located above the irrigable areas, meaning the water can be gravity fed to wherever it is needed without pumping or electrical requirements.

6.2 Effects on stream ecology and hydrology

As discussed in Section 3.4.1, both the hydrology and the ecology of the Amisfield Burn are relatively well understood. The water race intake for 95789 effectively acts as an open diversion channel, and therefore only abstracts a fraction of the total flow in the creek – leaving plenty of water in the creek downstream of the take (see Figure 2-Figure 5). Furthermore, due to the open nature of the intake, taking generally matches the natural hydrological cycles of the Amisfield Burn, with a higher rate of take during times of high flows in the creek and a lower rate of take during times of low flow. This ensures that the natural dynamics of the Amisfield Burn are maintained downstream of the take.

With regards to fish values, the current effects assessment is able to draw upon numerous historic surveys along with several recent surveys to develop a detailed picture of what is present in the creek. As discussed in Section 3.4.1.2, native fish values in the catchment are relatively limited, with just several

upland bully and two koaro found well downstream of the abstraction point across all of the surveys. Notably, no galaxiids have ever been recorded in the Amisfield Burn. With regards to introduced species, brown trout have been found throughout the Amisfield Burn but no rainbow trout have been recorded, and it is important to reiterate that neither of the 2018 and 2019 surveys above the 95789 abstraction identified any fish present. This is despite that part of the creek providing prime sportfish habitat, and suggests that no sportfish inhabit the creek upstream of the take, with the waterfall below the take preventing any future migrations of fish upstream of this point.

Additionally, abstraction may not be the sole cause of a lack of trout migration to the upstream section of the creek, given that water must flow past the applicants' take if the other downstream users are to access water. There are a number of barriers in the creek, natural (like the waterfall at the Amisfield Burn intake) and unnatural, such as Mt Pisa Station's culvert crossing across the Amisfield Burn. Control of both of these structures is outside of the control of the applicants.

Finally, due consideration should be given to the results of the stream gauging completed in January 2019, which showed that the Amisfield 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 typically 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 Amisfield Burn, and as such the following can be concluded:

- Abstraction under 95789 does not impact sportfish values in the Amisfield Burn. Surveys indicate a self-sustaining population of stunted brown trout that have persisted in the catchment despite ongoing abstractions. This proposal is for a significantly lowered rate of take from the status quo, meaning any brown trout habitat downstream of the take would in fact be improved. As the Amisfield Burn appears to lose surface connectivity with Lake Dunstan regardless of abstraction, the proposal has no effect on the ability of sportfish to up-migrate.

- Upland bully prefer low water velocity habitats that would be characteristic of the lower reaches of the Amisfield Burn (and verified by fish surveys). Upland bully populations often respond favourably to summer low flow conditions, meaning the 95789 abstraction actually has the potential to benefit this species by slowing water velocities downstream. Regardless, upland bully is not considered a threatened fish and is nationally widespread.

- The impact of the activity on koaro populations is difficult to determine, but given the low abundance of koaro in the Amisfield Burn, the natural fish passage limitations and the potential threat koaro pose to Clutha flathead galaxiids, any impact would be limited and may in fact promote upstream Clutha flathead populations if they were indeed present.

The proposed lower rate of take should ensure that any invertebrate values in the vicinity of the 95789 abstraction are not adversely affected.

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 concluded the following:

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 [Lake Dunstan] 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.

Considering this, the value of a residual flow requirement past the applicants' abstraction point is difficult to determine. Conversely, imposing a strict residual flow condition could significantly affect the applicants' ability to obtain sufficient water during the summer and early autumn months, thereby putting crops and livelihoods at risk.

6.4 Effects on other water users

The following is a summary of current water users on the Amisfield Burn (excluding Breakneck Creek, users of which would not be affected by the activity):

Table 7: Summary of other Amisfield Burn water users

Permit No.	Location	Rate of take (L/s)	Primary consent holder
96321.V1	Approx. 700 m d/s of 95789 take	41.7 L/s	Smallburn Limited
97232	Approx. 3 km d/s of 95789 take	83.3 L/s	Lowburn Land Holdings LP

While the activity has the potential to impact these downstream water users, the applicants' intake is not capable of taking all of the flow from the Amisfield Burn, and historically the applicants have coordinated with Smallburn and Lowburn Land Holdings to ensure that sufficient water is left in the creek during critical periods. As discussed earlier, all of the water users on the Amisfield Burn have prepared their deemed permit replacement 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 Amisfield Burn, it is unlikely that there will be any adverse effects on recreational users due to the proposal – particularly considering the unsuitability of the creek for angling.

6.5 Available water allocation

Policy 6.4.2 of the RPW defines the primary allocation limit for each 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 Amisfield 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 95789. In fact, the amount of water being sought as replacement to this permit is significantly lower than the current paper allocation.

6.6 Efficiency of use

Policy 6.4.0A of the RPW requires an application to prove that the quantity of water granted is no more than that required for the purpose of taking. 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.

An assessment of reasonable irrigation demand has been undertaken for the combined irrigation areas of the applicants in accordance with Aqualinc 2017[6] guidelines, which involved determining soil types within the command area via Landcare Research's S-Map[7] online tool. The soil types encompassed within the irrigable areas are presented in Appendix C. Aqualinc was then used in conjunction with ORC mean annual rainfall (MAR) data to determine the peak monthly and annual irrigation demand.

Table 8 provides a summary of the Aqualinc outputs, with full calculations and explanations presented in Appendix C.

Table 8: Aqualinc modelled application requirements for existing and future irrigated areas of 95789 users, compared to current allocation.

Volume	Daily (m^3)	Monthly (m^3)	Annual (m^3)
Required (per Aqualinc calcs)	6,327	196,556	1,018,576
Current paper allocation	14,400[8]	416,750	Not specified
Frost-fighting requirements[9]	8,100	64,800	170,100
Stock drinking requirements	5	152	1,825
Baseflow required outside irrigation season[10]	-	-	83,376
Volume sought	N/A	255,390	1,257,818

[6] 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.

[7] https://smap.landcareresearch.co.nz/app

[8] Based on 600,000 L/hour limit specified in permit

[9] Based on ORC-recommended Bay of Plenty guidelines, which recommend a max application of 30 m^3/ha for a max of 10 hours per frost event, considering 33 ha total of vineyard within the scheme command area. A breakdown of frost fighting calculations is provided in Appendix C.

[10] Calculated by assuming 193 days outside of irrigation season at a rate of 5 L/s

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 vineyards on days when frost fighting is required, meaning irrigation requirements for those crops have been subtracted from those particular days. A nominal baseflow of 5 L/s has been provided in the above calculations outside of the irrigation season to prevent the race channel from drying out and cracking, and to provide stock drinking water and future domestic water.

As the table shows, considerably more water is needed by the applicants than is suggested by Aqualinc for efficient use. This is due to the fact that Aqualinc calculations do not give any consideration to frost fighting requirements, stock drinking requirements, or race maintenance requirements. The largest additional demand is from frost fighting, however given the importance of frost protection for the viability of grape yields, and the importance of this land use for the local economy, it is not considered that this additional frost fighting volume is excessive. Note that there is a significant decrease in the monthly volume sought compared to the current paper allocation.

The below table compares the hydrological year abstraction totals to suggested efficient irrigation volumes calculated via Aqualinc. Note that the 2015/16 and 2016/17 seasons only contain partial data, while the 2018/19 season is close to complete (records are up till May 8th, however use is minimal from May-end of June).

Table 9*:* Aqualinc modelling compared to actual annual water use for Permit 95789 on the Amisfield Burn.

	Irrigation Season			
	2015/2016	2016/2017	2017/2018	2018/2019
Permit 95789 (m^3)	903,755	900,453	1,796,734	1,382,269
Percent of Aqualinc 100th%ile				
Current demand (112 ha)	118%	118%	235%	181%
Current+proposed demand (165.7 ha)	85%	85%	170%	131%

Based on the data above, abstraction from the Amisfield Burn under 95789 tends to significantly exceed Aqualinc irrigation modelling for the properties within the scheme, which can be explained by the aforementioned additional water needs for frost fighting, stock drinking, and race maintenance. Per Table 8, the volume sought (which incorporates all water requirements within the scheme, rather than just irrigation) is 123% of the Aqualinc volume.

The applicants intend to use water more efficiently in future, meaning a greater area of land will be able to be irrigated using a smaller abstracted volume. This includes shifting from flood irrigation to spray in the case of pastures managed by Wakefield Estates Ltd, scheduling more regular maintenance of the water race to prevent leakages and overflows, and further investment in water storage to reduce reliance on instantaneous water demand.

6.7 Effects on Cultural Values

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

6.8 Monitoring

The abstraction of Amisfield Burn water under 95789 and its subsequent replacement permit will continue to be metered and reported as per the current arrangement. As discussed earlier, the water meter is located a considerable distance from the point of take (due to communication and maintenance issues closer to the intake), and a WEX was applied for several years ago but has not been granted due to the new point of take not having been authorised by way of a s136 transfer. A WEX will need to be issued as part of the current application process.

It should be noted that the water meter has been sited close to the location suggested by ORC during 2012 discussions about the WEX.

6.9 Effects on groundwater

There are no designated aquifers within the study area, with the closest designated aquifer being the Lowburn Alluvial Ribbon Aquifer approximately 4 km to the southwest. No effects of the activity on this aquifer are anticipated, given the distance.

The closest neighbouring groundwater take to the 95789 abstraction point is Consent No. 2003.363, approximately 4.2 km to the southeast. Due to the distance between the take point and any neighbouring bores, it is unlikely that the activity will adversely affect any groundwater users in the area. However, as some bores may be hydraulically linked to the Amisfield Burn, there may be a minor effect on other groundwater users in the vicinity of the watercourse.

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

6.10 Positive effects

The positive effects of the take and use of Amisfield Burn water under 95789 (or subsequent replacement) are numerous, and include:

- Enabling the continued operation of world-class vineyards and cherry orchards that would not be possible without a reliable supply of water. These land uses are key contributors to the local and regional economies, and have become an iconic element of the wider Cromwell area's landscape.
- Low energy consumption – because the water take and much of the irrigation systems from this source are gravity fed, energy consumption can be kept to a minimum. Alternative sources of water (groundwater, 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.

- Contributing to local tourism, particularly in the case of the vineyards.

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 Amisfield Burn for irrigation, frost fighting and stock drinking.
- Location: Amisfield Burn, approximately 5.1 km northwest of the intersection of Smiths Way and Luggate-Cromwell Road, State Highway 6.
- Legal description of land at point of take: Lot 3 Deposited Plan 343853
- Map reference: NZTM 2000: 1300312E 5018963N
- This permit shall not commence until Deemed Permit 95789 has expired or been surrendered.
- The rate of take shall not exceed 120 L/s.
- The combined volume of water taken under this consent [replacement to permit 95789] shall not exceed:
    - 255,390 m^3/month
    - 1,257,818 m^3/year
- The consent holder shall maintain a water meter to record the water take, at or close to the point 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 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 reference is different to that entered on the existing permit, however this new reference reflects the actual ground-truthed take location (discussed earlier).

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. The proposal will have a less than minor effect on the Amisfield Burn's ability to meet the reasonably foreseeable needs of future generations, or on the life-supporting capacity of the Amisfield Burn 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) Kāi Tahu ki Otago Natural Resource Management Plan, 2005
(iv) Partially Operative Otago Regional Policy Statement, 2019
(v) Partially Operative Regional Policy Statement for Otago, 1998
(vi) Proposed Regional Policy Statement for Otago, 2015
(vii) 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.

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 sees a significant reduction in the current level of allocation for the Amisfield Burn, from an instantaneous, monthly and annual standpoint. The water sought from the Amisfield Burn is within the allocation limits defined by Policy 6.4.2 of the RPW.

With regards to Policy B8, the proposal will enable the various orchards, vineyards and farms to continue operating at optimum levels. All of these land uses are fundamental aspects 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 take is 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 applicants' abstraction record indicating ongoing adherence to the Regulations with no proposed change to this system of water measurement and reporting.

As discussed earlier, a WEX application for the water meter has been lodged and is still awaiting approval from ORC in light of the transferred point of take.

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

Policy		Comments
2.2.1	*Manage the natural environment to support Kāi Tahu wellbeing by all of the following:* *a) Recognising and providing for their customary uses and cultural values in Schedules 1A and B; and* *b) Safe-guarding the life-supporting capacity of natural resources.*	The proposal will see a reduction in allocated water from the Amisfield Burn, thereby significantly improving the life-supporting capacity of this creek. 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.
2.2.2	*Recognise and provide for the protection of wāhi tūpuna, by all of the following:* *a) Avoiding significant adverse effects on those values that contribute to the identified wāhi tūpuna being significant;* *b) Avoiding, remedying, or mitigating other adverse effects on the identified wāhi tūpuna;* *c) Managing the identified wāhi tūpuna sites in a culturally appropriate manner.*	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 Amisfield Burn likely has some significance in terms of Wāhi Mahika kai (food and natural material gathering sites), Taumanu (fishing sites) and Wāi māori (important freshwater areas).
3.1.1	*Safeguard the life-supporting capacity of fresh water and manage fresh water to:* *a) Maintain good quality water and enhance water quality where it is degraded, including for:* *i. Important recreation values, including contact recreation; and, ii. Existing drinking and stock water supplies;* *b) Maintain or enhance aquatic:* *i. Ecosystem health;* *ii. Indigenous habitats; and,* *iii. Indigenous species and their migratory patterns.* *c) Avoid aquifer compaction and seawater intrusion;* *d) Maintain or enhance, as far as practicable:* *i. Natural functioning of rivers, lakes, and wetlands, their riparian margins, and aquifers;* *ii. Coastal values supported by fresh water;* *iii. The habitat of trout and salmon unless detrimental to indigenous biological diversity; and*	The ecological and hydrological features of the Amisfield Burn are discussed in Section 3.4, while the potential effects on these features, and subsequent mitigation proposed, are discussed in Sections 6.2 and 6.3, respectively. 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 6.4, 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.

	iv. Amenity and landscape values of rivers, lakes, and wetlands; *e) Control the adverse effects of pest species, prevent their introduction and reduce their spread;* *f) Avoid, remedy or mitigate the adverse effects of natural hazards, including flooding and erosion; and,* *g) Avoid, remedy or mitigate adverse effects on existing infrastructure that is reliant on fresh water.*	
3.1.2	*Manage the beds of rivers, lakes, wetlands, their margins, and riparian vegetation to:* *a) Safeguard the life supporting capacity of fresh water;* *b) Maintain good quality water, or enhance it where it has been degraded;* *c) Maintain or enhance bank stability;* *d)Maintain or enhance ecosystem health and indigenous biological diversity;* *e) Maintain or enhance, as far as practicable:* *i. Their natural functioning and character; and* *ii. Amenity values;* *f) Control the adverse effects of pest species, prevent their introduction and reduce their spread; and,* *g) Avoid, remedy or mitigate the adverse effects of natural hazards, including flooding and erosion.*	See response to 3.1.1 above.
3.1.3	*Manage the allocation and use of fresh water by undertaking all of the following:* *a) Recognising and providing for the social and economic benefits of sustainable water use;* *b) Avoiding over-allocation, and phasing out existing over-allocation, resulting from takes and discharges;* *c) Ensuring the efficient allocation and use of water by:* *i) Requiring that the water allocated does not exceed what is necessary for its efficient use;* *ii) Encouraging the development or upgrade of infrastructure that increases use efficiency;* *iii. Providing for temporary dewatering activities necessary for construction or maintenance.*	An evaluation of efficient water use in relation to the proposal is provided in Section 6.6. The proposal will see a reduction in allocation from the Amisfield Burn based on historic use records and the aforementioned efficient use calculations. Proposed improvements in the maintenance regime for the race and intake structure should ensure that water is used more efficiently.
3.1.4	*Manage for water shortage by undertaking all of the following:* *a) Encouraging land management that improves moisture capture, infiltration, and soil moisture holding capacity.* *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*	An evaluation of efficient water use in relation to the proposal is provided in Section 6.6. The permit holders operate as a water sharing collective, working together to allocate water efficiently between users. Water harvesting and storage takes place

	minimum flow or aquifer level restriction to optimise use of water available for taking; *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.*	within the command area via several reservoirs.
3.1.13	*Encourage, facilitate and support activities that contribute to the resilience and enhancement of the natural environment, by one or more of the following where applicable:* *a) Improving water quality and quantity;* *b) Protecting or restoring habitat for indigenous species;* *c) Regenerating indigenous species;* *d) Mitigating natural hazards;* *e) Protecting or restoring wetlands;* *f) Improving the health and resilience of:* *i. Ecosystems supporting indigenous biological diversity;* *ii. Important ecosystem services, including pollination;* *g) Improving access to rivers, lakes, wetlands and their margins, and the coast;* *h) Buffering or linking ecosystems, habitats and areas of significance that contribute to ecological corridors;* *i) Controlling pest species.*	As discussed earlier, koaro (1 specimen on two survey occasions) and upland bully (various) have been identified downstream of the point of take. A reduction in water quantity sought as part of the proposal should help to protect any non-migratory native fish.
4.1.4	*Assess activities for natural hazard risk to people, property and communities, by considering all of the following:* *a) The natural hazard risk identified, including residual risk; and* *b) Any measures to avoid, remedy or mitigate those risks, including relocation and recovery methods; and* *c) The long term viability and affordability of those measures; and* *d) Flow-on effects of the risk to other activities, individuals and communities; and* *e) The availability of, and ability to provide, lifeline utilities, and essential and emergency services, during and after a natural hazard event.*	According to ORC's Natural Hazard Database, the Pisa Fault runs through the general area occupied by several of the applicants' storage ponds.
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:* *a) Taking into account the effects of climate change, including by using the best relevant climate change data; and* *b) Applying a precautionary approach when assessing and managing the effects of climate change where*	The uncertainty of the effects of climate change are such that providing future water security to the applicants, both in terms of sufficient volume and duration, is critical to the ongoing operation of the various farms, orchards and vineyards within the command area.

	there is scientific uncertainty and potentially significant or irreversible effects; and *c) Encouraging activities that assist to reduce or mitigate the effects of climate* *change; and* *d) Encouraging system resilience.*	
5.2.1	*Recognise all of the following elements as characteristic or important to Otago's historic heritage:* *a) Residential and commercial buildings;* *b) Māori cultural and heritage values;* *c) 19th and early 20th century pastoral sites;* *d) Early surveying, communications and transport, including roads, bridges and routes;* *e) Early industrial historic heritage, including mills and brickworks;* *f) Gold and other mining systems and settlements;* *g) Dredge and ship wrecks;* *h) Coastal historic heritage, particularly takata whenua occupation sites and those associated with early European activity such as whaling;* *i) Memorials;* *j) Trees and vegetation.*	As the 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. This application outlines how the races and infrastructure associated with these heritage values will be managed in the future, with continued operation under the status quo helping to preserve these features.
5.3.1	*Manage activities in rural areas, to support the region's economy and communities, by:* *a) Enabling primary production and other rural activities that support the rural economy; and* *b) Providing for mineral exploration, extraction and processing; and* *c) Minimising the loss of significant soils; and* *d) Restricting the establishment of activities in rural areas that may lead to reverse sensitivity effects; and* *e) Minimising the subdivision of productive rural land into smaller lots that may result in rural residential activities; and* *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.*	Replacement of the applicants' deemed permit with sufficient instantaneous and volumetric rates of take will ensure the viticultural, horticultural, and farming activities that take place within the command area 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 within the scheme (spray, drip irrigation etc.), meaning the proposal does not pose any risk to soil health.
5.4.3	*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.*	Due to reliable historic abstraction records and a long history of use, much of the potential adverse effects associated with the proposal will have been captured within Section 6 of this document. Where information gaps occur, Council has the ability to

	review consent conditions and adjust methods or approaches to better manage adverse effects.

7.2.4 Proposed Regional Policy Statement for Otago

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

Table 11: Relevant policies from the Proposed Regional Policy Statement for Otago, 2015

Policy		Comments
1.1.2	*Ensure that local authorities exercise their functions and powers, to:* *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,* *b) Involve Kāi Tahu in resource management decision-making processes and implementation; and* *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* *d) Ensure Kāi Tahu have the prerogative to:* *i. Identify their relationship with their ancestral lands, water, sites, wāhi tapu, and other taoka; and* *ii. Determine how best to express that relationship; and* *e) Ensure Kāi Tahu are able to exercise kaitiakitaka; and* *f) Ensure that district and regional plans:* *i. Give effect to the Ngāi Tahu Claims Settlement Act 1998; and* *ii. Recognise and provide for statutory acknowledgement areas, as detailed in Schedule 2; and* *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.*	Kāi Tahu 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.
2.1.1	*Recognise freshwater values, and manage freshwater, to:* *a) Support healthy ecosystems in all Otago aquifers, and rivers, lakes, wetlands, and* *their margins; and* *b) Retain the range and extent of habitats provided by freshwater; and* *c) Protect outstanding water bodies and wetlands; and*	The ecological and hydrological features of the Amisfield Burn are discussed in Section 3.4, while the potential effects on these features, and subsequent mitigation proposed, are discussed in Sections 6.2 and 6.3, respectively. Water quality is unlikely to be affected by the activities. Kāi Tahu and other cultural values have been assessed

	d) Protect migratory patterns of freshwater species, unless detrimental to indigenous biodiversity; and *e) Avoid aquifer compaction, and seawater intrusion in aquifers; and* *f) Maintain good water quality, including in the coastal marine area, or enhance it where it has been degraded; and* *g) Maintain or enhance coastal values supported by freshwater values; and* *h) Maintain or enhance the natural functioning of rivers, lakes, and wetlands, their riparian margins, and aquifers; and* *i) Retain the quality and reliability of existing drinking water supplies; and* *j) Protect Kāi Tahu values; and* *k) Provide for other cultural values; and* *l) Protect important recreation values; and* *m) Maintain the aesthetic and landscape values of rivers, lakes, and wetlands; and* *n) Avoid the adverse effects of pest species, prevent their introduction and reduce their spread; and* *o) Mitigate the adverse effects of natural hazards, including flooding and erosion; and* *p) Maintain the ability of existing infrastructure to operate within their design parameters.*	above and in Section 7.2.6 of this document. Recreational values are addressed in Section 6.4, 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 activities. Replacement of the applicants' permit will enable them to continue operating their existing infrastructure within their design parameters.
2.1.2	*Recognise the values of beds of rivers and lakes, wetlands, and their margins, and manage them to:* *a) Protect or restore their natural functioning; and* *b) Protect outstanding water bodies and wetlands; and* *c) Maintain good water quality, or enhance it where it has been degraded; and* *d) Maintain ecosystem health and indigenous biodiversity; and* *e) Retain the range and extent of habitats supported; and* *f) Maintain or enhance natural character; and* *g) Protect Kāi Tahu values; and* *h) Provide for other cultural values; and* *i) Maintain their aesthetic and amenity values; and* *j) Avoid the adverse effects of pest species, prevent their introduction and reduce their spread; and* *k) Mitigate the adverse effects of natural hazards, including flooding and erosion; and* *l) Maintain bank stability.*	Much of this policy is also reflected in Policy 2.1.1, which is discussed above.

