

Supporting Information (Revised July 2019)

Luggate Partnership Application to ORC

1. Summary

The applicant is a partnership formed by Lake McKay Station Ltd and Luggate Irrigation Co Ltd who wish to obtain consents to continue to take water from the Luggate Creek (North Branch) and the Alice Burn (South branch).

The application is take up to 362 litres per second from Luggate Creek from three points of take for irrigation, stockwater and residential use. One point of take is in the north branch of Luggate Creek and the other two are from the south branch. (see Location Plan of water intakes and Irrigation areas in Appendix 1). This will be used to irrigate 526 ha which is made up of 298 ha of existing irrigation area and 228 ha of proposed future irrigation area.

This is a revised application for RM18-345 in place of the initial application that was lodged in September 2018. The initial application was for the full replacement of the existing water permits held by the Luggate Partners being 423 l/s and for an irrigated area of 616 ha.

However, the Partners have accepted that the water resource in the Luggate catchment would have a high allocation level if all the permits were operated and although the environmental values in the water way are protected by the minimum flow regime, there is less surety of supply for irrigation with a high allocation and the Partners have agreed to reduce their proposed take from the south branch by 61 l/s.

At present the land in the command area is irrigated by Pivot and K Line. It is anticipated that some new areas may be developed as the existing allocation is more efficiently applied and the potential for including storage is assessed. This requires capital expenditure which cannot at present be justified until there is certainty to the water rights.

1.1 The Applicant

Luggate Partnership

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Luggate Irrigation Company has 3 shareholders (and their associated land holding as shown on the Irrigation Areas Plan) being;

Lake McKay Station Ltd (10 %) (Stage 1, 2 ,3, Home block)

Dorothy Josephine Pittaway (33.3%) (Umbers)

Crystal River 2018 Limited (56.67 %) (Big River)

1.2 The Existing Water Permits

The water permits held by Lake McKay Station are;

Water Permit No.	Volume of Water Authorised (litres/second)	Location of point of take
97803 Mining privilege	85	4 points of take. - Main stem south branch approx 5km upstream of junction of north and south branches of Luggate Creek for 55 l/s - Two tributaries of south branch - 7 l/s and 21 l/s respectively. - Tin Hut Creek for 28 l/s approx 3km upstream of junction with Luggate Creek
2008.519 RMA permit	56	South branch of Luggate Creek same as intake for 97803.
Total	169 l/s	
98104 RMA permit	118	To discharge up to 118 l/s of water into an unnamed tributary of the south branch for the purpose of retaking the water from the same tributary.

The water permits held by Luggate Irrigation Company Ltd are;

Water Right No.	Volume of Water Authorised (litres/second)	Location of Point of Take
WR7284	56 (2 heads)	From the north branch of Luggate Creek approx 200m upstream of the junction north & south branches.
WR7285	85 (3 heads)	From the south branch approx 400m upstream of the junction of north and south branches of Luggate Creek.
WR7286	56 (2 heads)	South branch as above.
WR7298	56 (2 heads)	South branch as above.
Total	254 l/s	

Table 1: Existing water permits.

NB: - The water taken under all four-water race licences is carried in the water race described on WR7286 which states as "commencing in the southern branch of Luggate Creek and terminating at the bank of the Clutha river about three miles above the Luggate Bridge. Length and intended course of race: 5 miles east and west."

2. Description of the Environment

2.1 Site Location, Topography and Land Use

The properties are located at Luggate - the legal description of the properties is attached in Appendix II along with relevant titles. The total area of these properties is some 7000 ha but the irrigated areas are only a small proportion of this.

The irrigated areas or command area is relatively flat comprising of 200ha of river flat by Luggate Irrigation which is immediately below the Wanaka Airport and 300 ha of Lake McKay Station which comprises the terraces above Luggate township. There is also 82 ha proposed for residential subdivision.

2.2 Soils

There are seven main soil types on the property sourced from soil maps compiled by the DSIR in 1965 or latterly by Hewitt in 1998 Land Care Research Science Series No.1. These are as follows:-

1. Pigburn -very shallow/shallow silt loam
2. Luggate shallow sandy loam
3. Blackstone sandy loam
4. Arrow Steepland soils
5. Koinga Steepland soils
6. Conroy Hill soils
7. Carrick hill soils

The Pigburn soils have a medium to high natural nutrient status derived from schist alluvium and greywacke, these comprising a small area adjoining SH6, at the eastern end of the property.

Lying above this soil group adjacent to the northern boundary are the Koinga Steepland Soils which have a very low natural nutrient status. They are formed from Clutha alluvium and loess, but boulders are common and contour is generally steep to moderately steep.

Beyond these areas are the Luggate shallow sandy loams of a low to medium natural nutrient status. Derived from loess and Clutha alluvium, these soils are found on flat to easy rolling terraces.

Of greater significance are the Blackstone sandy loam soils which have a high natural nutrient status, also being derived from schist and loess. These soils are found on rolling ridges and downs and are a good adjunct to the Luggate soils.

The Conroy Hill soils are of a high natural nutrient status and are located on both the Midrun and Lake McKay sectors of the property - see attached Soil Map. Due in part to the loess component of the soils, extensive sheet erosion has occurred in the past and if cultivated are particularly prone to wind blow. Direct drilling as opposed to cultivation is being used to good effect in this regard. In common with many other soils in this area they are deficient in Sulphur but this may be remedied through the application of Sulphur Super.

Above this area and rising up to the southern boundary are the Arrow Steepland soils also of medium to high natural nutrient status. These areas are characterised by steep to moderately steep hills, with many rock outcrops.