2.1.6	*Recognise the values of ecosystems and indigenous biodiversity, and manage ecosystems and indigenous biodiversity, to:* *a) Maintain or enhance ecosystem health and indigenous biodiversity; and* *b) Maintain or enhance areas of predominantly indigenous vegetation; and* *c) Buffer or link existing ecosystems; and* *d) Protect important hydrological services, including the services provided by tussock grassland; and* *e) Protect natural resources and processes that support indigenous biodiversity; and* *f) Maintain habitats of indigenous species that are important for recreational, commercial, cultural or customary purposes; and* *g) Protect biodiversity significant to Kāi Tahu; and* *h) Avoid the adverse effects of pest species, prevent their introduction and reduce their spread.*	The ecosystem values of the Amisfield Burn are discussed in Section 3.4, while the potential effects on these values and subsequent mitigation measures proposed are provided in Sections 6.2 and 6.3, respectively.
2.1.7	*Recognise the values of natural features, landscapes, seascapes and the coastal environment are derived from the following attributes, as detailed in Schedule 4:* *a) Biophysical attributes, including:* *i. Natural science factors;* *ii. The presence of water;* *iii. Vegetation (indigenous and introduced);* *iv. The natural darkness of the night sky;* *b) Sensory attributes, including:* *i. Legibility or expressiveness;* *ii. Aesthetic values;* *iii. Transient values, including nature's sounds;* *iv. Wild or scenic values;* *c) Associative attributes, including:* *i. Whether the values are shared and recognised;* *ii. Cultural and spiritual values for Kāi Tahu;* *iii. Historical and heritage associations.*	The values of applicable natural features potentially affected by the proposal (namely the Amisfield Burn) have been recognised in Section 3.4.
2.2.1	*Identify areas and values of significant indigenous vegetation and significant habitats of indigenous fauna, using the attributes detailed in Schedule 5.*	The Amisfield Burn is listed in the Schedule 1A of the RPW as significant habitat for koaro.
2.2.2	*Protect and enhance the values of areas of significant indigenous vegetation and significant habitats of indigenous fauna, by:* *a) Avoiding adverse effects on those values which contribute to the area or habitat being significant; and* *b) Avoiding significant adverse effects on other values of the area or habitat; and*	See above. A report attached to this AEE notes that providing habitat for koaro is not necessarily in the interests of native biodiversity, given it's rapidly increasing numbers and due to the fact that it feeds on small galaxiids and other

	c) Assessing the significance of adverse effects on those values, as detailed in Schedule 3; and *d) Remediating, when adverse effects cannot be avoided; and* *e) Mitigating where adverse effects cannot be avoided or remediated; and* *f) Encouraging enhancement of those areas and values.*	native fish, such as the local, Nationally Critical Clutha flathead galaxiid.
2.2.12	*Identify outstanding water bodies and wetlands and their values, using the following criteria:* *a) A high degree of naturalness;* *b) Outstanding aesthetic or landscape values;* *c) Significant takata whenua cultural values;* *d) Significant recreational values;* *e) Significant ecological values;* *f) Significant hydrological values.*	Outstanding water bodies are largely determined through the regional plan framework, with the RPW listing the Amisfield Burn in Schedule 1A for it's notable absence of pest plants and significant native fish habitat. Effects on these features have all been assessed in Section 6 of this document.
2.2.13	*Protect the values of outstanding water bodies and wetlands by:* *a) Avoiding significant adverse effects, including cumulative effects, on those values which contribute to the water body or wetland being outstanding; and* *b) Avoiding, remedying or mitigating other adverse effects on the water body or wetland's values; and* *c) Assessing the significance of adverse effects on values, as detailed in Schedule 3; and* *d) Controlling the adverse effects of pest species, preventing their introduction and* *reducing their spread; and* *e) Encouraging enhancement of outstanding water bodies and wetlands.*	See above.
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:* *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.*	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. Based on ORC's GIS mapping, the Pisa Fault runs roughly through the middle of the command area.

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 12: Assessment of RPW policies

Policy	Comments
5.4.1 To identify the following natural and human use values supported by Otago's lakes and rivers, as expressed in Schedule 1: *(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.*	As discussed in Section 3.4, the Amisfield Burn is listed in Schedule 1A for its ecosystem values and significant habitat for koaro. No other Schedule 1 values directly relate to the activity.
5.4.2 In the management of any activity involving surface water, groundwater or the bed or margin of any lake or river, to give priority to avoiding, in preference to remedying or mitigating: *(1) Adverse effects on:* *(a) Natural values identified in Schedule 1A;* *(b) Water supply values identified in Schedule 1B;* *(c) Registered historic places identified in Schedule 1C, or archaeological sites in, on, under or over the bed or margin of a lake or river;* *(d) Spiritual and cultural beliefs, values and uses of significance to Kai Tahu identified in Schedule 1D;* *(e) The natural character of any lake or river, or its margins;* *(f) Amenity values supported by any water body; and* *(2) Causing or exacerbating flooding, erosion, land instability, sedimentation or property damage.*	The Amisfield Burn Schedule 1A values relate to the absence of aquatic pest plants and the importance of the creek as habitat for koaro. The proposal would not have any effect on Amisfield Burn flora, except perhaps to provide a net benefit in terms of providing more water in the creek past the point of take. The conundrum presented by koaro was discussed in Section 6, but an overview is provided here for clarity: • Koaro populations in the tributaries that feed the Clutha River and Lake Dunstan have increased considerably following the installation of the Clyde Dam. Their numbers are now relatively stable in the area. • Koaro feed on Clutha flathead galaxiids, populations of which are far more localised than koaro and are at a much higher risk of extinction (Nationally Critical vs At Risk: Declining for koaro). • Promoting koaro values by imposing residual flow conditions past the

Policy	Comments
	point of take may therefore directly harm any Clutha flathead populations that could exist upstream (but have not yet been identified in fish surveys). Regardless, providing connectivity during summer and early autumn would likely be impossible as the Amisfield Burn appears to naturally run dry prior to reaching Lake Dunstan. The Amisfield Burn is not listed in any other parts of Schedule 1. By lowering the instantaneous rate of take, the proposal seeks to improve the natural character of the creek and improve any peripheral amenity values. The proposal will not cause or exacerbate flooding, erosion, land instability, sedimentation or property damage.
5.4.3 In the management of any activity involving surface water, groundwater or the bed or margin of any lake or river, to give priority to avoiding adverse effects on: *(a) Existing lawful uses; and* *(b) Existing lawful priorities for the use, of lakes and rivers and their margins.*	All other lawful users on the Amisfield Burn have been consulted and have prepared their deemed permit replacement applications concurrently to ensure that everyone's needs are considered and met. This permit (95789) currently has top priority in the Amisfield Burn and Breakneck Creek.
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.	The Kai Tahu ki Otago Natural Resource Management Plan (NRMP) is considered later in this report.
5.4.8 To have particular regard to the following features of lakes and rivers, and their margins, when considering adverse effects on their natural character *(a) The topography, including the setting and bed form of the lake or river;* *(b) The natural flow characteristics of the river;* *(c) The natural water level of the lake and its fluctuation;* *(d) The natural water colour and clarity in the lake or river;* *(e) The ecology of the lake or river and its margins; and*	The natural flow characteristics of the Amisfield Burn are discussed earlier in this report. The abstraction of water will undeniably have some influence on the natural flow regime of the creek, however the open nature of the intake is such that the natural character of the creek should remain largely uncompromised, with the water level fluctuations, colour, clarity and ecology that would typically be expected of a natural watercourse.

Policy	Comments
(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.	It should be noted that the Amisfield Burn take has been occurring for over 150 years, meaning the ecology and (to a lesser extent) hydrology of the Amisfield Burn has likely adapted to account for the 95789 water take. Any changes to this take would likely change the character of the creek itself. It should also be noted that the take has enabled the development and ongoing operation of world class horticultural and viticultural activities (which would not otherwise be possible) while ensuring that enough water remained in the Amisfield Burn to maintain the core values of the watercourse.
5.4.9 To have particular regard to the following qualities or characteristics of lakes and rivers, and their margins, when considering adverse effects on amenity values: *(a) Aesthetic values associated with the lake or river; and* *(b) Recreational opportunities provided by the lake or river, or its margins.*	Considering the long history of abstraction from the Amisfield Burn, it could be argued that the aesthetic values of the creek are intrinsically tied to the long-established water take. Furthermore, virtually all of the Amisfield Burn is located on private land and is unsupportive of recreation, with the small size of the creek unsupportive of angling.
5.4.12 To promote the establishment of, and support, appropriate water user groups to assist in the management of water resources.	The multiple holders of 95789 effectively operate as a water group to ensure equitable and efficient use of Amisfield Burn water, and plan to form a water company in future.
6.4.0 To recognise the hydrological characteristics of Otago's water resources, including behaviour and trends in: *(a) The levels and flows of surface water bodies; and* *(b) The levels and volumes of groundwater; and* *(c) Any interrelationships between adjoining bodies of water, when managing the taking of water.*	The hydrological regime of the Amisfield Burn is discussed earlier in this report.
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: *(a) How local climate, soil, crop or pasture type and water availability affect the quantity of water required; and* *(b) The efficiency of the proposed water transport, storage and application system.*	The proposed irrigation volumes have been calculated in accordance with guidelines which ORC accepts as representing reasonable water requirements for irrigation of pasture, cherries and vineyards. The irrigation volumes account for all factors mentioned in the policy (climate, crop, efficiency of use, etc.).

Policy	Comments
	Recent discussions amongst the permit holders have focussed on developing a regular inspection and maintenance programme for the intake and water race to ensure more efficient water conveyance. This will be developed in more detail following granting of the replacement consent. Most permit holders own or have access to modern storage ponds to reduce reliance on instantaneous water demand, and with the exception of Wakefield Estates, all irrigators employ efficient (spray) irrigation techniques. Wakefield Estates plan to convert to spray in future.
6.4.0B To promote and support shared use and management of water that: *(a) Allows water users the flexibility to work together, with their own supply arrangements; or* *(b) Utilises shared water infrastructure which is fit for its purpose.*	As mentioned earlier, the 95789 permit holders informally operate as a water group, making internal arrangements for water sharing and for sharing water infrastructure (such as races and storage ponds).
6.4.0C To promote and give preference, as between alternative sources, to the take and use of water from the nearest practicable source.	The proposal seeks to enable the continued taking of water from the nearest practicable source.
6.4.1 To enable the taking of surface water, by: *(a) Defined allocation quantities; and* *(b) Provision for water body levels and flows,* *except when:* *(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.* *(ii) All of the surface water or connected groundwater taken is immediately returned to the source water body.* *(iii) Water is being taken which has been delivered to the source water body for the purpose of that subsequent take.*	The proposal seeks to take water that is within the current primary allocation limit for the Amisfield Burn.

Policy	Comments
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: *(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.*	The proposal seeks to take water that is within the current primary allocation limit for the Amisfield Burn, per Policy 6.4.2(b)(i)(3).
6.4.2A 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.	The rate of take sought is no more than what has been taken under the existing consent.
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.	Residual flow considerations are discussed earlier in this report (Section 6.3).

Policy	Comments
6.4.16 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.	The take will continue to be metered in accordance with the Resource Management (Measurement and Reporting of Water Takes) Regulations 2010.
6.4.19 When setting the duration of a resource consent to take and use water, to consider: *(a) The duration of the purpose of use;* *(b) The presence of a catchment minimum flow or aquifer restriction level;* *(c) Climatic variability and consequent changes in local demand for water;* *(d) The extent to which the risk of potentially significant, adverse effects arising from the activity may be adequately managed through review conditions;* *(e) Conditions that allow for adaptive management of the take and use of water;* *(f) The value of the investment in infrastructure; and* *(g) Use of industry best practice.*	These matters are discussed in Section 8.
6.6.0 To promote and support development of shared water infrastructure.	The applicants already operate as an informal water company whereby multiple users are supplied water for irrigation and stock drinking via shared water infrastructure.

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 Amisfield Burn is a tributary of the Clutha River/Mata-Au, 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 and physical 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 Amisfield Burn has been given throughout the application, exemplified in reduced instantaneous, monthly and annual allocations and future improvements to water infrastructure and maintenance regimes to increase water use efficiencies.

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 13: Relevant policies of the Kai Tahu ki Otago NRMP

Policy	Comments
To require an assessment of instream values for all activities affecting water.	Values of the Amisfield Burn are considered in Section 3.4.
To require that resource consent applicants seek only the amount of water actually required for the purpose specified in the application.	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 6.6).
To require that all water takes are metered and reported on, and information be made available upon request to Kāi Tahu ki Otago.	The water take 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 applicants, if desired.
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.	Consent duration is discussed in Section 8.
To require that fish passage is provided for at all times, both upstream and downstream.	As discussed in Section 6.3, the Amisfield 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 regardless of any residual or minimum flow conditions imposed.
To require that fish screens be fitted to all pumps and race intakes.	There are no records of any fish present above the point of take, therefore requiring a fish screen would not provide any value and would impose additional costs and maintenance requirements on the applicants.
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.*	Viticultural and horticultural land uses within the command area use drippers and spray – all of which are considered an efficient means of irrigation. A small area of pasture within the scheme still uses flood irrigation, however there are plans to convert to spray irrigation in the near future.

Policy	Comments
To encourage irrigation to occur at times when winds are light and evaporation low.	Irrigation at the most efficient times is in the applicants' 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 properties within the scheme for farming, viticulture and cherry orchards. It is also worth noting that the proposed takes are to supply water to activities that are already in place, with recognition of future expansion.

- There is close to 6 years of flow data for the Amisfield Burn above the uppermost point of take (95789), meaning the hydrological characteristics of the watercourse if well understood. This makes understanding the ongoing effects of takes from this creek a lot easier, and can ensure informed decision making.

- Abstraction has taken place under 95789 and preceding permits for over 150 years – dating back to 1866. This long history of 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 and 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 rights to the Amisfield Burn, while preserving and/or enhancing the values of the watercourse, will enable the farms, orchards and vineyards serviced by 95789 water (and subsequent replacement permit) to continue operating at their fullest potential into the future.

- This report and the supporting documents demonstrate that the activities 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 (see Section 2.2 for further details). 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 applicants the security to make ongoing investment decisions based on the returns from their operation over this duration. It should also be noted that high-value crops

like grapes and cherries are also high risk, and it can take many years for a given orchard or vineyard to break even. In the case of vineyards, it can take 10 to 15 years for this to occur. This means that a consent term of anything shorter than 15 years could completely undermine the longer-term business model of the subject vineyards, and the same is likely true for the cherry orchards.

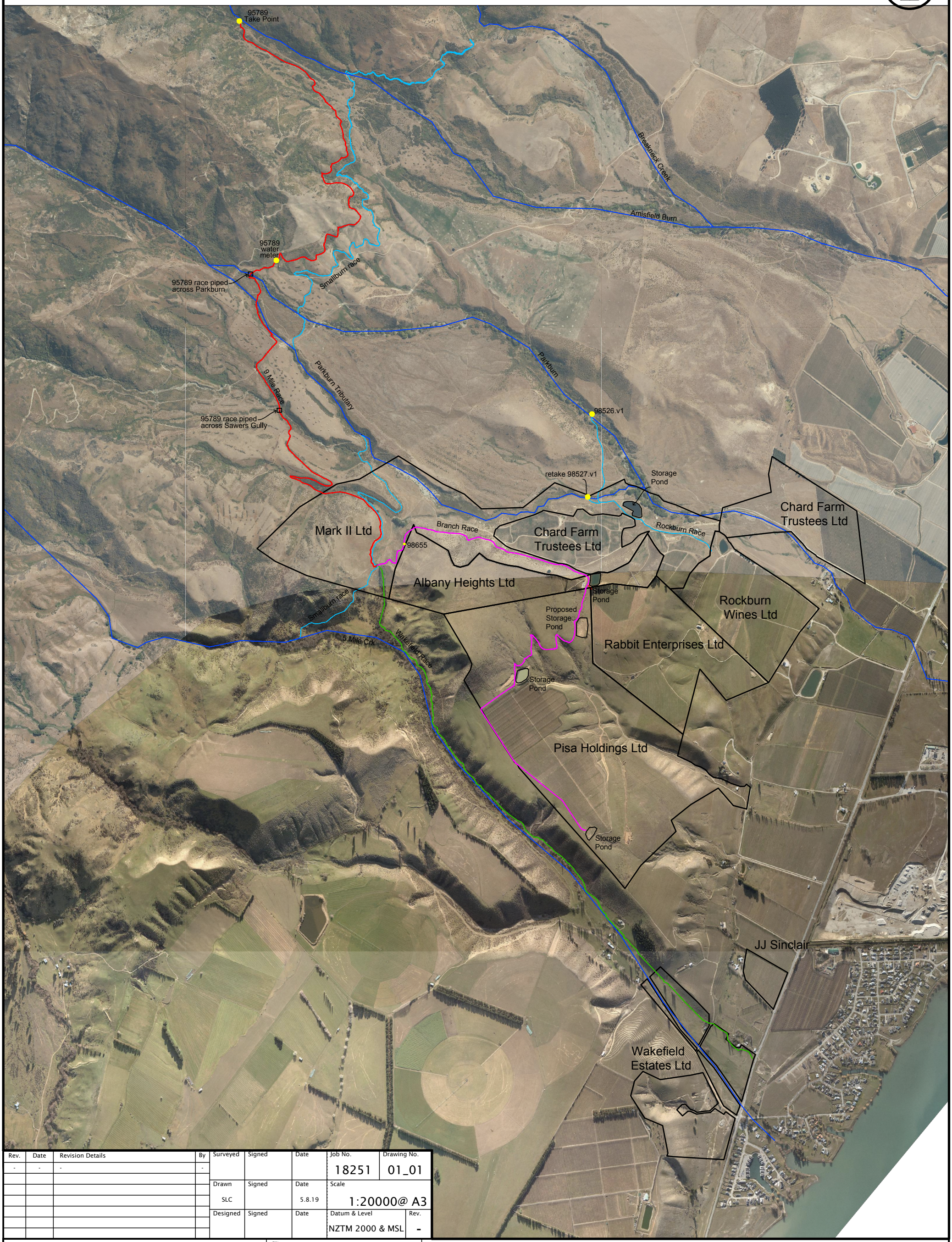
9. CONCLUSION

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 consent 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: 95789 Race Map



Rev.	Date	Revision Details	By
-	-	-	-

Surveyed	Signed	Date	Job No. 18251	Drawing No. 01_01
Drawn SLC	Signed	Date 5.8.19	Scale 1:20000@ A3	
Designed	Signed	Date	Datum & Level NZTM 2000 & MSL	Rev. -

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- Check any electronic data against the hardcopy plan to ensure it is the latest version
-If this plan is being used as part of sale and purchase agreement then it is done so on the basis that it is preliminary only, final dimensions and areas may vary on final survey

95789 RACE PLAN

L:\18251 - Pisa Holdings Ltd - Deemed Permit Replacement\CAD\18251_03_RACE PLAN.dwg Plotted: 05.08.2019

Appendix B: Water use map, Certificates of Title and s417 Certificates

Parkburn Tributary
MAR 450
to Amisfield Burn
9 Mile Race
98526.v1
Parkburn
MAR 450
MAR 350
retake 98527.v1
take 2
Storage
Pond
Chard Farm Trustees Ltd
Mark II Ltd
98655
Branch Race
Chard Farm Trustees Ltd
Rockburn Race
93177
Albany Heights Ltd
Storage
Pond
Rockburn Wines Ltd
Smallburn race
5 Mile Crk
Wakefeild race
Rabbit Enterprises Ltd
Proposed
Storage
Pond
Storage
Pond
Pisa Holdings Ltd
Storage
Pond
JJ Sinclair
Wakefield Estates Ltd

LEGEND

- Legal Boundaries
- Races
- Waterways
- Existing Cherries (45.8ha)
- Proposed Cherries (27.2ha)
- Existing Pasture (15.9ha)
- Existing vines (67.1ha)
- Proposed vines (25.7ha)

Rev.	Date	Revision Details	By
A	21.1.19	more areas added	SLC
B	28.5.19	albany increased, chard farm increased	SLC
C	29.8.19	Wakefeild redused, colours changed	SLC

Surveyed	Signed	Date	Job No. 18251	Drawing No. 01_01	
Drawn SLC	Signed	Date 9.11.18	Scale 1:14000@ A3		
Designed	Signed	Date	Datum & Level NZTM 2000 & MSL	Rev. C	

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-If this plan is being used as part of sale and purchase agreement then it is done so on the basis that it is preliminary only, final dimensions and areas may vary on final survey

PROPERTY OWNERS
PISA HOLDINGS LIMITED

L:\18251 - Pisa Holdings Ltd - Deemed Permit Replacement\CAD\18251_01_PROPERTY OWNERS_REV C.dwg Plotted: 29.08.2019

Quickmap Title Details

Information last updated as at 15-Dec-2019

RECORD OF TITLE
DERIVED FROM LAND INFORMATION NEW ZEALAND
FREEHOLD

Identifier **580085**

Land Registration District **Otago**

Date Issued 09 July 2013

Prior References

OT18D/265

Type Fee Simple

Area 7.0172 hectares more or less

Legal Description Lot 1-2 Deposited Plan 453152

Registered Owners

Wakefield Estates Limited

Appurtenant hereto is a right to convey water created by Transfer 885377.7 - 28.6.1995 at 10:27 am

Appurtenant hereto is a right to convey water specified in Easement Certificate 934441.9 - 8.8.1997 at 10:45 am

The easements specified in Easement Certificate 934441.9 are subject to Section 243 (a) Resource Management Act 1991

5002267.2 Deed of Easement - 19.5.2000 at 11:17 am \

Type	Servient Tenement	Easement Area	Dominant Tenement	
Right of way	Marked B Deposited Plan 27663 - CT 1314	Marked B Deposited Plan 27663	Lot 1 Deposited Plan 453152 - herein	Subject to Section 243 (a) Resource Management Act 1991

5002267.3 Easement Certificate specifying the following easements - 19.5.2000 at 11:17 am \

Type	Servient Tenement	Easement Area	Dominant Tenement	Statutory Restriction
Convey water	Lot 1 Deposited Plan 27663 - CT OT18D/264	Marked F Deposited Plan 27663	Lot 1-2 Deposited Plan 453152 - herein	N/A
Right of way				

	Lot 1 Deposited Plan 27663 - CT OT18D/264	Marked C Deposited Plan 27663	Lot 1-2 Deposited Plan 453152 - herein	Subject to Section 243 (a) Resource Management Act 1991
Right of way	Lot 1 Deposited Plan 27663 - CT OT18D/264	Marked F Deposited Plan 27663	Lot 1-2 Deposited Plan 453152 - herein	Subject to Section 243 (a) Resource Management Act 1991
Right of way	Lot 6 Deposited Plan 27663 - CT OT18D/264	Marked A Deposited Plan 27663	Lot 1-2 Deposited Plan 453152 - herein	Subject to Section 243 (a) Resource Management Act 1991

Land Covenant in Transfer 5401667.2 - 14.11.2002 at 9:00 am

Some of the easements created by Easement Instrument 9453292.3 are subject to Section 243 (a) Resource Management Act 1991

Appurtenant hereto is a right to convey water, the right to occupy for Bore and Pump and the right to take water created by Easement Instrument 9453292.3 - 9.7.2013 at 10:02 am

9453292.4 Consent Notice pursuant to Section 221 Resource Management Act 1991 - 9.7.2013 at 10:02 am

Subject to Section 241(2) Resource Management Act 1991 (affects DP 453152)

Excepting and reserving nevertheless to Her Majesty the Queen all minerals, mineral oil, gas, metals, coal and valuable stone under the surface of part Section 34

9660019.1 Mortgage to ASB Bank Limited - 7.3.2014 at 11:48 am

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

Quickmap Title Details

Information last updated as at 15-Dec-2019

RECORD OF TITLE
DERIVED FROM LAND INFORMATION NEW ZEALAND
FREEHOLD

Identifier **397154**

Land Registration District **Otago**

Date Issued 03 September 2009

Prior References

OT19A/905

Type Fee Simple

Area 10.4865 hectares more or less

Legal Description Lot 5 Deposited Plan 399543

Registered Owners

Chard Farm Trustees Limited

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

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

5057573.1 Notice pursuant to Section 91 Transit New Zealand Act 1989 - 10.7.2001 at 2:30 pm

5057573.2 Notice pursuant to Section 91 Transit New Zealand Act 1989 - 10.7.2001 at 2:30 pm

Subject to a right of way and a right to convey electricity and telecommunications over part marked O on DP 399543 created by Transfer 6267740.3 - 24.12.2004 at 9:00 am

Subject to a right to the Crown to enter upon the within land and thereon to take, lay, construct, maintain, inspect, repair or reconstruct water races, drains and all other works for the supply of water to the within land and take water from races so provided for irrigation purposes at a price to be fixed for any damage caused by any overflow or breakaway of any race or channel.

Saving and expecting all minerals within the meaning of the Land Act 1924 on or under the within land

Subject to Section 315 Land Act 1924

7993898.3 Consent Notice pursuant to Section 221 Resource Management Act 1991 - 3.9.2009 at 12:08 pm

Subject to Section 59 Land Act 1948

The easements created by Easement Instrument 7993898.6 are subject to Section 243 (a) Resource Management Act 1991

Appurtenant hereto is a right of way created by Easement Instrument 7993898.6 - 3.9.2009 at 12:08 pm

Subject to a right to convey water, electricity & telecommunications over part marked O on DP 526513 created by Easement Instrument 11219424.1 - 24.9.2018 at 9:28 am

Appurtenant hereto is a right to convey electricity, water & telecommunications and a right to pump water created by Easement Instrument 11219424.1 - 24.9.2018 at 9:28 am

11240254.3 Mortgage to Southland Building Society - 1.10.2018 at 5:03 pm

Quickmap Title Details

Information last updated as at 15-Dec-2019

RECORD OF TITLE
DERIVED FROM LAND INFORMATION NEW ZEALAND
FREEHOLD

Identifier **580086**

Land Registration District **Otago**

Date Issued 09 July 2013

Prior References

OT18D/265

Type Fee Simple

Area 8.6106 hectares more or less

Legal Description Lot 3-4 Deposited Plan 453152

Registered Owners

Wakefield Estates Limited

Appurtenant hereto is a right to convey water created by Transfer 885377.7 - 28.6.1995 at 10:27 am

Appurtenant hereto is a right to convey water specified in Easement Certificate 934441.9 - 8.8.1997 at 10:45 am

The easements specified in Easement Certificate 934441.9 are subject to Section 243 (a) Resource Management Act 1991

5002267.2 Deed of Easement - 19.5.2000 at 11:17 am \

Type	Servient Tenement	Easement Area	Dominant Tenement	
Right of way	Marked B Deposited Plan 27663 - CT 1314	Marked B Deposited Plan 27663	Lot 3 Deposited Plan 453152 - herein	Subject to Section 243 (a) Resource Management Act 1991

5002267.3 Easement Certificate specifying the following easements - 19.5.2000 at 11:17 am \

Type	Servient Tenement	Easement Area	Dominant Tenement	Statutory Restriction
Convey water	Lot 1 Deposited Plan 27663 - CT OT18D/264	Marked F Deposited Plan 27663	Lot 3-4 Deposited Plan 453152 - herein	N/A
Convey water				N/A

	Lot 3 Deposited Plan 453152 - herein	Marked D and E Deposited Plan 453152	Lot 1 Deposited Plan 27663 - CT OT18D/264	
Convey water	Lot 3 Deposited Plan 453152 - herein	Marked D and E Deposited Plan 453152	Lot 1 Deposited Plan 27663 - CT OT18D/264	N/A
Right for Bore and Pump	Lot 3 Deposited Plan 453152 - herein	Marked D Deposited Plan 453152	Lot 1 Deposited Plan 27663 - CT OT18D/264	N/A
Right of way	Lot 1 Deposited Plan 27663 - CT OT18D/264	Marked C Deposited Plan 27663	Lot 3-4 Deposited Plan 453152 - herein	Subject to Section 243 (a) Resource Management Act 1991
Right of way	Lot 1 Deposited Plan 27663 - CT OT18D/264	Marked F Deposited Plan 27663	Lot 3-4 Deposited Plan 453152 - herein	Subject to Section 243 (a) Resource Management Act 1991
Right of way	Lot 6 Deposited Plan 27663 - CT OT18D/264	Marked A Deposited Plan 27663	Lot 3-4 Deposited Plan 453152 - herein	Subject to Section 243 (a) Resource Management Act 1991
Transmit electricity	Lot 3 Deposited Plan 453152 - herein	Marked D and E Deposited Plan 453152	Lot 1 Deposited Plan 27663 - CT OT18D/264	N/A
Transmit electricity	Lot 3 Deposited Plan 453152 - herein	Marked D and E Deposited Plan 453152	Lot 1 Deposited Plan 27663 - CT OT18D/264	N/A
Transmit telecommunications	Lot 3 Deposited Plan 453152 - herein	Marked D and E Deposited Plan 453152	Lot 1 Deposited Plan 27663 - CT OT18D/264	N/A
Transmit telecommunications	Lot 3 Deposited Plan 453152 - herein	Marked D and E Deposited Plan 453152	Lot 1 Deposited Plan 27663 - CT OT18D/264	N/A

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

Land Covenant in Transfer 5401667.2 - 14.11.2002 at 9:00 am

Some of the easements created by Easement Instrument 9453292.3 are subject to Section 243 (a) Resource Management Act 1991

Subject to the easement rights over Lot 3 on DP 453152 being the right to convey water over part marked D and E, right to occupy for Bore and Pump and the right to take water over part marked D all on DP 453152 created by Easement Instrument 9453292.3 - 9.7.2013 at 10:02 am

9453292.4 Consent Notice pursuant to Section 221 Resource Management Act 1991 - 9.7.2013 at 10:02 am

9453292.5 Consent Notice pursuant to Section 221 Resource Management Act 1991 - 9.7.2013 at 10:02 am

Subject to Section 241(2) Resource Management Act 1991 (affects DP 453152)

Excepting and reserving nevertheless to Her Majesty the Queen all minerals, mineral oil, gas, metals, coal and valuable stone under the surface of part Section 34

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

Subject to a right (in gross) to convey electricity over part marked A on DP 520354 in favour of Aurora Energy Limited created by Easement Instrument 11040889.2 - 26.7.2018 at 10:34 am

Quickmap Title Details

Information last updated as at 15-Dec-2019

RECORD OF TITLE
DERIVED FROM LAND INFORMATION NEW ZEALAND
FREEHOLD

Identifier **677068**

Land Registration District **Otago**

Date Issued 19 February 2016

Prior References

174921 OT5B/864

Type Fee Simple

Area 125.4520 hectares more or less

Legal Description Lot 1, 3 Deposited Plan 481936

Registered Owners

Pisa Holdings Limited

615367 Land Improvement Agreement pursuant to Section 30A Soil Conservation and Rivers Control Act 1941 - 25.5.1984 at 10.42 am (affects Lot 1 DP 481936)

Appurtenant to Lot 3 DP 481936 herein are rights of way specified in Easement Certificate 885377.6 - 28.6.1995 at 10:27 am

The easements specified in Easement Certificate 885377.6 are subject to Section 243 (a) Resource Management Act 1991

Subject to a right to convey water over part Lot 3 DP 481936 marked M on DP 481936 created by Transfer 885377.7 - 28.6.1995 at 10:27 am

Subject to a right to convey water over part Lot 3 DP 481936 marked M on DP 481936 created by Transfer 885377.9 - 28.6.1995 at 10:27 am

Subject to a right to convey water over part Lot 3 DP 481936 marked M on DP 481936 created by Transfer 885377.13 - 28.6.1995 at 10:27 am

Subject to a water race right over part Lot 3 DP 481936 marked O, to convey water over part Lot 3 DP 481936 marked P and to store water over part Lot 3 DP 481936 marked N all on DP 481936 specified in 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

Subject to a right (in gross) for telecommunication purposes over part Lot 3 DP 481936 marked A, D, G, J, K and L on DP 481936 in favour of Telecom New Zealand Limited created by Transfer 6108297.9 - 9.8.2004 at 9:00 am

Subject to a right (in gross) to convey electricity over part Lot 3 DP 481936 marked A, D, G, J, K and L on DP 481936 in favour of Aurora Energy Limited created by Easement Instrument 6108297.10 - 9.8.2004 at 9:00 am

Subject to a right of way over part Lot 3 DP 481936 marked A, B and C, to convey electricity over part Lot 3 DP 481936 marked D, E and F, to convey water over part Lot 3 DP 481936 marked G, H and I and to convey telecommunications and computer media over part Lot 3 DP 481936 marked H and I all on DP 481936 created by Easement Instrument 6362663.4 - 31.3.2005 at 9:00 am

The easements created by Easement Instrument 6362663.4 are subject to Section 243 (a) Resource Management Act 1991

9990393.9 Mortgage to ANZ Bank New Zealand Limited - 19.2.2016 at 2:46 pm

Subject to Section 11 Crown Minerals Act 1991 (affects Lot 3 DP 481936)

Subject to Part IV A Conservation Act 1987 (affects Lot 3 DP 481936)

Reserving also a right to holders of miners rights and mining privileges to use any water-course running through or bounding the said land for the purpose of discharging therein tailings, mining debris or waste water without liability to pay compensation therefor. Subject also to the reservation to the Crown of the right at any time and from time to time without being deemed to commit a trespass and without payment of compensation to enter upon the said land and to take, lay, construct, maintain, inspect, repair or re-construct water-races, drains and all other works which the Minister of Works deems necessary for the supply of water to the said land or to any other land and subject also to the owner of the said land being required 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. (affects Lot 1 DP 481936)

Subject to Section 206 Land Act 1924 (affects Lot 1 DP 481936)

Subject to Section 278 (12) Public Works Act 1928 (affects Lot 1 DP 481936)

Subject to Section 241(2) Resource Management Act 1991 (affects DP 481936)

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

Quickmap Title Details

Information last updated as at 15-Dec-2019

RECORD OF TITLE
DERIVED FROM LAND INFORMATION NEW ZEALAND
FREEHOLD

Identifier **844471**

Land Registration District **Otago**

Date Issued 19 February 2019

Prior References

829494

Type Fee Simple

Area 82.6260 hectares more or less

Legal Description Lot 2 Deposited Plan 526279

Registered Owners

Mark II Limited

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

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

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)

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

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

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

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 o 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)

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)

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

Quickmap Title Details

Information last updated as at 15-Dec-2019

RECORD OF TITLE
DERIVED FROM LAND INFORMATION NEW ZEALAND
FREEHOLD

Identifier **707767**

Land Registration District **Otago**

Date Issued 02 August 2016

Prior References

OT19A/904

Type Fee Simple

Area 32.8863 hectares more or less

Legal Description Lot 2 Deposited Plan 490342

Registered Owners

Albany Heights Limited

Appurtenant to the part formerly Lot 2 DP 27337 contained in CT OT19A/536 is a right of way created by Easement Certificate 885377.6 - 28.6.1995 at 10.27 am

Appurtenant to the part formerly Lot 2 DP 27337 contained in CT OT19A/536 is a water race, a right to convey water and a right to store water specified in Easement Certificate 914599.11 21-8-1996 at 1.45pm

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

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 (affects part formerly Part Section 35 Block I Wakefield Survey District contained in CT OT19A/538)

966109.1 Certificate under Section 417 (2) Resource Management Act 1991 - 21.4.1999 at 11.06 am (affects part formerly Section 46 Block I Wakefield Survey District contained in CT OT12C/1084)

Appurtenant to the part formerly Lot 2 DP 27337 contained in CT OT19A/536 is a right of way created by Easement Certificate 975233.7 - 20.9.1999 at 10.49 am

The easements specified in Easement Certificate 975233.7 are subject to Section 243 (a) Resource Management Act 1991

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

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

7489310.7 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 7489310.13 - 3.8.2007 at 9:00 am

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

Subject to Part IV A Conservation Act 1987 (affects part formerly Lot 2 DP 27337 contained in CT OT19A/536)

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 CT OT19A/538)

Subject to Section 11 Crown Minerals Act 1991 (affects part formerly Lot 2 DP 27337 contained in CT OT19A/536)

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

Part formerly Section 35 Block I Wakefield Survey District contained in CT 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 a right of way over part marked K, a right to store water and to pump water over part marked Q and a right to convey electricity, telecommunications and computer media over parts marked E, K, L and Q on DP 490342 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)

Appurtenant hereto is a right of way, right to store water and a vineyard management purposes easement created by Easement Instrument 10435540.8 - 2.8.2016 at 2:41 pm

Subject to a right to convey water over part marked RA, CE, K, L and Q on DP 490342 created by Easement Instrument 10570977.1 - 23.9.2016 at 11:13 am

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

Subject to a right to convey water over parts marked RA and CE on DP 490342 created by Easement Instrument 11086083.1 - 7.8.2018 at 11:50 am

Subject to a right to convey water over part marked X on DP 522616 created by Easement Instrument 11245556.5 - 18.10.2018 at 9:15 am

Subject to a right (in gross) to convey electricity over part marked E on DP 490342 and over part marked X on DP 522616 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 X on DP 522616 and over part marked E on DP 490342 in favour of Chorus New Zealand Limited created by Easement Instrument 11284981.2 - 22.11.2018 at 3:37 pm

Quickmap Title Details

Information last updated as at 15-Dec-2019

RECORD OF TITLE
DERIVED FROM LAND INFORMATION NEW ZEALAND
FREEHOLD

Identifier **OT19A/535**

Land Registration District **Otago**

Date Issued 20 September 1999

Prior References

OT16A/941 OT17C/535

Type Fee Simple

Area 33.6305 hectares more or less

Legal Description Lot 1 Deposited Plan 27337

Registered Owners

Rockburn Wines Limited

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

979613.8 Mortgage to Bank of New Zealand - 7.12.1999 at 10.54 am

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

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

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 to convey water created by Easement Instrument 10570977.1 - 23.9.2016 at 11:13 am

Quickmap Title Details

Information last updated as at 15-Dec-2019

RECORD OF TITLE
DERIVED FROM LAND INFORMATION NEW ZEALAND
FREEHOLD

Identifier **829493**

Land Registration District **Otago**

Date Issued 18 October 2018

Prior References

707766

Type Fee Simple

Area 20.8267 hectares more or less

Legal Description Lot 1 Deposited Plan 522616

Registered Owners

Chard Farm Trustees Limited

Subject to a right to convey water over parts marked PC, PB on DP 522616 created by Transfer 975233.8 - 20.9.1999 at 10.49 am

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

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

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

Subject to a right of way over parts marked FB, J on DP 522616 and a right to store water over part marked FB on DP 522616 and a vineyard managment purposes easement over parts marked MA, MB, J on DP 522616 created by Easement Instrument 10435540.8 - 2.8.2016 at 2:41 pm

Appurtenant hereto is a right of way, right to store water and pump water and 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)

Appurtenant hereto is a right to convey water 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 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

Subject to a right of way over parts marked PB, PC, A, B, FB, J, MA on DP 522616, a right to convey water over parts marked PB, PC, FB, J, MA, MB, O, A, PC on DP 522616 and a right to convey electricity, telecommunications and computer media over parts marked FB, J, MA, MB, O, A, PC on DP 522616 created by Easement Instrument 11245556.7 - 18.10.2018 at 9:15 am

Appurtenant hereto is a right of way, 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

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

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

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 CT OT19A/538)

Part formerly Section 35 Block I Wakefield Survey District contained in CT 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 CT OT19A/538)

11273127.3 Mortgage to Southland Building Society - 14.11.2018 at 4:44 pm

11471418.2 CAVEAT BY AURORA ENERGY LIMITED - 19.6.2019 at 3:07 pm

Quickmap Title Details

Information last updated as at 15-Dec-2019

RECORD OF TITLE
DERIVED FROM LAND INFORMATION NEW ZEALAND
FREEHOLD

Identifier **OT19A/907**

Land Registration District **Otago**

Date Issued 26 November 1999

Prior References

OT19A/536

Type Fee Simple

Area 48.1699 hectares more or less

Legal Description Lot 4 Deposited Plan 27494

Registered Owners

Rabbit Enterprises Limited

Subject to Part IV A Conservation Act 1987

Subject to Section 11 Crown Minerals Act 1991

885377.6 Easement Certificate specifying the following easements - 28.6.1995 at 10.27 am

Type	Servient Tenement	Easement Area	Dominant Tenement	Statutory Restriction
Right of way	Lot 3 Deposited Plan 24478 - CT OT16B/1161	A DP 24478	Lot 4 Deposited Plan 27494 - herein	
Right of way	Lot 2 Deposited Plan 25665 - CT OT17D/54	B DP 24478	Lot 4 Deposited Plan 27494 - herein	

914599.11 Easement Certificate specifying the following easements - 21.8.1996 at 1.45 pm

Type	Servient Tenement	Easement Area	Dominant Tenement	Statutory Restriction
Water race	Lot 1 Deposited Plan 25510 - CT OT17C/533	a-b DP 22510	Lot 4 Deposited Plan 27494 - herein	
Convey water	Lot 1 Deposited Plan 25510 - CT OT17C/533	b-c DP 22510	Lot 4 Deposited Plan 27494 - herein	

Store water	Lot 1 Deposited Plan 25510 - CT OT17C/533	D DP 22510	Lot 4 Deposited Plan 27494 - herein	

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 4 Deposited Plan 27494 - herein	Resource Management Act 1991 Section 243 (a)
Right of way	Lot 1 Deposited Plan 27337 - CT OT19A/535	B DP 27337	Lot 4 Deposited Plan 27494 - herein	Resource Management Act 1991 Section 243 (a)

5523670.6 Mortgage to Southland Building Society - 18.3.2003 at 9:00 am

Subject to a right (in gross) for telecommunication purposes over parts marked C & D on DP 321420 in favour of Telecom New Zealand Limited created by Transfer 6108297.6 - 9.8.2004 at 9:00 am

Subject to a right (in gross) to convey electricity over parts marked C & D on DP 321420 in favour of Aurora Energy Limited created by Easement Instrument 6108297.7 - 9.8.2004 at 9:00 am

6504564.1 Variation of Mortgage 5523670.6 - 21.7.2005 at 9:00 am

Subject to a right (in gross) to convey electricity and transform electricity (includes a right to establish and maintain an electricity transformer and ancillary equipment) over part marked A on DP 347372 in favour of Aurora Energy Limited created by Easement Instrument 6972005.1 - 2.8.2006 at 9:00 am

Appurtenant hereto is a right of way created by Easement Instrument 7489310.15 - 3.8.2007 at 9:00 am

7489310.9 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 to occupy for bore and pump and a right to convey water created by Easement Instrument 7909829.4 - 18.8.2008 at 9:00 am

9460669.1 CAVEAT BY AURORA ENERGY LIMITED - 16.7.2013 at 4:05 pm

Subject to a right (in gross) to convey and transform electricity over part marked B on DP 490342 in favour of Aurora Energy Limited created by Easement Instrument 10435540.6 - 2.8.2016 at 2:41 pm

Subject to a right (in gross) to convey telecommunications and computer media over part marked C on DP 490342 in favour of Chorus New Zealand Limited created by Easement Instrument 10435540.7 - 2.8.2016 at 2:41 pm

View Instrument Details

Instrument No.	10994522.1
Status	Registered
Date & Time Lodged	19 Dec 2017 12:03
Lodged By	O'Neill, Joseph Gerard
Instrument Type	Certificate Specifying Mining Rights under s417 Resource Management Act 1991

Affected Computer Registers	Land District
180117	Otago
707766	Otago

Annexure Schedule: Contains 3 Pages.

Signature

Signed by Joseph Gerard O'Neill as Permit Holder Representative on 05/02/2018 10:32 AM

***** End of Report *****

Otago Regional Council

Our reference: A410208

File Number: 2904

CERTIFICATE UNDER S. 417 OF THE RESOURCE MANAGEMENT ACT 1991

oOo

Pursuant to Section 417(2) of the Resource Management Act 1991, the Otago Regional Council hereby certifies that:

Mark II Limited
of Donaldson Chartered Accountants Limited, 162 Dee Street, Invercargill

Pisa Holdings Limited
of Level 5, 25 Broadway, Newmarket, Auckland

Stuart Douglas Hawker and Phillipa Mary Hawker
225 Cannon Hill Crescent, Christchurch

Robert Stanley Perriam
Lowburn, RD 3, Cromwell

being registered as holders of Licence for Race No. 2904C, Cromwell Registry of the Warden's Court which was granted in substitution of water race licence No 765, are entitled to cut, construct, and maintain a water race, or to use as a water race any natural channel (but only where that channel has been so used under the licences); to occupy (but only for the purposes of the construction, maintenance, and improvement of the race) the land forming the course of the race plus a strip 6.1 metres wide (20 feet) along the entire length of the race, and measured either wholly on one side of its course or partly on one side and partly on the other, so that the total on both sides does not exceed 6.1 metres; to deposit within those strips any material removed from the race in the course of maintaining and improving it, and to convey water in the race, across the lands described in the Schedule, as indicated on the attached diagram.

Peter Cornelius William Bodeker
Chief Executive

Dated this 26th day of October 2017.

THE COMMON SEAL of the
OTAGO REGIONAL COUNCIL
Was hereunto affixed in the
Presence of:

OTAGO REGIONAL COUNCIL Common Seal

Nicholas James Francis Donnelly
Director Corporate Services

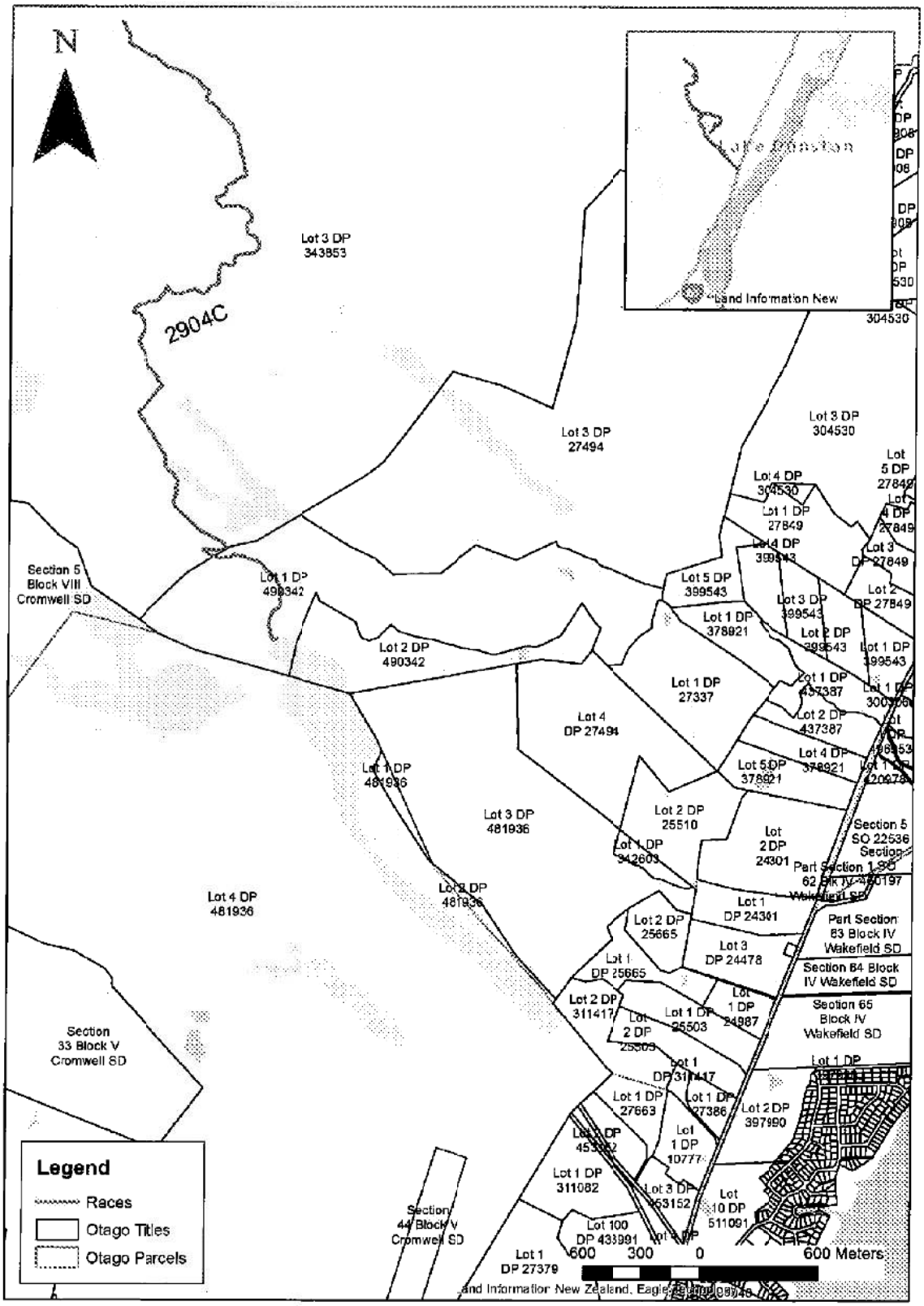
Otago Regional Council

SCHEDULE

Land Affected	Title Reference	Owner
Lot 3 DP 343853	180117	Mt Pisa Station Holdings Limited
Lot 1 DP 490342	707766	Mark II Limited

Otago Regional Council

Race 2904C



View Instrument Details

Instrument No.	10994522.3
Status	Registered
Date & Time Lodged	19 Dec 2017 12:03
Lodged By	O'Neill, Joseph Gerard
Instrument Type	Certificate Specifying Mining Rights under s417 Resource Management Act 1991

Affected Computer Registers	Land District
677069	Otago
707766	Otago
707767	Otago

Annexure Schedule: Contains 5 Pages.

Signature

Signed by Joseph Gerard O'Neill as Permit Holder Representative on 05/02/2018 10:32 AM

***** End of Report *****

Otago Regional Council

Our reference: A1030741

File Number: 2904

CERTIFICATE UNDER S. 417 OF THE RESOURCE MANAGEMENT ACT 1991

oOo

Pursuant to Section 417(2) of the Resource Management Act 1991, the Otago Regional Council hereby certifies that:

Stuart Douglas Hawker and Phillipa Mary Hawker
of 225 Cannon Hill Crescent, Christchurch

being registered as holders of Licence for a Branch Race No. 2904E granted in substitution of branch races 3139 and 8746 Cromwell Registry of the Warcen's Court, are entitled to cut, construct, and maintain a water race, or to use as a water race any natural channel (but only where that channel has been so used under the licences); to occupy (but only for the purposes of the construction, maintenance, and improvement of the race) the land forming the course of the race plus a strip 6.1 metres wide (20 feet) along the entire length of the race, and measured either wholly on one side of its course or partly on one side and partly on the other, so that the total on both sides does not exceed 6.1 metres; to deposit within those strips any material removed from the race in the course of maintaining and improving it, and to convey water in the race, across the lands described in the Schedule, as indicated on the attached diagram.

Peter Cornelius William Bodeker
Chief Executive

Dated this 27th day of October 2017

THE COMMON SEAL of the
OTAGO REGIONAL COUNCIL
Was hereunto affixed in the
Presence of:

OTAGO REGIONAL COUNCIL Common Seal

Nicholas James Francis Donnelly
Director Corporate Services

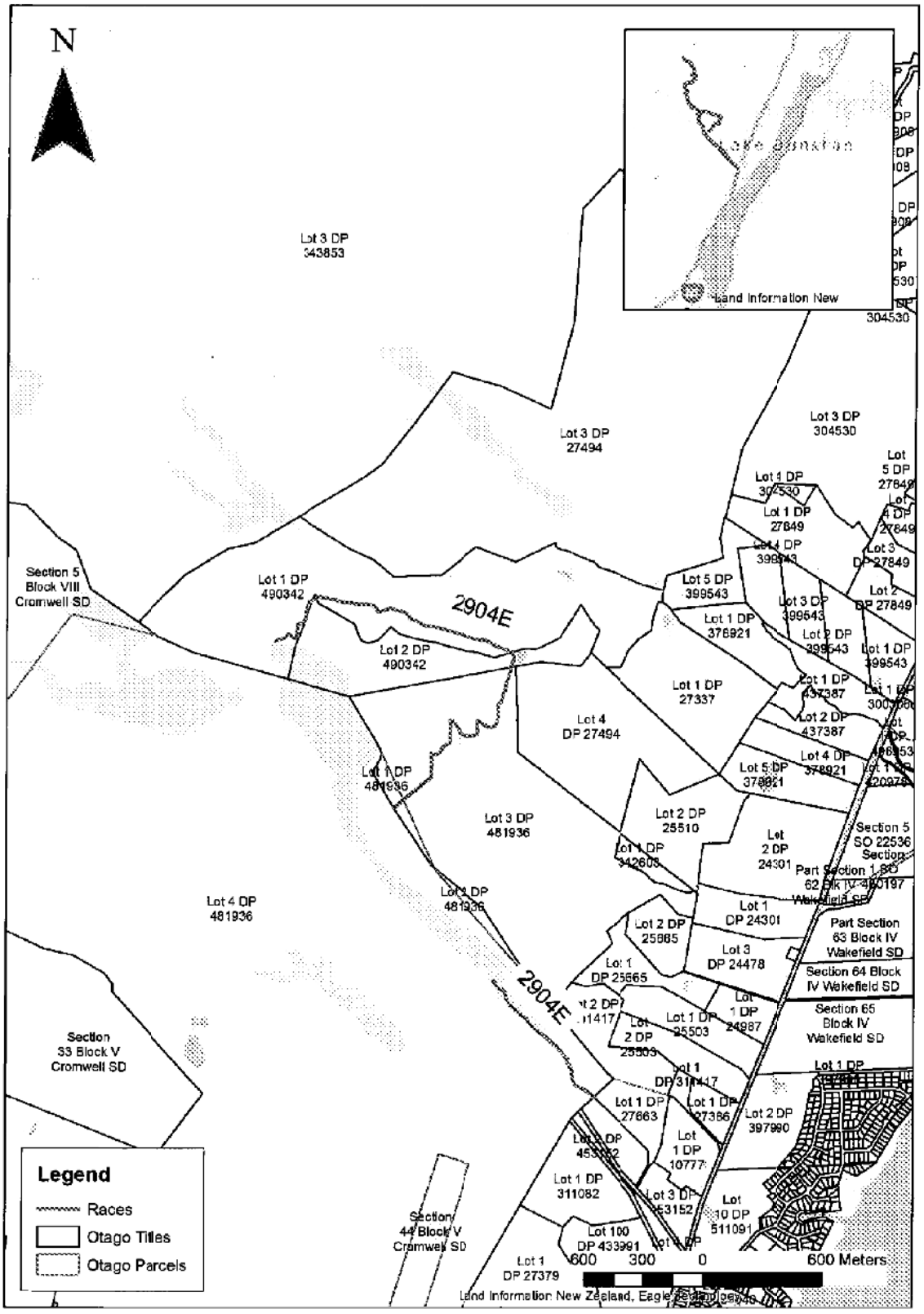
Otago Regional Council

SCHEDULE

Land Affected	Title Reference	Owner
Lot 1 DP 490342	707766	Mark II Limited
Lot 2 DP 490342	707767	Mark II Limited
Lot 4 DP 481936	677069	Smallburn Limited

Otago Regional Council

BRANCH RACE 2904E



ANNEXURE SCHEDULE - CONSENT FORM[1]

Land Transfer Act 1952 section 238(2)

Person giving consent	Capacity and interest of Person giving consent
AURORA ENERGY LIMITED	Caveator under Caveat Number 6381707.1 Caveator under Caveat Number 10770607.1 Caveator under Caveat Number 10469931.1

Consent

Delete words in [ ] if inconsistent with the consent
State full details of the matter for which consent is required

[Without prejudice to the rights and powers existing under the interest of the person giving consent,]

the person giving consent hereby consents to registration against the Certificates of Title of Certificates under Section 417 of the Resource Management Act 1991 in respect of the following:

Caveat Number 6381707.1	Certificate of Title 45041
Caveat Number 10770607.1	Certificate of Title 580086
Caveat Number 10469931.1	Certificate of Title 677069

Dated this 26th day of January 2018

Attestation

Signed by Aurora Energy Limited by its Attorney	Signed in my presence by the Person giving consent *Signature of Witness* *Witness to complete in BLOCK letters (unless legibly printed):* **Witness name** Karen Bainbridge **Occupation** Personal Assistant **Address** 11 Tor Street Vauxhall Dunedin
Signature [Common seal] of Person giving consent	

[1] An Annexure Schedule in this form may be attached to the relevant instrument, where consent is required to enable registration under the Land Transfer Act 1952, or other enactments, under which no form is prescribed.

CERTIFICATE OF NON-REVOCATION OF POWER OF ATTORNEY

I, **GARY GRAEME DIXON**, of Dunedin, Chief Financial Officer and General Manager – Finance and Systems, hereby certify –

1. That by Deed dated 14 December 2012 **AURORA ENERGY LIMITED** having its registered office at 10 Halsey Street, Dunedin ("the Company") appointed me as its Attorney on the terms and subject to the conditions set out in the said Deed.

2. That at the date hereof I have not received any notice or information of the revocation of that appointment.

SIGNED at Dunedin this
26th day of January
2017

View Instrument Details

Instrument No.	10994522.2
Status	Registered
Date & Time Lodged	19 Dec 2017 12:03
Lodged By	O'Neill, Joseph Gerard
Instrument Type	Certificate Specifying Mining Rights under s417 Resource Management Act 1991

Affected Computer Registers	Land District
45041	Otago
580085	Otago
580086	Otago
677069	Otago
707766	Otago
OT1C/733	Otago

Annexure Schedule: Contains 5 Pages.

Signature

Signed by Joseph Gerard O'Neill as Permit Holder Representative on 05/02/2018 10:32 AM

***** End of Report *****

Otago Regional Council

Our reference: A1030730

File Number: 2904

CERTIFICATE UNDER S. 417 OF THE RESOURCE MANAGEMENT ACT 1991

oOo

Pursuant to Section 417(2) of the Resource Management Act 1991, the Otago Regional Council hereby certifies that:

Robert Stanley Perriam
of Wakefield, RD 3, Cromwell

being registered as holders of Licence for a Branch Race No. 2904D which was granted in substitution of branch races 6709 and 8537 Cromwell Registry of the Warden's Court, are entitled to cut, construct, and maintain a water race, or to use as a water race any natural channel (but only where that channel has been so used under the licences); to occupy (but only for the purposes of the construction, maintenance, and improvement of the race) the land forming the course of the race plus a strip 6.1 metres wide (20 feet) along the entire length of the race, and measured either wholly on one side of its course or partly on one side and partly on the other, so that the total on both sides does not exceed 6.1 metres; to deposit within those strips any material removed from the race in the course of maintaining and improving it, and to convey water in the race, across the lands described in the Schedule, as indicated on the attached diagram.

Peter Cornelius William Bodeker
Chief Executive

Dated this 26th day of October 2017

THE COMMON SEAL of the
OTAGO REGIONAL COUNCIL
Was hereunto affixed in the
Presence of:

OTAGO REGIONAL COUNCIL Common Seal

Nicholas James Francis Donnelly
Director Corporate Services

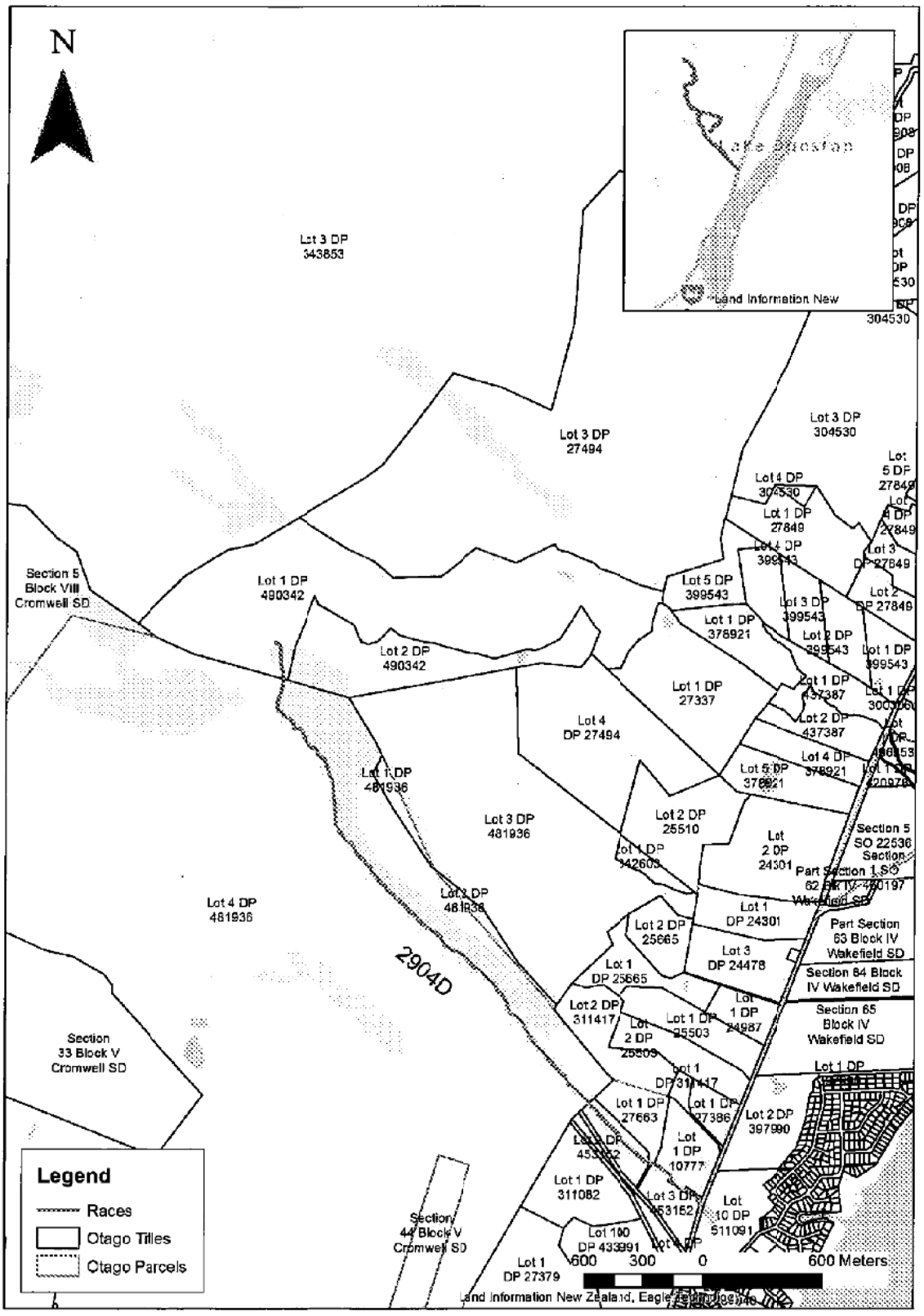
Otago Regional Council

SCHEDULE

Land Affected	Title Reference	Owner
Lot 1 DP 490342	707766	Mark II Limited
Lot 4 DP 481936	677069	Small Burn Limited
Lot 1 DP 453152	580085	Wakefield Estates Limited
Lot 3 DP 453152	580086	Wakefield Estates Limited
Lot 1 DP 27663	45041	Surveyor Thompson Wines Limited
Lot 1 DP 10777	OT1C/733	Cherry Futures Limited

Otago Regional Council

Branch Race 2904D



ANNEXURE SCHEDULE - CONSENT FORM[1]

Land Transfer Act 1952 section 238(2)

Person giving consent	Capacity and interest of Person giving consent
AURORA ENERGY LIMITED	Caveator under Caveat Number 6381707.1 Caveator under Caveat Number 10770607.1 Caveator under Caveat Number 10469931.1

Consent

Delete words in [ ] if inconsistent with the consent
State full details of the matter for which consent is required

[Without prejudice to the rights and powers existing under the interest of the person giving consent,]

the person giving consent hereby consents to registration against the Certificates of Title of Certificates under Section 417 of the Resource Management Act 1991 in respect of the following:

Caveat Number 6381707.1	Certificate of Title 45041
Caveat Number 10770607.1	Certificate of Title 580086
Caveat Number 10469931.1	Certificate of Title 677069

Dated this 24th day of January 2018

Attestation

Signed by Aurora Energy Limited by its Attorney	Signed in my presence by the Person giving consent *Signature of Witness* *Witness to complete in BLOCK letters (unless legibly printed):* **Witness name** Karen Bainbridge **Occupation** Legal Assistant **Address** 11 Tarr Street Vauxhall Dunedin
Signature [Common seal] of Person giving consent	

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CERTIFICATE OF NON-REVOCATION OF POWER OF ATTORNEY

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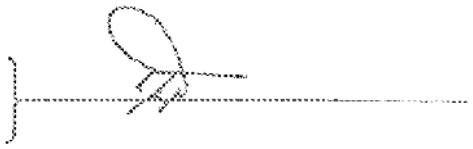
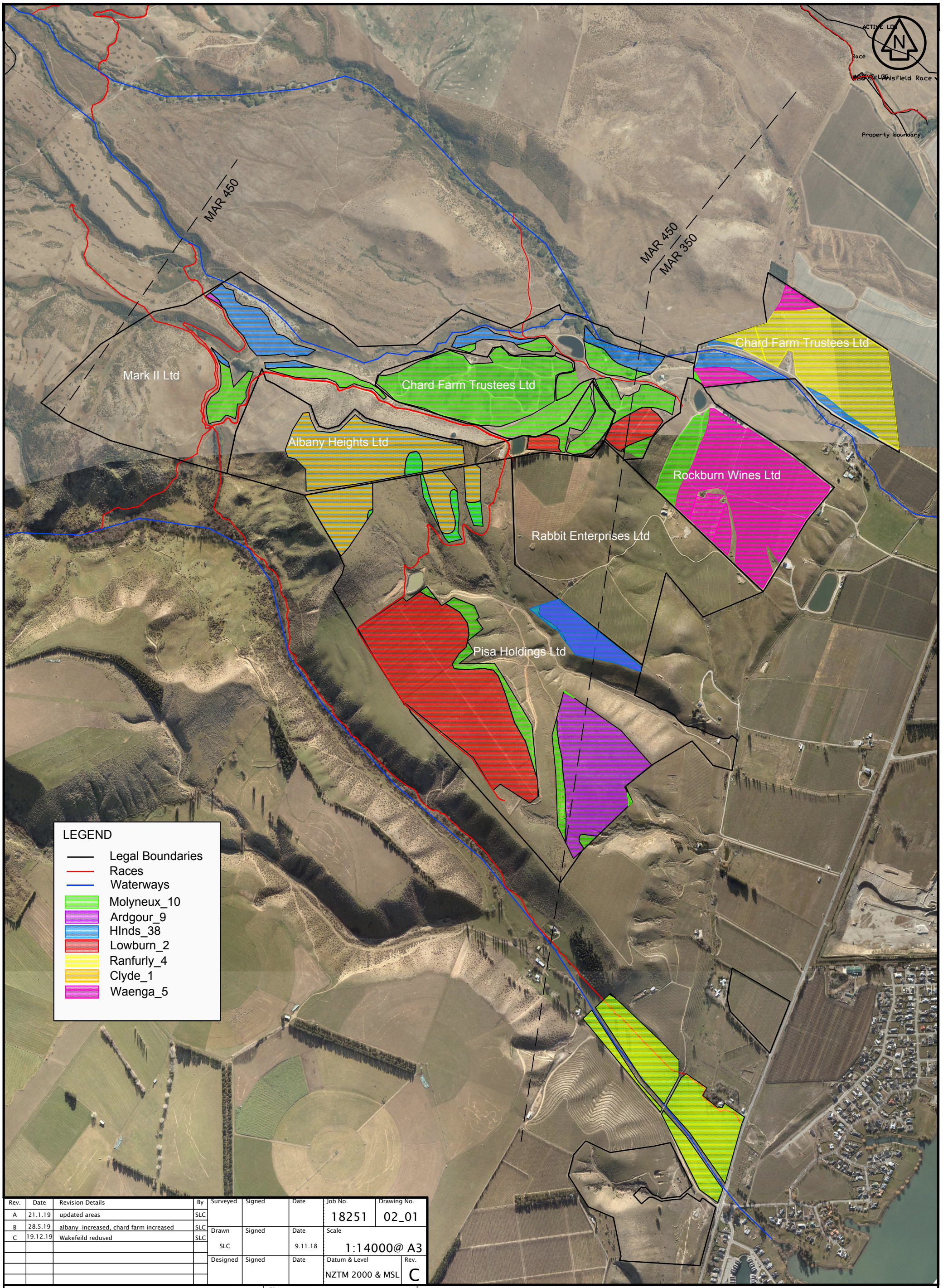
1. That by Deed dated 14 December 2012 **AURORA ENERGY LIMITED** having its registered office at 10 Halsey Street, Dunedin ("the Company") appointed me as its Attorney on the terms and subject to the conditions set out in the said Deed.

2. That at the date hereof I have not received any notice or information of the revocation of that appointment.

SIGNED at Dunedin this 26th day of January 2017



Appendix C: Soil map and efficient water use calculations



Rev.	Date	Revision Details	By
A	21.1.19	updated areas	SLC
B	28.5.19	albany increased, chard farm increased	SLC
C	19.12.19	Wakefeild redused	SLC

Surveyed	Signed	Date	Job No. 18251	Drawing No. 02_01	
Drawn SLC	Signed	Date 9.11.18	Scale 1:14000@ A3		
Designed	Signed	Date	Datum & Level NZTM 2000 & MSL	Rev. C	

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Client
PISA HOLDINGS LTD

NOTES
- All dimensions shown are in metres unless otherwise shown
- Copyright on this drawing is reserved
- Check any electronic data against the hardcopy plan to ensure it is the latest version
-If this plan is being used as part of sale and purchase agreement then it is done so on the basis that it is preliminary only, final dimensions and areas may vary on final survey

SOILS PLAN
PISA HOLDINGS LIMITED

L:\18251 - Pisa Holdings Ltd - Deemed Permit Replacement\CAD\18251_01_PROPERTY OWNERS_REV D.dwg Plotted: 19.12.2019

Aqualinc calculations walkthrough

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

Frost fighting

ORC's resource consent application form 4 recommends a maximum of 3mm/hour (30 m^3/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, impacting both grapes and cherries) and a total of 9 autumn frost events (impacting grapes only), therefore frost fighting volumes have been calculated and integrated into the total volumes sought as follows:

- 27 ha of vineyard (Rockburn, Wakefield) use or plan to use overhead sprinklers for frost fighting. All other vineyards and orchards use helicopters or wind machines for frost fighting.
- Daily frost fighting maximum: 30*10*27 = 8,100 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. Annual frost fight volume = 9,990*21 = 170,100.

As part of the calculations, it was assumed that no irrigation water is required on those properties with overhead sprinklers during frost events.

Stock drinking

Stock drinking requirements are calculated based on current and proposed stock numbers (87 cows, 302 ewes).

Stock units/water use	ORC guidelines (per Form 4)	Water required (L/day)
302 mixed age ewes	5 L/head/day	1,510
87 beef cattle	40 L/head/day	3,480
3 heifers		120
Total		5,110

Current irrigation demand

Landowner	Soils	Areas	Ha in MAR 300-400 Zone	HA in MAR 400 - 500 Zone	Smaps PAW	1000 mm PAW	900 mm PAW	600 mm PAW	Peak Daily demand (mm/day) MAR 350	Peak Daily demand (mm/day) MAR 450	M3/day	Monthly Demand (mm/m) 350 MAR	Monthly Demand (mm/m) 450 MAR	M3/MONTH	90% ile Annual Demand (mm/yr) 350 MAR	90% ile Annual Demand (mm/yr) 450 MAR	M3/YEAR	100%ile Annual demand (mm/yr) 350 MAR	100%ile Annual Deamd (mm/yr) 450 MAR	M3/Year
	Ranfurly Pasture	15.9	15.9	0	53			60	5.2	5.1	827	161	158	25,599	866	791	137,694	988	913	157,092
Wakefield	*Total*	*15.9*	*15.9*								*827*			*25,599*			*137,694*			*157,092*
	Ardgour Cherries	14.1	10.6	3.5	40	60			5.7	5.6	800	177	174	24,852	786	750	109,566	898	847	124,833
	Molyneux Cherrie	4.9	0.3	4.6	36	60			5.7	5.6	275	177	174	8,535	786	750	36,858	898	847	41,656
	Lowburn Cherries	26.8	0	26.8	38	60			5.7	5.6	1,501	177	174	46,632	786	750	201,000	898	847	226,996
Pisa holdings Ltd	*Total*	*45.8*									*2,576*			*80,019*			*347,424*			*393,485*
	Molyneux Vines	2.9	1.9	1	36		40		2.42	2.42	70	75	75	2,175	258	239	7,292	329	293	9,181
	Lowburn Vines	2.1	1.5	0.6	36		40		2.42	2.42	51	75	75	1,575	258	239	5,304	329	293	6,693
Mark II Limited	Total	5									121			3,750			12,596			*15,874*
	Ranfurly Vines	16.7	16.7	0	53		60		2.42	2.42	404	75	75	12,525	248	229	41,416	332	281	55,444
	Waenga Vines	0.9	0.9	0	55		60		2.42	2.42	22	75	75	675	248	229	2,232	332	281	2,988
	Hinds Vines	0.6	0.6	0	199		200		2.42	2.42	15	77	77	462	203	183	1,218	290	227	1,740
Chard Farm	Total	18.2									440.44			13662			44,866			60,172
	Molyneux Vines	3.3	3.3	0	36		40		2.42	2.42	80	75	75	2,475	258	239	8,514	329	293	10,857
	Waenga Vines	21.4	21.4	0	55		60		2.42	2.42	518	75	75	16,050	248	229	53,072	332	281	71,048
Rockburn Wines	Total	24.7									597.74			18525			61,586			81,905
	Molyneux Vines	1.6	0	1.6	36		40		2.42	2.42	39	75	75	1,200	258	239	3,824	329	293	4,688
	Lowburn Vines	0.8	0	0.8	36		40		2.42	2.42	19	75	75	600	258	239	1,912	329	293	2,344
Albany Heights Ltd	*Total*	*2.4*									*58.08*			*1800*			*5,736*			*7,032*
	Total	*112*									*4,620*			*143,355*			*609,902*			*715,560*

Proposed Irrigation demand

Landowner	Soils	Areas	Ha in MAR 300-400 Zone	HA in MAR 400 - 500 Zone	SMAPS PAW	1000 mm PAW	900 mm PAW	600 mm PAW	Peak Daily demand (mm/day) MAR 350	Peak Daily demand (mm/day) MAR 450	M3/day	Monthly Demand (mm/m) 350 MAR	Monthly Demand (mm/m) 450 MAR	M3/MONTH	90% ile Annual Demand (mm/yr) 350 MAR	90% ile Annual Demand (mm/yr) 450 MAR	M3/YEAR	100% ile Annual Demand (mm/yr) 350 MAR	100% ile Annual Demand (mm/yr) 450 MAR	M3/YEAR
	Molyneux Vines	1.2	1.2	0	36		40		2.42	2.42	29	75	75	900	258	239	3,096	329	293	3948
Wakefield	*Total*	*1.2*									*29.04*			*900*			*3,096*			*3,948*
	Ardgour Cherries	3.9	1.2	2.7	40	60			5.7	5.6	220	177	174	6,822	786	750	29,682	898	847	33,645
	Molyneux Cherrie	1.74	0	1.74	36	60			5.7	5.6	97	177	174	3,028	786	750	13,050	898	847	14,738
	Clyde Cherries	7.6	7.6	0	42	60			5.7	5.6	433	177	174	13,452	786	750	59,736	898	847	68,248
Pisa holdings Ltd	*Total*	*13.24*									*317.04*			*9,850*			*42,732*			*116,631*
	Molyneux Vines	9.6	0.09	9.51	36		40		2.42	2.42	232	75	75	7,200	258	239	22,961	329	293	28160.4
	Hinds Vines	7.8	0.7	7.7	199		200		2.42	2.42	203	77	77	6,468	203	183	15,512	290	227	19509
	Ardgour Vines	0.1	0	0.1	40		40		2.42	2.42	2	75	75	75	258	239	239	329	293	293
Mark II Limited	*Total*	*17.5*									*438.02*			*13,743*			*38,712*			*47,962*
	Waenga vines	1.3	1.3	0	55		60		2.42	2.42	31	75	75	975	248		3,224	332	281	4316
	Hinds Vines	1.8	1.8	0	199		200		2.42	2.42	44	77	77	1,386	203		3,654	290	227	5220
	Molyneux Vines	0.03	0.03	0	36		40		2.42	2.42	1	75	75	23	258	239	77	329	293	98.7
	Ranfurly Vines	1.1	1.1	0	53		60		2.42	2.42	27	75	75	825	248		2,728	332	281	3652
Chard Farm	Total	4.23									*102*			3,209			9,683			13,287

	Waenga Vines	1.7	1.7	0	55	60	2.42	2.42	41	75	75	1,275	248		4,216	332	281	5644
ckburn Vineyards L	Total	1.7							41			1,275			4,216			5,644
	Clyde Cherries	12	0	12	42	60	5.7	5.6	672	177	174	20,880	786	750	90,000	898	847	101640
	Molyneux Cherrie	0.5	0	0.5	36	60	5.7	5.6	28	177	174	870	786	750	3,750	898	847	4235
	Molyneux Vines	2	0	2	36	40	2.42	2.42	48	75	75	1,500	258	239	4,780	329	293	5860
	Lowburn Vines	1.3	0	1.3	36	40	2.42	2.42	31	75	75	975	258	239	3,107	329	293	3809
Albany Heights Ltd	Total	15.8							780			24,225			101,637			115,544
	Total	*53.67*							*1,707*			*53,201*			*200,077*			*303,016*

		total m3/da	6,327	total m3/mc	196,556
	165.67	L/day	6,327,226		
Frost fighting ha (existing +proposed):	27	L/s	73.23		

				TOTAL	809,979		1,018,576

Volume	Daily (m^3)	Monthly (m^3)	Annual (m^3)
Total Required (per Aqualinc calcs)	6,327	196,556	1,018,576
Aqualinc irrigation requirements - frost fighting areas	5,563		
Current paper allocation	14,400[1]	416,750	Not specified
Frost-fighting requirements[2]	8,100	64,800	170,100
Stock drinking requirements	5	152	1825
Baseflow required outside irrigation season[3]	-	-	83,376
Volume sought	13668	255390	1257818

123% of Aqualinc irrigation volume

158 L/s

Attachment D: Amisfield Burn hydrology report

TECHNICAL COMMENT

Date: 28 May 2019 Our Ref: 18249; 18251; 18344

To: Zoe McCormack, Senior Planner, Landpro Ltd

From: Christina Bright, Environmental Scientist, Landpro Ltd

Subject: Hydrological assessment prepared for the water users of the Amisfield Burn; Smallburn Limited, Pisa Holdings Ltd, and Lowburn Land Holdings Ltd.

---

1. Background

Smallburn Limited, the users of 95789 (Pisa Holdings Limited, Wakefield Estates Limited, Rockburn Wines Limited, S&P Hawker, and Albany Heights Limited) and Lowburn Land Holdings Partnership wishes to obtain resource consent from the Otago Regional Council to continue abstracting water from the Amisfield Burn for pasture and crop irrigation. The consent numbers relevant to this assessment on the Park Burn are RM15.007.1, 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 Amisfield Burn. Specifically, to:

- Estimate the natural loses and gains of a preidentified reach of the Amisfield Burn;
- Estimate the naturalised 7-day mean annual low flow (7-day MALF) for the abstraction points on the property so that available allocation can be determined;
- Estimate the mean annual flow of the Amisfield Burn so that available supplementary allocation can be determined; and
- Determine the flow of a tributary of the Amisfield Burn (Breakneck Creek).

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Table 1: Summary of permits for Amisfield Burn Catchment.

Permit	Permit holder	Creek	Consented Rate of take/volume	Location of intake (NZTM 2000)
97358A (take)	Lowburn Landholdings Limited Partnership	Breakneck	200,000 L/hour (55.6 L/s)	1301270E 5019397N
97358B (discharge)	Lowburn Landholdings Limited Partnership	Breakneck	200,000 L/hour (55.6 L/s)	1301270E 5019397N
96320.V1	Smallburn Limited	Breakneck	200,000 L/hour (55.6 L/s)	1301270E 5019397N
96321.V1	Smallburn Limited	Amisfield Burn	150,000 L/hour (41.7 L/s)	1300929E 5018701N
95789	Wakefield Estates Limited; Rockburn Wines Limited; Pisa Holdings Limited; Mark II Limited; J&J Sinclair; S&P Hawker; Albany Heights Limited; Chard Farm Trustees Limited	Amisfield burn	600,000 L/hour (166.7 L/s) 416,570 m3/month	1300755E 5018662N
97232	Lowburn Landholdings Limited Partnership	Amisfield Burn	300,000 L/hour (83.3L/s)	1303300E 5017791N

Figure 1 shows the location of the creek in relation to the relevant properties and other watercourses in the vicinity.

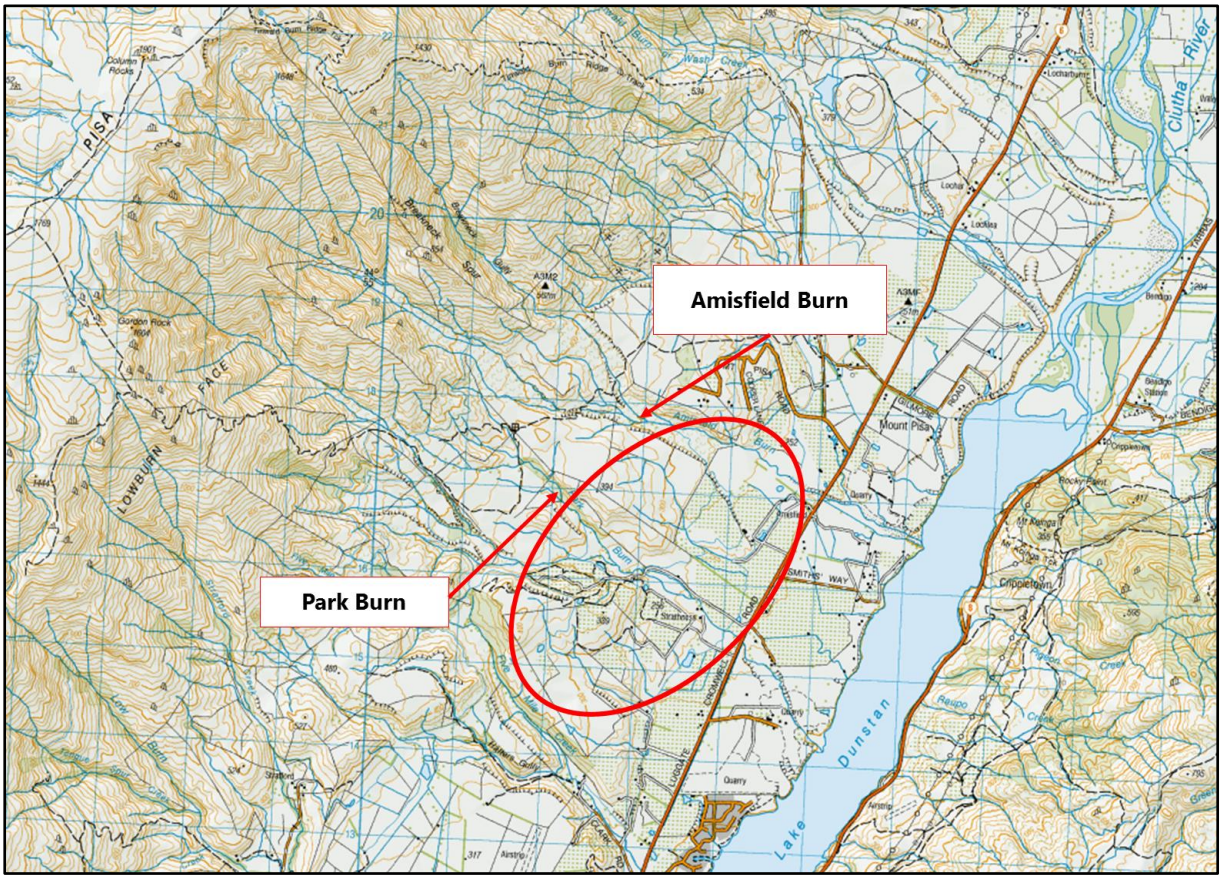

Figure 1: Site location map in relation to surface water bodies and general location of properties (red circle). [Source: NZ topo map]

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 km^2. 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 plans 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 own and irrigate land to the northwest of Lake Dunstan along the Pisa Range. The Amisfield 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 gently rolling land at the foothills of the range.

The hydrology of the Amisfield Burn is fed primarily through runoff from the upper Pisa Range, and in winter and spring runoff is predominately driven by snow melt. The Amisfield Burn originates high up in a gully of the Low Burn face at approximately 1700 meters above sea level (mamsl) where it drains down to 200 mamsl at its confluence with Lake Dunstan. Breakneck Creek is a significant tributary of the Amisfield Burn and drains from a similar elevation, joining the main stem of the Amisfield Burn at 300mamsl.

Since October 2013, a continuous flow monitoring site has been maintained by the Otago Regional Council on the Amisfield Burn above the upper most point of take. This continuous record (Figure 2) shows the creek follows the typical behavior of steep headwater streams, with fast to respond event specific hydrographs. Based on this record, basic flow statistics have been determined (Table 2).

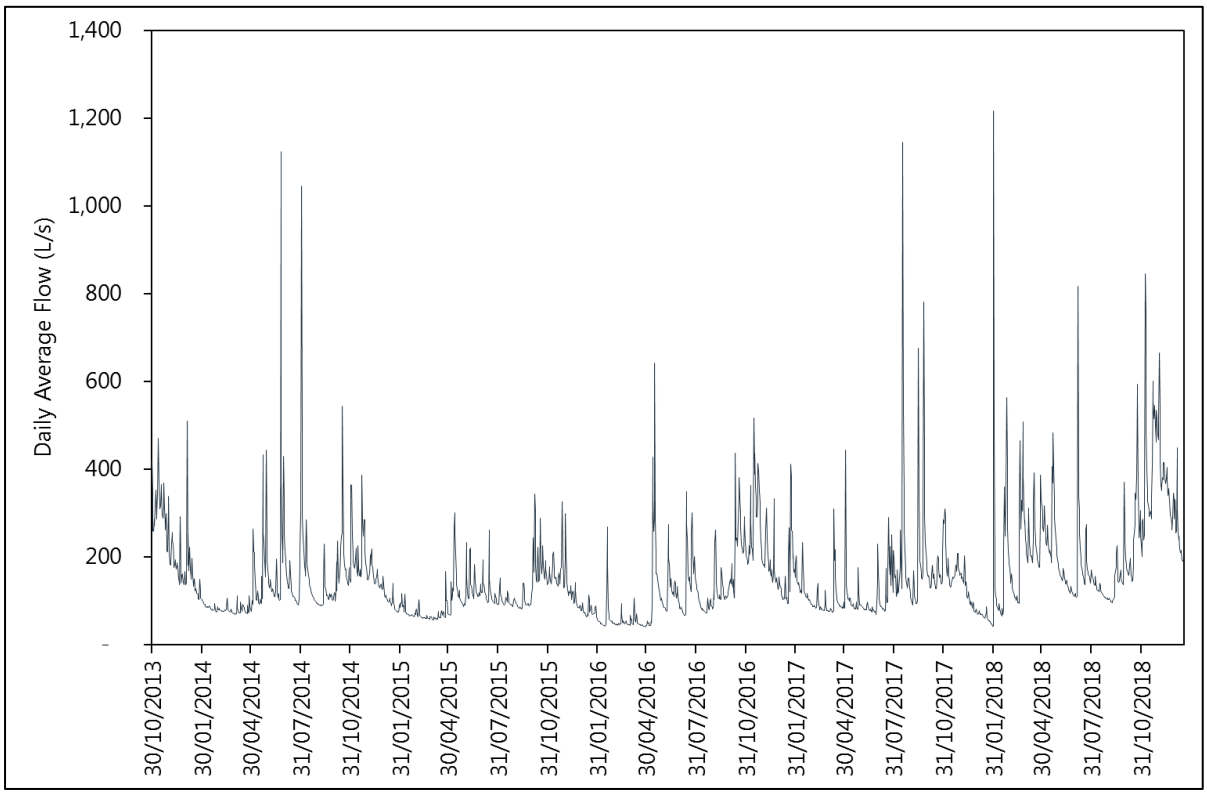

Figure 2: Daily flow for Amisfield Burn monitoring site located in upper reaches of the catchment, unaffected by abstraction.

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

Table 2: Flow statistics for the Amisfield Burn and Lowburn. [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
Lowburn 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 15 January 2019 by Landpro Limited to determine the quantity of water flowing at various sites throughout the Amisfield Burn. A total of five reaches were selected for assessment. These were located upstream from the upper most water take, through the middle reaches of the Amisfield Burn catchment, and lower in the catchment on the lowland alluvial gravels. A flow assessment was also conducted on the upper reach of the Breakneck Creek, above the upper most point of take. For the duration of the survey and for 24hours 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

AMIS1: Amisfield Burn Upper

Flow gauging site approximately 3 meters upstream from point of take diversion. True left side of stream grassy whilst the true right side had much taller woody vegetation. River Bed relatively sandy with pebbles, stream bounded by bedrock boulder on true right side.

BREAK1: Breakneck Creek Upper

Flow gauging site approximately 1.5 meters upstream from point of take diversion. True left and right sides of the stream had low lying vegetation, with scrub. Stream bed consisted of sand with pebbles, little algae cover.

AMIS2: Amisfield Burn mid catchment

Flow gauging site approximately 5 meters down from Breakneck Creek and Amisfield Burn confluence. True left and right side express significant vegetation growth with large trees. Stream bed consisted of boulders and cobbles with significant algae covering.

AMIS3: Amisfield Burn mid catchment

Flow gauging site approximately 200 meters upstream from state highway 6 crossing. True left and right side of the stream had minimal low-lying vegetation. Streambed made up of cobbles and boulders with algae. Wetted perimeter narrower than outermost boundaries of the alluvial channel (exposed dry alluvial rock).

AMIS4: Amisfield Burn Lower

Flow gauging site approximately 100 meters downstream from State Highway 6. Very minimal vegetation on both true left side of stream, small trees present on true right. Streambed made up of cobbles and boulders with algae. Wetted perimeter narrower than outermost boundaries of the alluvial channel (exposed dry alluvial rock).

AMIS5: Amisfield Burn above confluence with Lake Dunstan

Observation site where the Amisfield Burn ceased to flow. Upstream of this location the creek was braided, and flow was pooling behind bars and depressions in the streambed. At this point flow ceased, and water was disappearing to gravels.

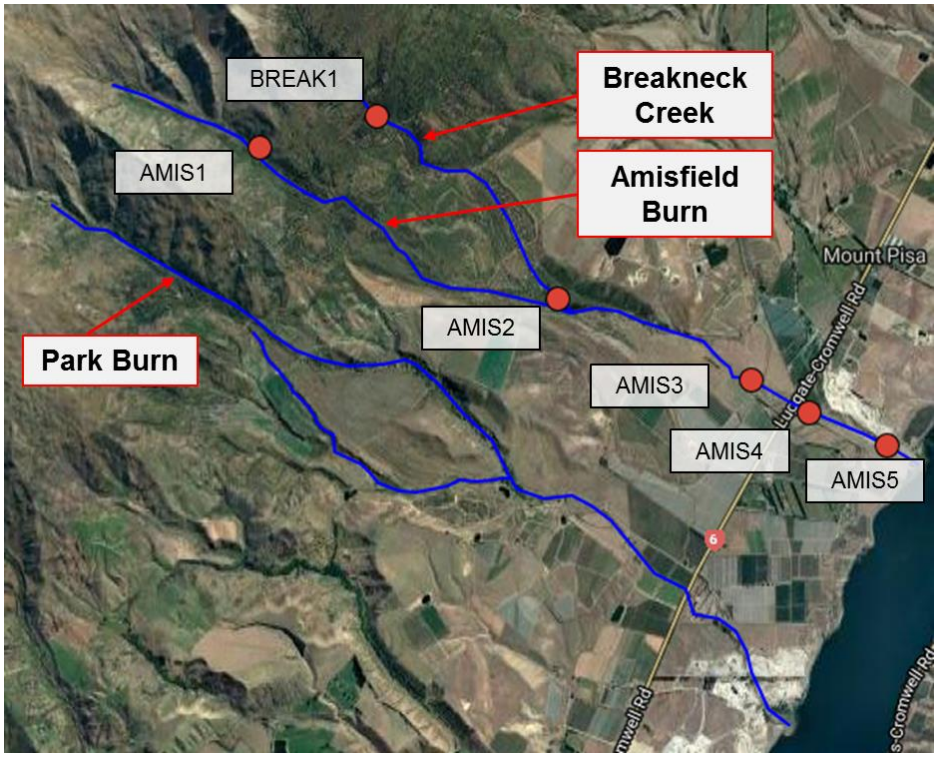

Figure 6: Location of flow gauging sites in the Amisfield Burn Catchment.

3.2.2 Site Photos

Figure 6: Amisfield Burn upstream of upper point of take (AMIS1), left: looking upstream and right: looking downstream to diversion.

Figure 7: Amisfield Burn downstream of confluence between Amisfield Burn and Breakneck Creek (AMIS2), left: looking upstream and right: looking downstream.

Figure 8: Amisfield Burn upstream of State Highway (AMIS3), left: looking upstream and right: looking downstream.

Figure 9: Amisfield Burn downstream of State Highway (AMIS4), left: looking upstream and right: looking downstream.

Figure 10: Amisfield Burn upstream of Lake Dunstan confluence (AMIS5), left: looking upstream and right: looking downstream.

Figure 11: Breakneck Creek upstream of point of take (BREAK1), left: looking upstream and right: looking downstream to diversion.

3.2.3 Measured Flow

Table 3: Field measurements for Amisfield Burn.

Easting (NZTM 2000)	Northing (NZTM 2000)	Date	Measured flow (L/sec)	†Gauging uncertainty flow range (L/sec)	Site Name
1300319	5019044	15/01/2019	140.6	134-147	AMIS1
1301316	5019364	15/01/2019	54.9	53-57	BREAK1
1302972	5017853	15/01/2019	210.6	203-218	AMIS2
1304670	5017233	15/01/2019	152.7	147-158	AMIS3
1305196	5016969	15/01/2019	72	70-74	AMIS4

†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 (15 January 2019), daily average flow at the nearest rated flow site located in the upper reaches of the Amisfield Burn was 194 L/s while the Low Burn (another nearby rated flow site at Chinamans Gully) was approximately 360 L/s. These flows are only slightly above the mean flow of the Amisfield Burn and Low Burn (144L/s and 267L/s respectively; Table 2) 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 Amisfield Burn main stem, and included a gauging on Breakneck Creek, a significant tributary of the Amisfield Burn. 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 traverse steep 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 Amisfield Burn suggest that flow in the lower reaches of the Amisfield 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 210 L/s between the confluence of the Amisfield Burn and Breakneck Creek, and below State Highway 6 where the Amisfield Burn ran dry, as summarised in Figure 3.

General survey findings:

- Gauging was carried out above the upper point of take in the Amisfield Burn Catchment and 141 L/s was measured. Flow increased to 211 L/s below the confluence of the main stem Amisfield Burn and Breakneck Creek. Flow in Breakneck Creek was 55 L/s, and therefore an additional 15 L/s is picked up and converges at this confluence. This was an expected gain in flow as this is typical behavior of runoff driven systems, and under the uncharacteristically wet environmental conditions smaller unnamed tributaries that are typically ephemeral have a small quantity of water to contribute.
- Below the confluence, as the gradient decreased and the alluvial channel widened loses of water were measured; above the State Highway 6 bridge, flow was 153 L/s. A total of 58 L/s was lost over 1.5km (Amisfield Burn Breakneck Confluence to State Highway 6).

- 100m below the State Highway 6 crossing flow was substantially lower at 72L/s than the measured flow upstream, a measured loss of 81 L/s.
- A further 800m downstream the Amisfield Burn ceased to flow, the 72L/s measured upstream was reduced to an unmeasurable flow, before disappearing entirely. The possible wetted perimeter at this location and nature of the tall woody vegetation suggested that the gravels were absorbing water. The surface area of the wider alluvial channel at this location and further downstream increases the potential for water to be lost to the sub-surface zone. Humps and hollows in the riverbed also prevented flow from remaining in a single channel and hence the 72 L/s could not maintain connection downstream to Lake Dunstan.

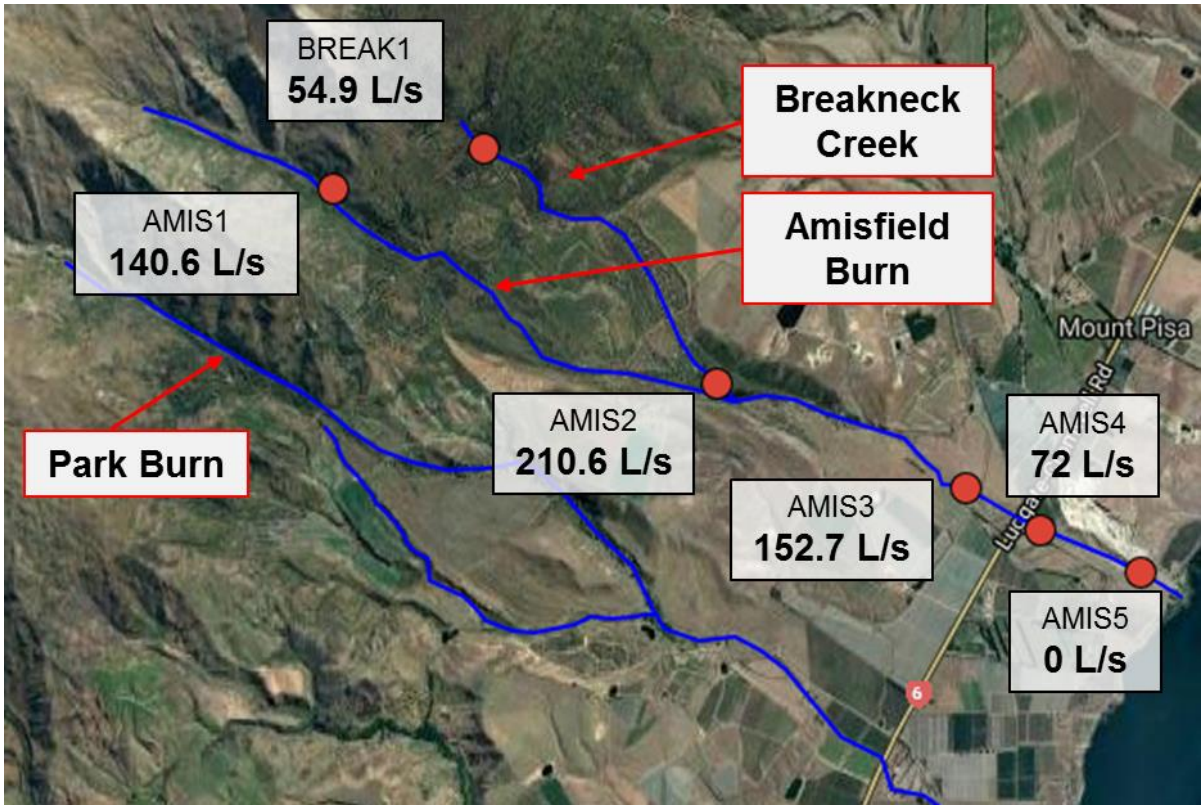

Figure 12: Flow gauging sites with measured flows.

The geology of the catchment is variable, with schist geology in the upper headwaters, and loess and alluvium in the lower reaches (Figure 12). 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 Amisfield Burn Catchment in the lower reaches. explaining the observed water loses.

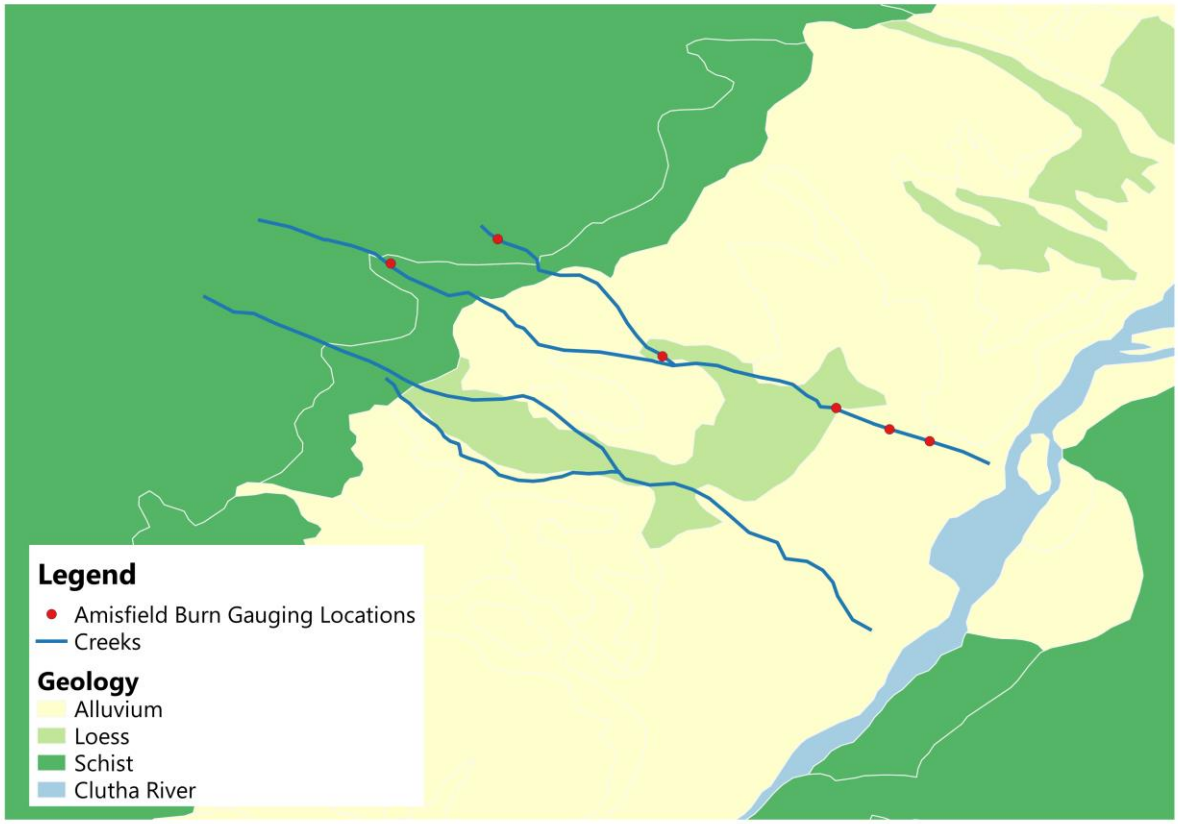

Figure 13: Geology of the Amisfield Burn Catchment (source: MfE Geology).

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.

Flow and water temperature data are available for the upper Amisfield Burn, with an additional two temperature records for the lower reaches of the Amisfield Burn:

- Upstream flow monitoring site (November 2013 – December 2018)
- State Highway 6 Bridge (August 2018 – January 2019)
- Amisfield Burn Quarry (December 2013 – December 2014)

The quarry site is further downstream than the State Highway site and would be expected to be dry more often than the State Highway site, all else being equal. However, given the short data series

available and lack of data overlap, temporal variation in stream conditions is likely to be a more significant influence on the data, than this spatial difference.

The three temperature records were used to assess the validity of using temperature monitoring data for the lower Amisfield Burn to determine when the stream is dry 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.

Analysis and visualisation was carried out in R (version 3.5.3) and RStudio (version 1.1.463). The packages clifro, lubridate, readxl, scales and tidyverse were also used.

Figure 14 below illustrates the raw temperature, which is broadly consistent with the expected behavior, in that both the variability of the absolute water temperature and daily water temperature are significantly higher downstream than upstream, particularly during the summer and autumn months when the stream is most likely to be dry. Also evident is that the degree of difference between the upstream and downstream site is greater in spring-summer compared to autumn-winter. Higher temperatures (and potentially greater variability) downstream would be expected even when water is present, due to the longer flow path, lower altitude, gravel bed, and the extreme climatic variations experienced at this location in Central Otago. It is therefore possible that this observed variability can be used as a proxy for indicating when the creek is dry, or when the probability of dryness occurring due to natural conditions may be likely.

Although Figure 14 shows the data for two different time periods, the general increase in observed downstream temperature in the 2013-2014 quarry site record is mimicked by the 2018-19 data record which ends in January 2019; both records show maximum temperatures reaching up to 50 degrees Celsius. The 2013-2014 record shows that the greatest variability occurs in the later part of the irrigation season, i.e. March and April. The abstraction record for this period of the 2013/2014 season shows that as abstraction begins to taper off in March-April, temperature maximums of 30 degrees Celsius are still observed downstream, and the difference between the average daily temperature at the upstream and quarry temperature sites is a magnitude of 10 degrees Celsius or so, showing the thermal warming affect in the downstream direction. The upstream versus downstream difference late in the irrigation

season likely indicates environmental factors that contribute to natural flow loses. Data for the later end of the 2018/2019 was not available at the time of producing this report to see if these trends are repeated season on season.

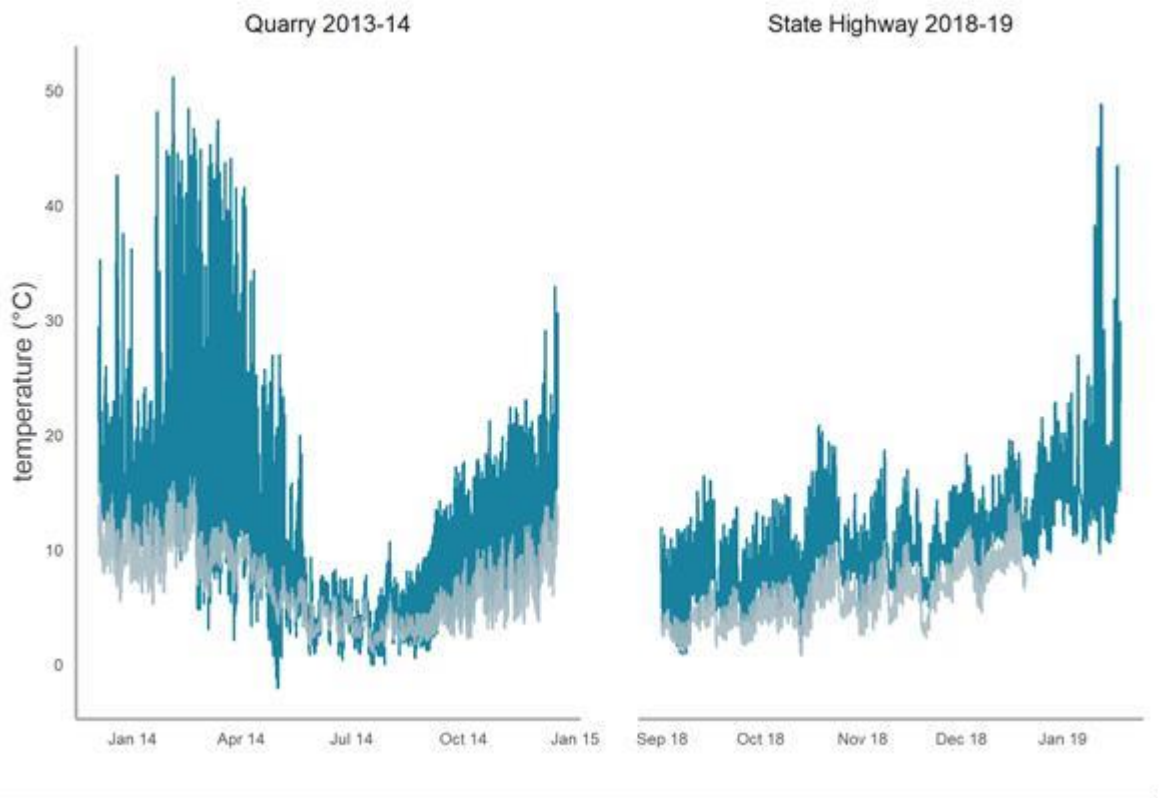

Figure 14: Temperatures measured at the downstream (blue) Amisfield Burn monitoring sites show significantly higher daily maxima and variability than the upstream (grey) monitoring site. Note different x scales for the two monitoring periods.

Figures 15 and 16 below show the frequency (count) of the daily maximum temperature and the daily temperature range. Figure 6 shows that the downstream dataset is skewed significantly higher in comparison to the equivalent upstream temperature, in that greater maximums are observed downstream more often. This trend is true also for the daily temperature range shown in Figure 7, in that the downstream sites observes a greater daily range in temperature more often than upstream. This is particularly true for the 2013-14 record, probably because this dataset includes late summer/early autumn 2013, whereas the 2018-19 record ends in January 2019. The extreme difference in temperature between the upstream and downstream sites in the 2013-14 record is highlighted in Figure 6 and 7, as there are more occurrences where temperature exceeds 30 degrees Celsius at the downstream quarry site than the State Highway site for 2018-19 record. Highlighting that times of dryness are probably associated with late summer early autumn. Furthermore, it is likely that the stream bed was dry for significantly more of the 2013-14 monitoring period than the 2018-19 period; the 2018/2019 season

has been significantly wet in comparison to previous seasons with substantial rainfall in both early and late summer. There is some evidence of biomodial or multimodal distribution of the 2013-14 record; this is to be expected as stream behavior is significantly different when the stream is dry.

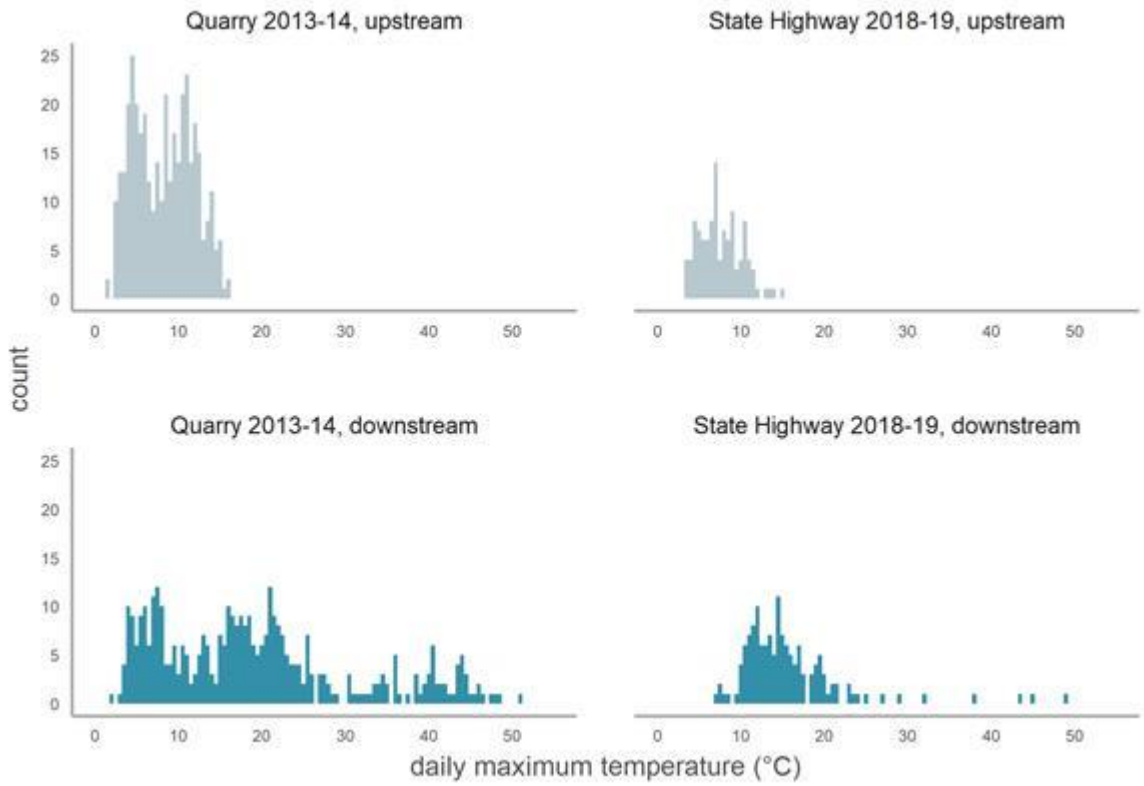

Figure 15: Histogram of daily maximum temperature showing that the downstream data is skewed significantly higher relative to the upstream data.

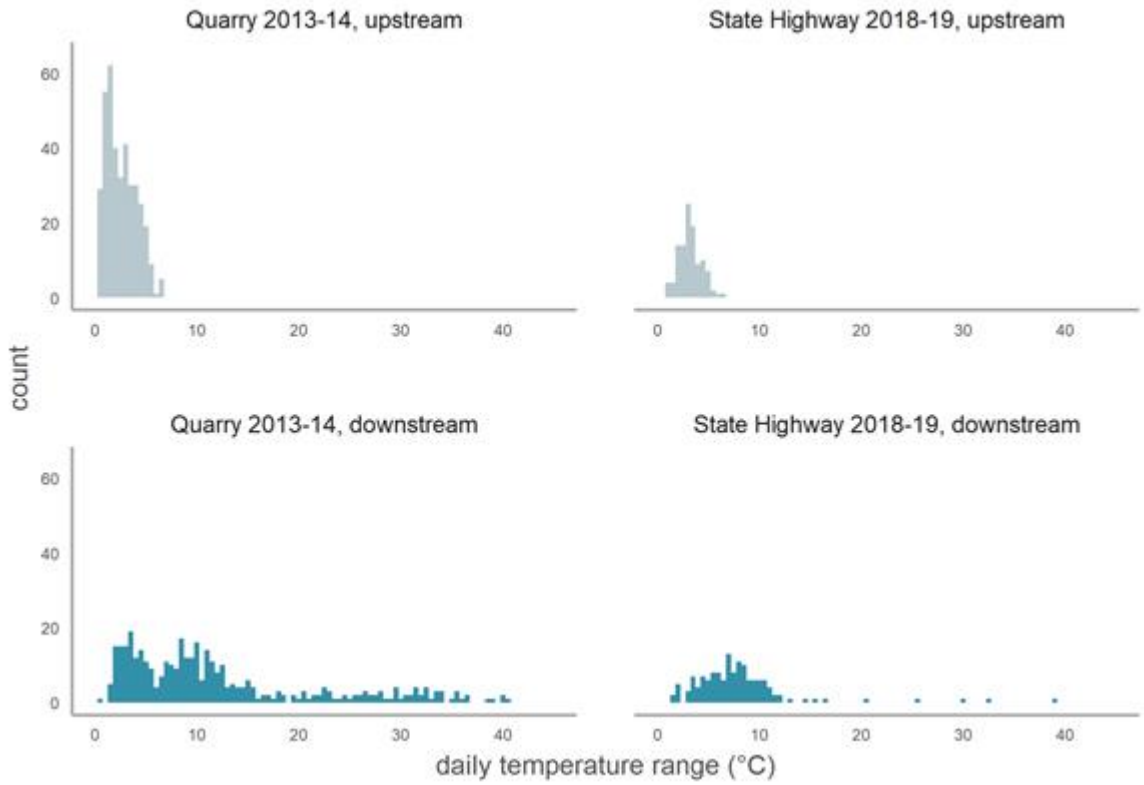

Figure 16: Histogram of daily temperature range showing that, again, the downstream data is skewed significantly higher than the upstream data.

The upstream temperature record and the flow record at this site has been used as a naturalised site for comparison to the two records of water temperature downstream. Based on a combination of the data distribution and local knowledge, it was decided to use the following thresholds for the downstream temperature monitoring data to indicate that the stream is likely to be dry:

- Daily maximum temperature of 25 °C or higher.
- Daily temperature range of 15 °C or higher.

Graphs illustrating the predicted dry spells based on the two potential thresholds identified are shown below in Figure 8 for daily max. downstream temperature of > 25°C, and Figure 17 for daily downstream temperature range of > 15 °C. Both give predicted dry spells which are generally consistent with each other, and with the expected behavior. For instance, the predicted dry spells occur primarily in late summer/early autumn, and generally coincide with periods of low upstream flows, low rainfall, and high air temperatures.

Note differing scales for the time periods and variables illustrated, on both graphs, and that all statistics (maxima, means, ranges and accumulations) are on a daily basis.

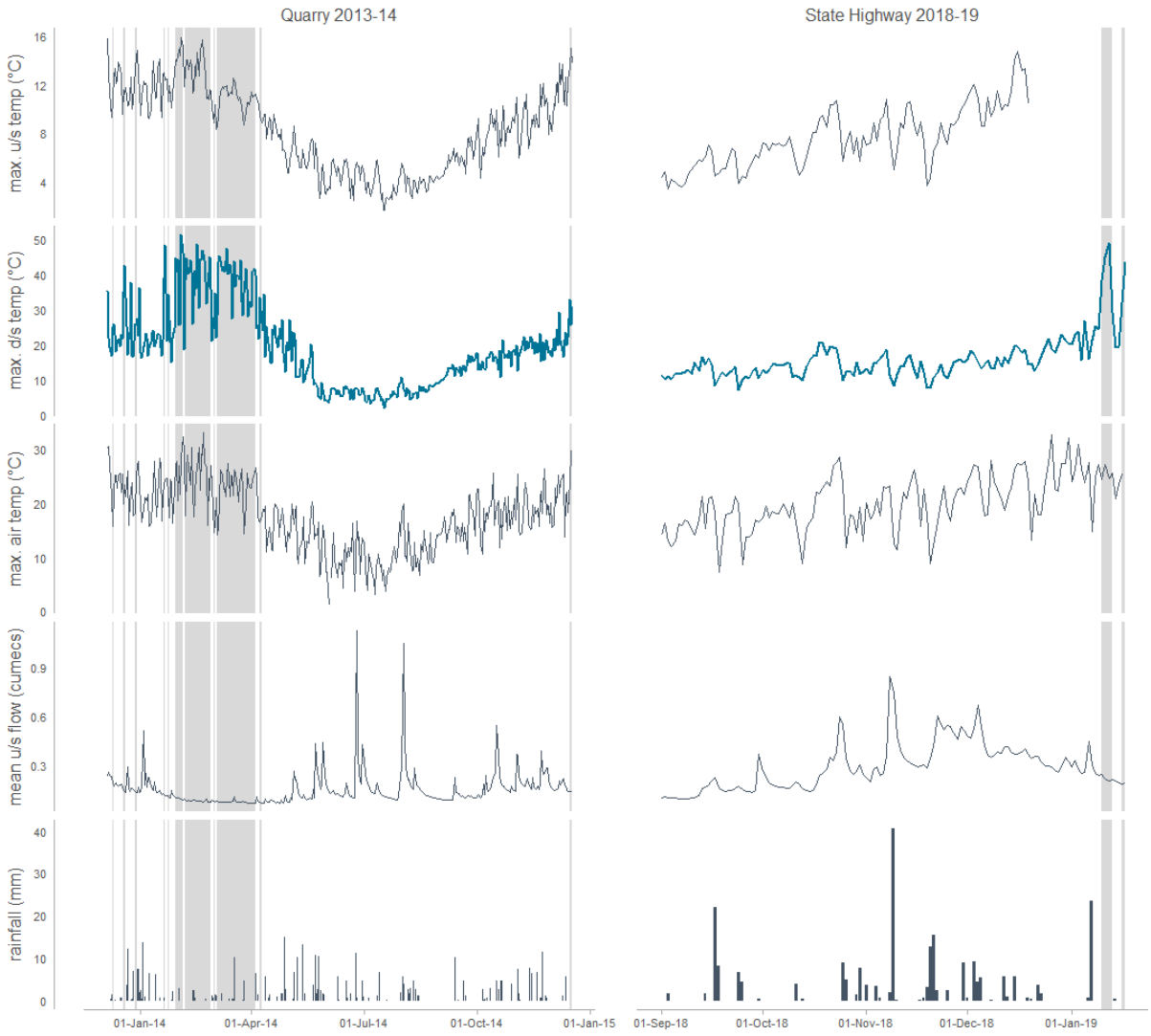

Figure 17: Predicted dry periods (grey shading) based on daily max temperature at the downstream site (blue line) > 25 ºC, overlaid on daily maximum water temperature measured at upstream and downstream sites, daily maximum air temperature measured at Cromwell, daily mean flow at the upstream site, and daily rainfall measured at Cromwell. Note differing scales.

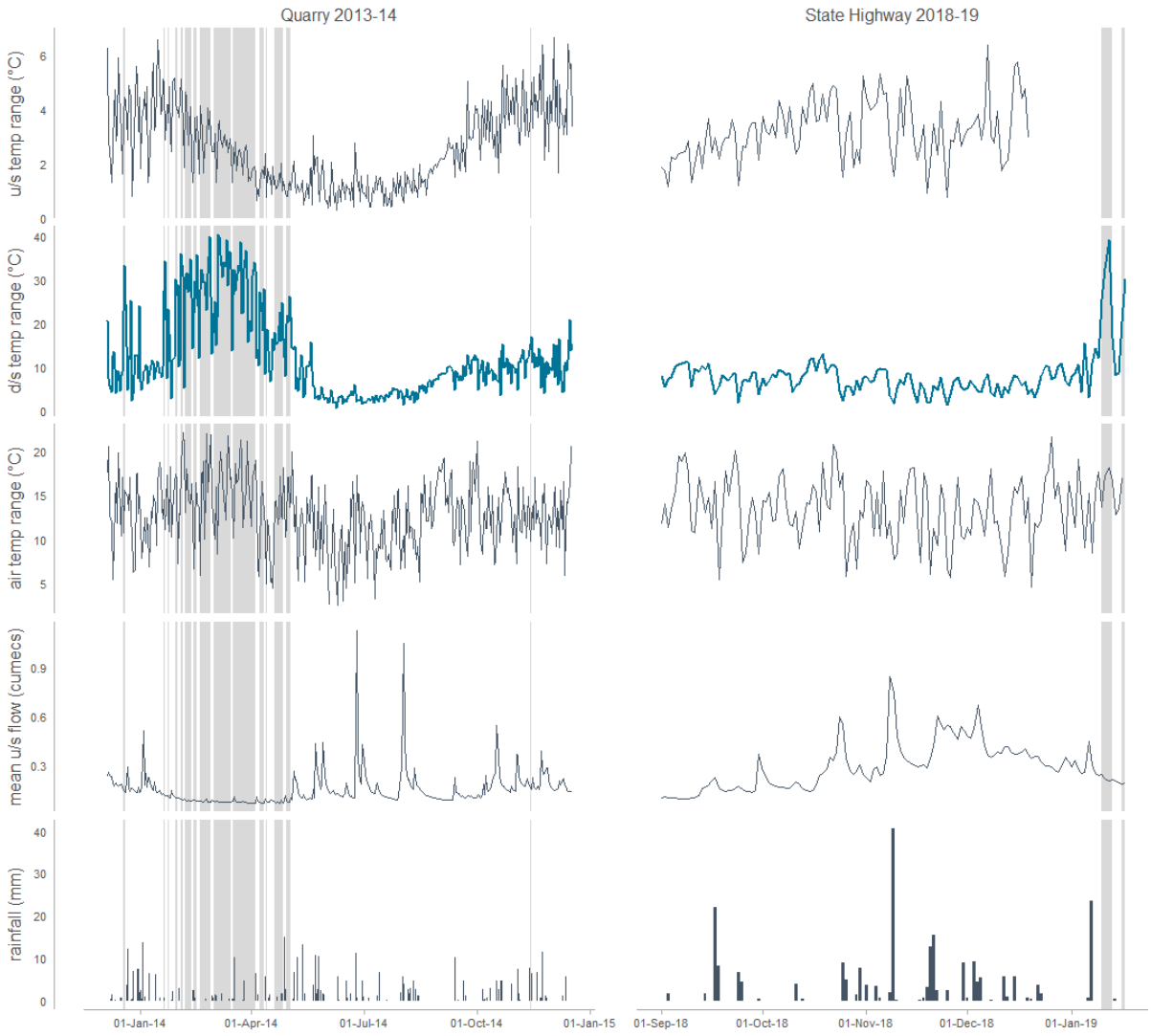

Figure 18: Predicted dry periods (grey shading) based on daily temperature range at the downstream site (blue line) > 15 ºC, overlaid on daily water temperature range measured at upstream and downstream sites, daily maximum air temperature measured at Cromwell, daily mean flow at the upstream site, and daily rainfall measured at Cromwell. Note differing scales.

To ground truth the analysis somewhat, a corresponding record of direct observations of when the stream is dry (e.g. from a photos) has been collated. These photos apply only to the 2018/2019 season at the State Highway.

The temperature analysis carried out suggests that both the maximum daily temperature and the daily temperature range have potential as predictors of when the stream is dry downstream.

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 effect 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.

5. Conclusion and Recommendation

It is likely that there are natural flow losses in the Amisfield Burn Catchment, as the predicted dry behavior determined by the temperature record analysis 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 promotes flow 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

Amisfield Burn – AMIS1

Discharge Measurement Summary

Date Generated: Wed Apr 10 2019

File Information

File Name	20190115_AMISUP.WAD
Start Date and Time	2019/01/14 09:21:28

Site Details

Site Name	AMISUP
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	m^ 2
Discharge	m^ 3/s

Discharge Uncertainty

Category	ISO	Stats
Accuracy	1.0%	1.0%
Depth	0.2%	2.6%
Velocity	2.3%	4.2%
Width	0.2%	0.2%
Method	2.7%	-
# Stations	2.5%	-
Overall	**4.5%**	**5.1%**

Summary

Averaging Int.	40	# Stations	20
Start Edge	LEW	Total Width	3.000
Mean SNR	36.5 dB	Total Area	0.907
Mean Temp	8.95 °C	Mean Depth	0.302
Disch. Equation	Mean-Section	Mean Velocity	0.1550
		Total Discharge	**0.1406**

Measurement Results

St	Clock	Loc	Method	Depth	% Dep	MeasD	Vel	CorrFact	MeanV	Area	Flow	% Q
0	09:21	0.00	None	0.210	0.0	0.0	0.0000	0.00	0.0000	0.000	0.0000	0.0
1	09:25	0.30	0.6	0.230	0.6	0.092	-0.0075	1.00	-0.0037	0.066	-0.0002	-0.2
2	*09:26*	*0.45*	*0.6*	*0.230*	*0.6*	*0.092*	*-0.0387*	*1.00*	*-0.0231*	*0.035*	*-0.0008*	*-0.6*
3	*09:28*	*0.60*	*0.6*	*0.250*	*0.6*	*0.100*	*-0.0310*	*1.00*	*-0.0348*	*0.036*	*-0.0013*	*-0.9*
4	09:29	0.75	0.6	0.280	0.6	0.112	-0.0100	1.00	-0.0205	0.040	-0.0008	-0.6
5	*09:31*	*0.90*	*0.6*	*0.340*	*0.6*	*0.136*	*0.0033*	*1.00*	*-0.0033*	*0.047*	*-0.0002*	*-0.1*
6	09:33	1.05	0.6	0.330	0.6	0.132	0.0174	1.00	0.0103	0.050	0.0005	0.4
7	*09:34*	*1.20*	*0.6*	*0.320*	*0.6*	*0.128*	*0.0475*	*1.00*	*0.0324*	*0.049*	*0.0016*	*1.1*
8	09:39	1.35	0.6	0.340	0.6	0.136	0.0816	1.00	0.0645	0.050	0.0032	2.3
9	*09:41*	*1.50*	*0.6*	*0.260*	*0.6*	*0.104*	*0.1496*	*1.00*	*0.1156*	*0.045*	*0.0052*	*3.7*
10	09:42	1.65	0.6	0.320	0.6	0.128	0.2369	1.00	0.1932	0.044	0.0084	6.0
11	*09:44*	*1.80*	*0.6*	*0.390*	*0.6*	*0.156*	*0.2839*	*1.00*	*0.2604*	*0.053*	*0.0139*	*9.9*
12	*09:45*	*1.95*	*0.6*	*0.380*	*0.6*	*0.152*	*0.3801*	*1.00*	*0.3320*	*0.058*	*0.0192*	*13.6*
13	09:47	2.10	0.6	0.400	0.6	0.160	0.4321	1.00	0.4061	0.059	0.0238	16.9
14	*09:49*	*2.25*	*0.6*	*0.400*	*0.6*	*0.160*	*0.5054*	*1.00*	*0.4687*	*0.060*	*0.0281*	*20.0*
15	*09:51*	*2.40*	*0.6*	*0.400*	*0.6*	*0.160*	*0.1667*	*1.00*	*0.3360*	*0.060*	*0.0202*	*14.3*
16	*09:52*	*2.55*	*0.6*	*0.280*	*0.6*	*0.112*	*0.1198*	*1.00*	*0.1432*	*0.051*	*0.0073*	*5.2*
17	*09:54*	*2.70*	*0.6*	*0.250*	*0.6*	*0.100*	*0.0648*	*1.00*	*0.0923*	*0.040*	*0.0037*	*2.6*
18	*09:57*	*2.95*	*0.6*	*0.240*	*0.6*	*0.096*	*0.2055*	*1.00*	*0.1351*	*0.061*	*0.0083*	*5.9*
19	09:57	3.00	None	0.000	0.0	0.0	0.0000	0.00	0.1027	0.006	0.0006	0.4

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

Amisfield Burn – AMIS2

Discharge Measurement Summary

Date Generated: Wed Apr 10 2019

File Information

File Name	20190115_AMISMID1.WAD
Start Date and Time	2019/01/14 12:08:21

Site Details

Site Name	AMISMID1
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	m^ 2
Discharge	m^ 3/s

Discharge Uncertainty

Category	ISO	Stats
Accuracy	1.0%	1.0%
Depth	0.2%	1.4%
Velocity	1.6%	4.1%
Width	0.1%	0.1%
Method	2.2%	-
# Stations	2.3%	-
Overall	**3.7%**	**4.5%**

Summary

Averaging Int.	40	# Stations	22
Start Edge	LEW	Total Width	3.300
Mean SNR	40.1 dB	Total Area	0.715
Mean Temp	12.61 °C	Mean Depth	0.217
Disch. Equation	Mean-Section	Mean Velocity	0.2947
		Total Discharge	**0.2106**

Measurement Results

St	Clock	Loc	Method	Depth	% Dep	MeasD	Vel	CorrFact	MeanV	Area	Flow	% Q
0	12:08	0.00	None	0.000	0.0	0.0	0.0000	0.00	0.0000	0.000	0.0000	0.0
1	*12:09*	*0.30*	*0.6*	*0.110*	*0.6*	*0.044*	*-0.0727*	*1.00*	*-0.0363*	*0.017*	*-0.0006*	*-0.3*
2	*12:11*	*0.45*	*0.6*	*0.120*	*0.6*	*0.048*	*-0.0279*	*1.00*	*-0.0503*	*0.017*	*-0.0009*	*-0.4*
3	*12:12*	*0.60*	*0.6*	*0.110*	*0.6*	*0.044*	*0.0590*	*1.00*	*0.0155*	*0.017*	*0.0003*	*0.1*
4	*12:14*	*0.75*	*0.6*	*0.150*	*0.6*	*0.060*	*0.0984*	*1.00*	*0.0787*	*0.020*	*0.0015*	*0.7*
5	*12:15*	*0.90*	*0.6*	*0.200*	*0.6*	*0.080*	*0.1752*	*1.00*	*0.1368*	*0.026*	*0.0036*	*1.7*
6	*12:17*	*1.05*	*0.6*	*0.240*	*0.6*	*0.096*	*0.2150*	*1.00*	*0.1951*	*0.033*	*0.0064*	*3.1*
7	12:18	1.20	0.6	0.290	0.6	0.116	0.3561	1.00	0.2855	0.040	0.0114	5.4
8	12:20	1.35	0.6	0.320	0.6	0.128	0.3447	1.00	0.3504	0.046	0.0160	7.6
9	12:21	1.50	0.6	0.350	0.6	0.140	0.3713	1.00	0.3580	0.050	0.0180	8.5
10	12:23	1.65	0.6	0.370	0.6	0.148	0.3557	1.00	0.3635	0.054	0.0196	9.3
11	12:24	1.80	0.6	0.380	0.6	0.152	0.3646	1.00	0.3601	0.056	0.0203	9.6
12	12:25	1.95	0.6	0.380	0.6	0.152	0.4279	1.00	0.3962	0.057	0.0226	10.7
13	*12:27*	*2.10*	*0.6*	*0.370*	*0.6*	*0.148*	*0.6155*	*1.00*	*0.5217*	*0.056*	*0.0293*	*13.9*
14	*12:28*	*2.25*	*0.6*	*0.330*	*0.6*	*0.132*	*0.3203*	*1.00*	*0.4679*	*0.053*	*0.0246*	*11.7*
15	12:30	2.40	0.6	0.270	0.6	0.108	0.0434	1.00	0.1818	0.045	0.0082	3.9
16	*12:32*	*2.55*	*0.6*	*0.220*	*0.6*	*0.088*	*0.3584*	*1.00*	*0.2009*	*0.037*	*0.0074*	*3.5*
17	*12:33*	*2.70*	*0.6*	*0.140*	*0.6*	*0.056*	*0.2960*	*1.00*	*0.3272*	*0.027*	*0.0088*	*4.2*
18	12:35	2.85	0.6	0.170	0.6	0.068	0.1570	1.00	0.2265	0.023	0.0053	2.5
19	12:36	3.00	0.6	0.120	0.6	0.048	0.2779	1.00	0.2174	0.022	0.0047	2.2
20	12:37	3.15	0.6	0.070	0.6	0.028	0.2198	1.00	0.2488	0.014	0.0035	1.7
21	12:37	3.30	None	0.000	0.0	0.0	0.0000	0.00	0.1099	0.005	0.0006	0.3

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

Amisfield Burn – AMIS3

Discharge Measurement Summary

Date Generated: Wed Apr 10 2019

File Information

File Name	20190115_AMISMID2.WAD
Start Date and Time	2019/01/14 13:35:15

Site Details

Site Name	AMISMID2
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	m^ 2
Discharge	m^ 3/s

Discharge Uncertainty

Category	ISO	Stats
Accuracy	1.0%	1.0%
Depth	0.4%	1.3%
Velocity	1.1%	2.0%
Width	0.1%	0.1%
Method	2.0%	-
# Stations	2.4%	-
Overall	**3.5%**	**2.5%**

Summary

Averaging Int.	40	# Stations	21
Start Edge	LEW	Total Width	3.000
Mean SNR	38.5 dB	Total Area	0.551
Mean Temp	16.77 °C	Mean Depth	0.184
Disch. Equation	Mean-Section	Mean Velocity	0.2775
		Total Discharge	**0.1527**

Measurement Results

St	Clock	Loc	Method	Depth	% Dep	MeasD	Vel	CorrFact	MeanV	Area	Flow	% Q
0	13:35	0.00	None	0.000	0.0	0.0	0.0000	0.00	0.0000	0.000	0.0000	0.0
1	*13:36*	*0.15*	*0.6*	*0.140*	*0.6*	*0.056*	*0.0034*	*1.00*	*0.0017*	*0.011*	*0.0000*	*0.0*
2	13:37	0.30	0.6	0.180	0.6	0.072	0.2685	1.00	0.1359	0.024	0.0033	2.1
3	13:39	0.45	0.6	0.200	0.6	0.080	0.3150	1.00	0.2917	0.029	0.0083	5.4
4	13:40	0.60	0.6	0.230	0.6	0.092	0.4220	1.00	0.3685	0.032	0.0119	7.8
5	13:41	0.75	0.6	0.250	0.6	0.100	0.3700	1.00	0.3960	0.036	0.0143	9.3
6	*13:43*	*0.90*	*0.6*	*0.260*	*0.6*	*0.104*	*0.3769*	*1.00*	*0.3734*	*0.038*	*0.0143*	*9.4*
7	13:44	1.05	0.6	0.250	0.6	0.100	0.4172	1.00	0.3970	0.038	0.0152	9.9
8	13:46	1.20	0.6	0.250	0.6	0.100	0.3349	1.00	0.3760	0.038	0.0141	9.2
9	13:47	1.35	0.6	0.250	0.6	0.100	0.2370	1.00	0.2859	0.038	0.0107	7.0
10	13:48	1.50	0.6	0.250	0.6	0.100	0.2837	1.00	0.2603	0.038	0.0098	6.4
11	13:49	1.65	0.6	0.250	0.6	0.100	0.2392	1.00	0.2614	0.038	0.0098	6.4
12	13:51	1.80	0.6	0.180	0.6	0.072	0.2175	1.00	0.2283	0.032	0.0074	4.8
13	13:52	1.95	0.6	0.170	0.6	0.068	0.2497	1.00	0.2336	0.026	0.0061	4.0
14	13:54	2.10	0.6	0.180	0.6	0.072	0.2765	1.00	0.2631	0.026	0.0069	4.5
15	13:55	2.25	0.6	0.170	0.6	0.068	0.2715	1.00	0.2740	0.026	0.0072	4.7
16	13:56	2.40	0.6	0.150	0.6	0.060	0.1873	1.00	0.2294	0.024	0.0055	3.6
17	*13:58*	*2.55*	*0.6*	*0.140*	*0.6*	*0.056*	*0.0535*	*1.00*	*0.1204*	*0.022*	*0.0026*	*1.7*
18	14:02	2.70	0.6	0.100	0.6	0.040	0.2224	1.00	0.1379	0.018	0.0025	1.6
19	14:03	2.85	0.6	0.070	0.6	0.028	0.1692	1.00	0.1958	0.013	0.0025	1.6
20	14:03	3.00	None	0.000	0.0	0.0	0.0000	0.00	0.0846	0.005	0.0004	0.3

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

Amisfield Burn – AMIS4

Discharge Measurement Summary

Date Generated: Wed Apr 10 2019

File Information	
File Name	20190115_AMISDOWN.WAD
Start Date and Time	2019/01/14 14:26:10

Site Details	
Site Name	AMISDOWN
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	m^ 2
Discharge	m^ 3/s

Discharge Uncertainty

Category	ISO	Stats
Accuracy	1.0%	1.0%
Depth	0.4%	3.6%
Velocity	1.3%	4.0%
Width	0.1%	0.1%
Method	1.8%	-
# Stations	2.1%	-
Overall	**3.2%**	**5.4%**

Summary

Averaging Int.	40	# Stations	24
Start Edge	LEW	Total Width	2.600
Mean SNR	36.9 dB	Total Area	0.236
Mean Temp	19.36 °C	Mean Depth	0.091
Disch. Equation	Mean-Section	Mean Velocity	0.3051
		Total Discharge	**0.0720**

Measurement Results

St	Clock	Loc	Method	Depth	% Dep	MeasD	Vel	CorrFact	MeanV	Area	Flow	% Q
0	14:26	0.00	None	0.000	0.0	0.0	0.0000	0.00	0.0000	0.000	0.0000	0.0
1	*14:29*	*0.20*	*0.6*	*0.080*	*0.6*	*0.032*	*0.0146*	*1.00*	*0.0073*	*0.008*	*0.0001*	*0.1*
2	14:31	0.30	0.6	0.080	0.6	0.032	0.1181	1.00	0.0663	0.008	0.0005	0.7
3	14:32	0.40	0.6	0.060	0.6	0.024	0.3253	1.00	0.2217	0.007	0.0016	2.2
4	14:33	0.50	0.6	0.060	0.6	0.024	0.2426	1.00	0.2839	0.006	0.0017	2.4
5	14:34	0.60	0.6	0.090	0.6	0.036	0.1137	1.00	0.1781	0.008	0.0013	1.9
6	14:35	0.70	0.6	0.090	0.6	0.036	0.1653	1.00	0.1395	0.009	0.0013	1.7
7	14:37	0.80	0.6	0.100	0.6	0.040	0.2898	1.00	0.2275	0.010	0.0022	3.0
8	14:38	0.90	0.6	0.100	0.6	0.040	0.4408	1.00	0.3653	0.010	0.0037	5.1
9	14:40	1.00	0.6	0.090	0.6	0.036	0.3627	1.00	0.4017	0.010	0.0038	5.3
10	14:41	1.10	0.6	0.090	0.6	0.036	0.3390	1.00	0.3508	0.009	0.0032	4.4
11	14:42	1.20	0.6	0.100	0.6	0.040	0.1990	1.00	0.2690	0.010	0.0026	3.5
12	14:43	1.30	0.6	0.100	0.6	0.040	0.2982	1.00	0.2486	0.010	0.0025	3.5
13	14:44	1.40	0.6	0.100	0.6	0.040	0.2363	1.00	0.2672	0.010	0.0027	3.7
14	14:47	1.50	0.6	0.130	0.6	0.052	0.1589	1.00	0.1976	0.012	0.0023	3.2
15	14:48	1.60	0.6	0.080	0.6	0.032	0.5450	1.00	0.3519	0.011	0.0037	5.1
16	*14:49*	*1.70*	*0.6*	*0.140*	*0.6*	*0.056*	*0.0029*	*1.00*	*0.2739*	*0.011*	*0.0030*	*4.2*
17	14:51	1.80	0.6	0.150	0.6	0.060	0.5809	1.00	0.2919	0.015	0.0042	5.9
18	14:52	1.90	0.6	0.110	0.6	0.044	0.5554	1.00	0.5681	0.013	0.0074	10.3
19	14:54	2.00	0.6	0.120	0.6	0.048	0.5018	1.00	0.5286	0.012	0.0061	8.4
20	*14:55*	*2.10*	*0.6*	*0.140*	*0.6*	*0.056*	*0.3352*	*1.00*	*0.4185*	*0.013*	*0.0054*	*7.6*
21	*14:56*	*2.20*	*0.6*	*0.130*	*0.6*	*0.052*	*0.3511*	*1.00*	*0.3431*	*0.014*	*0.0046*	*6.4*
22	14:57	2.30	0.6	0.090	0.6	0.036	0.5216	1.00	0.4363	0.011	0.0048	6.7
23	14:57	2.60	None	0.000	0.0	0.0	0.0000	0.00	0.2608	0.014	0.0035	4.9

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

Breakneck Creek – BREAK1

Discharge Measurement Summary

Date Generated: Wed Apr 10 2019

File Information	
File Name	20190115_BREAKUP.WAD
Start Date and Time	2019/01/14 10:37:00

Site Details	
Site Name	BREAKUP
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	m^ 2
Discharge	m^ 3/s

Discharge Uncertainty

Category	ISO	Stats
Accuracy	1.0%	1.0%
Depth	0.4%	1.7%
Velocity	1.2%	2.2%
Width	0.1%	0.1%
Method	2.0%	-
# Stations	2.5%	-
Overall	**3.6%**	**3.0%**

Summary

Averaging Int.	40	# Stations	20
Start Edge	LEW	Total Width	1.000
Mean SNR	38.5 dB	Total Area	0.161
Mean Temp	10.56 °C	Mean Depth	0.161
Disch. Equation	Mean-Section	Mean Velocity	0.3419
		Total Discharge	**0.0549**

Measurement Results

St	Clock	Loc	Method	Depth	% Dep	MeasD	Vel	CorrFact	MeanV	Area	Flow	% Q
0	10:37	0.00	None	0.000	0.0	0.0	0.0000	0.00	0.0000	0.000	0.0000	0.0
1	10:37	0.10	0.6	0.140	0.6	0.056	-0.0001	1.00	0.0000	0.007	0.0000	0.0
2	*10:40*	*0.15*	*0.6*	*0.150*	*0.6*	*0.060*	*-0.0050*	*1.00*	*-0.0025*	*0.007*	*0.0000*	*0.0*
3	10:41	0.20	0.6	0.180	0.6	0.072	0.0391	1.00	0.0170	0.008	0.0001	0.3
4	10:43	0.25	0.6	0.180	0.6	0.072	0.0919	1.00	0.0655	0.009	0.0006	1.1
5	10:44	0.30	0.6	0.170	0.6	0.068	0.1655	1.00	0.1287	0.009	0.0011	2.1
6	10:45	0.35	0.6	0.200	0.6	0.080	0.4154	1.00	0.2904	0.009	0.0027	4.9
7	10:46	0.40	0.6	0.200	0.6	0.080	0.5000	1.00	0.4577	0.010	0.0046	8.3
8	10:48	0.45	0.6	0.190	0.6	0.076	0.4963	1.00	0.4981	0.010	0.0049	8.9
9	10:49	0.50	0.6	0.180	0.6	0.072	0.5622	1.00	0.5292	0.009	0.0049	8.9
10	10:50	0.55	0.6	0.170	0.6	0.068	0.5161	1.00	0.5391	0.009	0.0047	8.6
11	10:51	0.60	0.6	0.180	0.6	0.072	0.4295	1.00	0.4728	0.009	0.0041	7.5
12	10:53	0.65	0.6	0.180	0.6	0.072	0.5058	1.00	0.4676	0.009	0.0042	7.7
13	10:54	0.70	0.6	0.180	0.6	0.072	0.5375	1.00	0.5216	0.009	0.0047	8.6
14	10:55	0.75	0.6	0.160	0.6	0.064	0.3126	1.00	0.4250	0.009	0.0036	6.6
15	10:56	0.80	0.6	0.170	0.6	0.068	0.2592	1.00	0.2859	0.008	0.0024	4.3
16	*10:58*	*0.85*	*0.6*	*0.200*	*0.6*	*0.080*	*0.4007*	*1.00*	*0.3299*	*0.009*	*0.0031*	*5.6*
17	*10:59*	*0.90*	*0.6*	*0.190*	*0.6*	*0.076*	*0.4506*	*1.00*	*0.4256*	*0.010*	*0.0042*	*7.6*
18	*11:03*	*0.95*	*0.6*	*0.120*	*0.6*	*0.048*	*0.6214*	*1.00*	*0.5360*	*0.008*	*0.0042*	*7.6*
19	11:03	1.00	None	0.000	0.0	0.0	0.0000	0.00	0.3107	0.003	0.0009	1.7

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

Attachment E: Fish survey and residual flow report

WATER WAYS
CONSULTING LTD

Park Burn and Amisfield Burn Ecological Considerations for Residual Flows

PREPARED FOR: LANDPRO LIMITED

DATE: MAY 2019

REPORT NUMBER: 78-2019

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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.

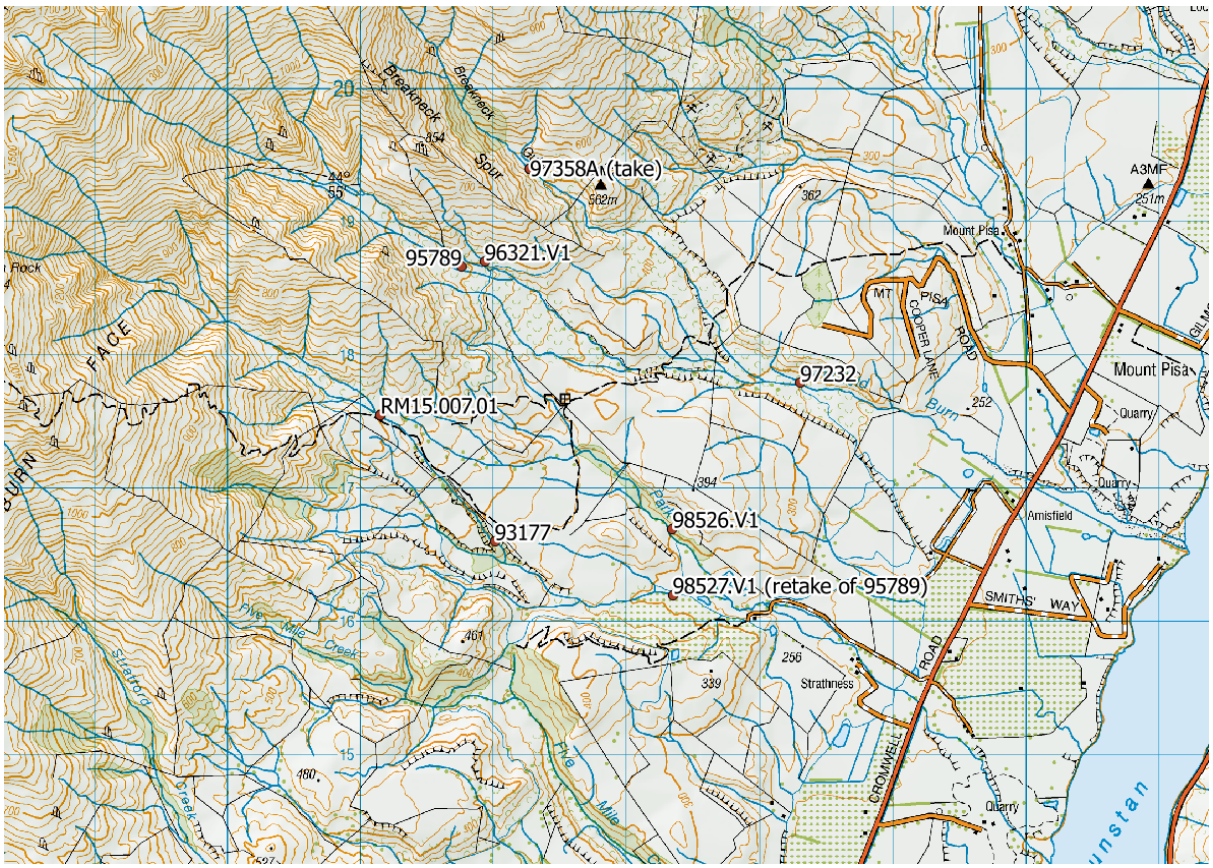

Figure 1: Take and discharge locations in the Park Burn and Amisfield Burn.

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.

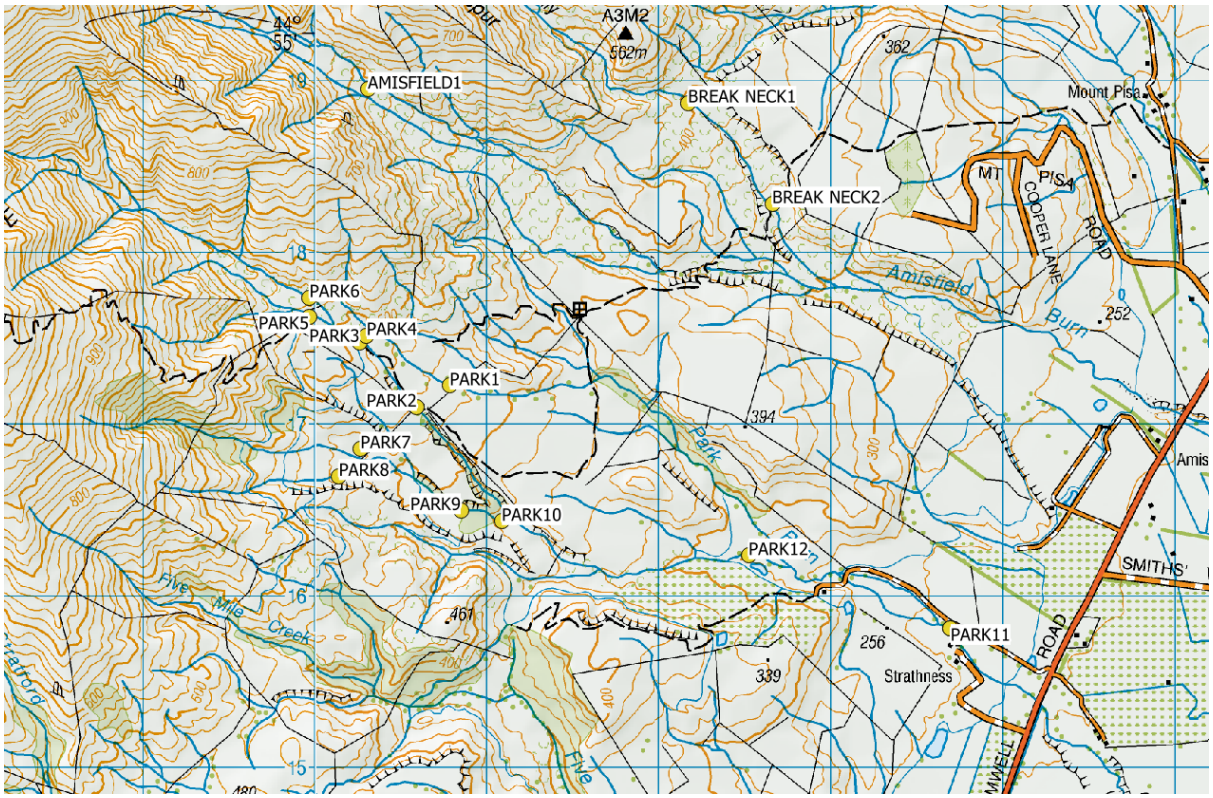

Figure 2: Park Burn and Amisfield fish survey sites, April 2019.

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.

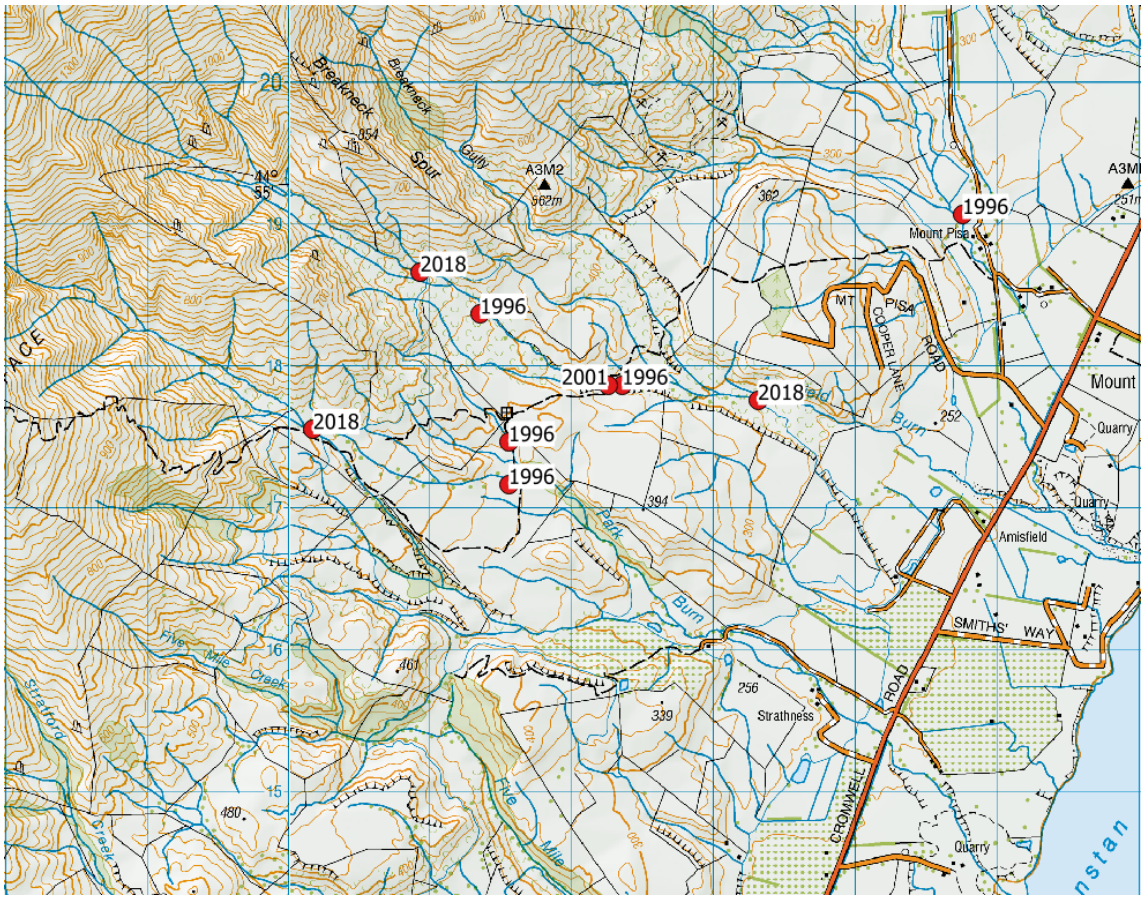

Figure 3: Brown trout locations reported in the NZFFD in the Park Burn and Amisfield Burn.

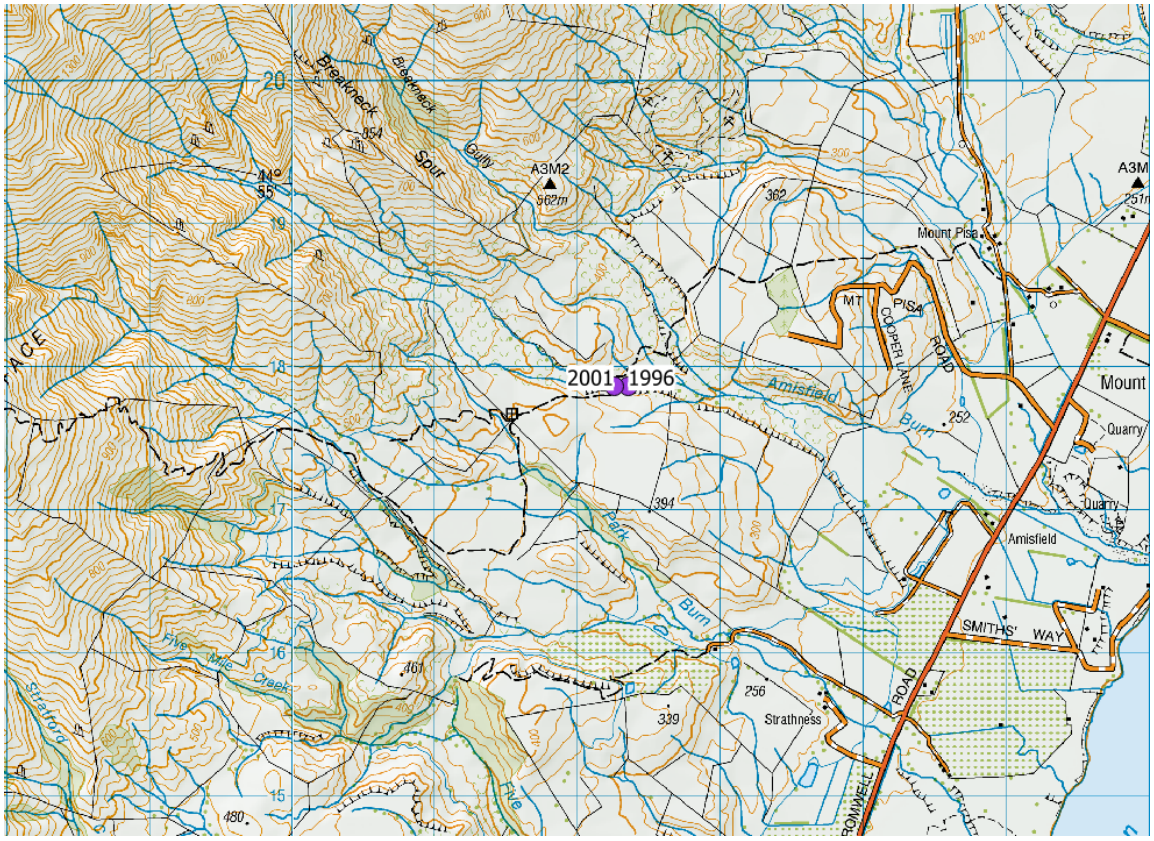

Figure 4: Koaro locations reported in the NZFFD in the Park Burn and Amisfield Burn.

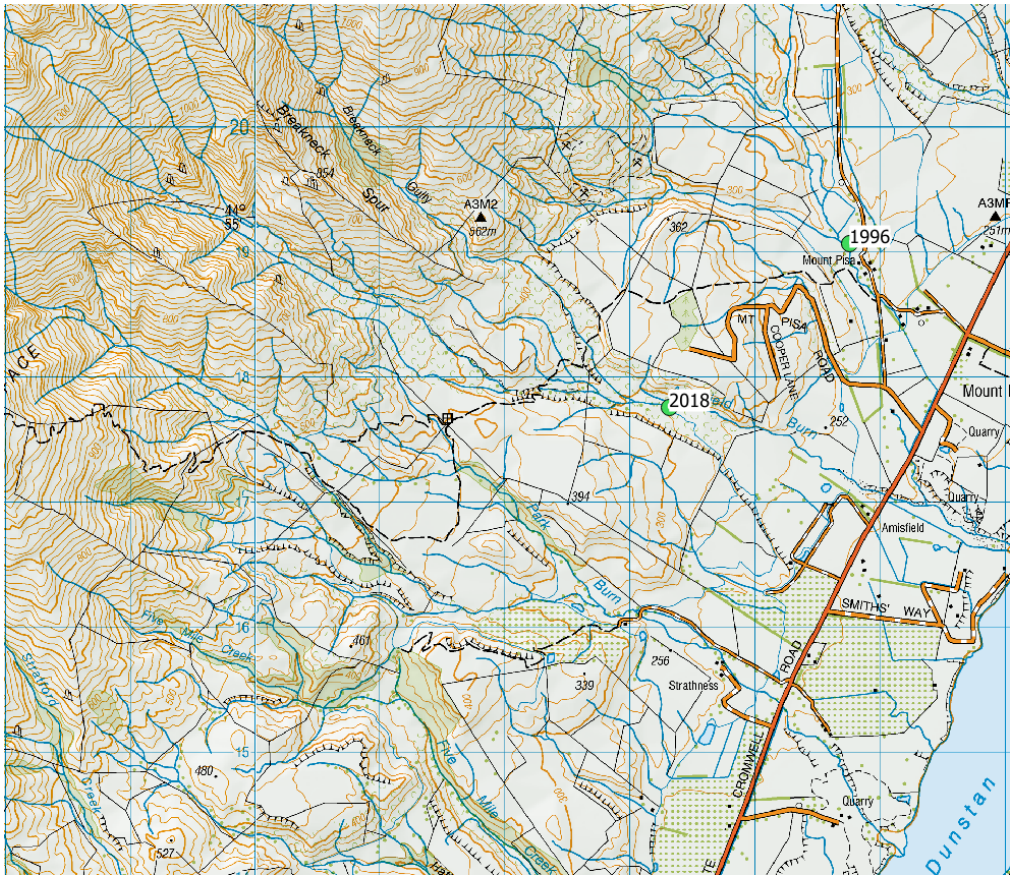

Figure 5: Upland bully locations reported in the NZFFD in the Park Burn and Amisfield Burn.

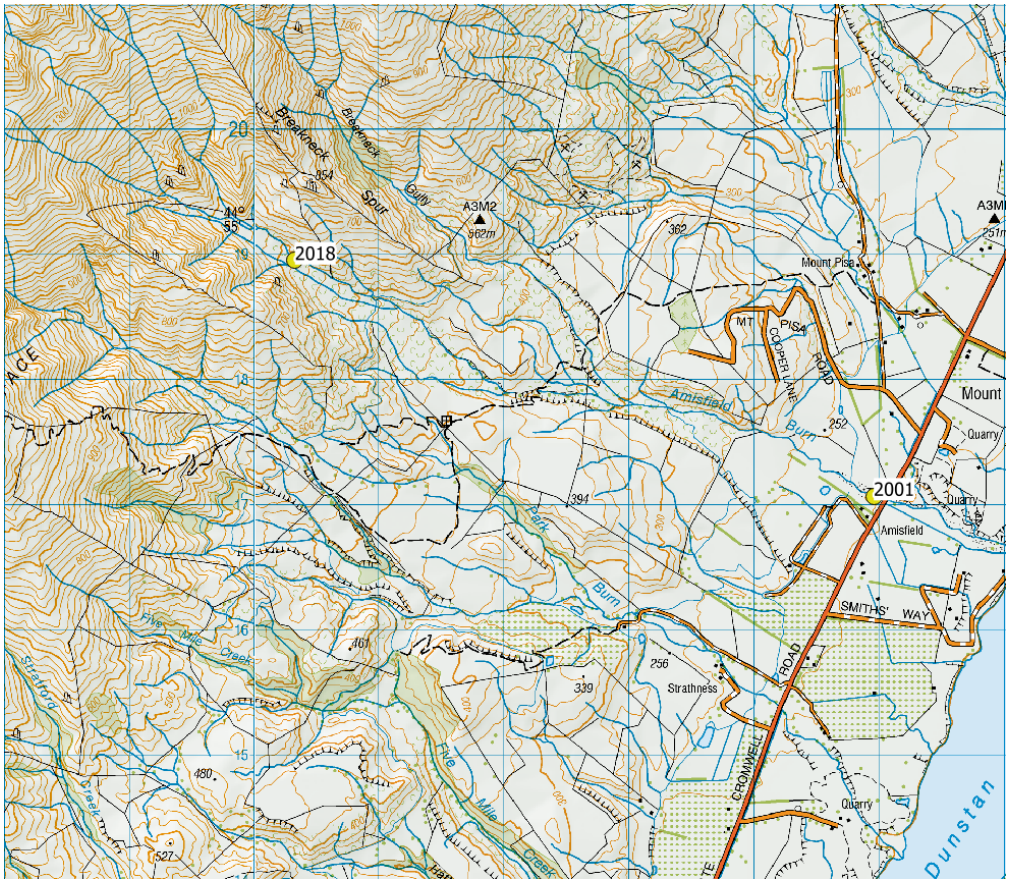

Figure 6: No fish present locations reported in the NZFFD in the Park Burn and Amisfield Burn.

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 straigthened and had reduced habitat diversity.

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

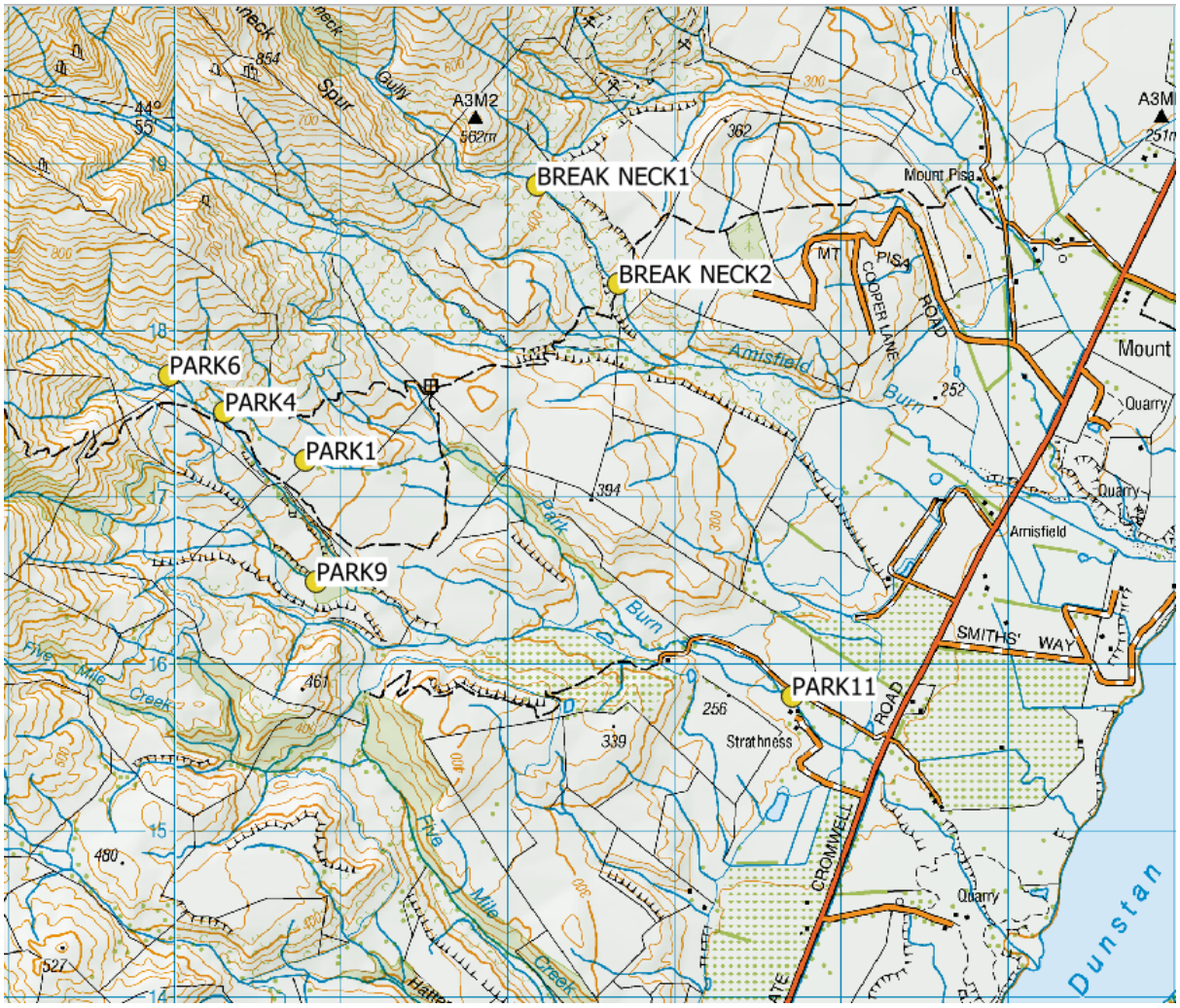

Figure 8: Fish survey sites with brown trout.

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 loose 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 looses 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 loosing 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 wold 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 m^2 survey area. Downstream of the upper most take the survey (site 4) caught seven juvenile brown trout in 80 m^2. 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

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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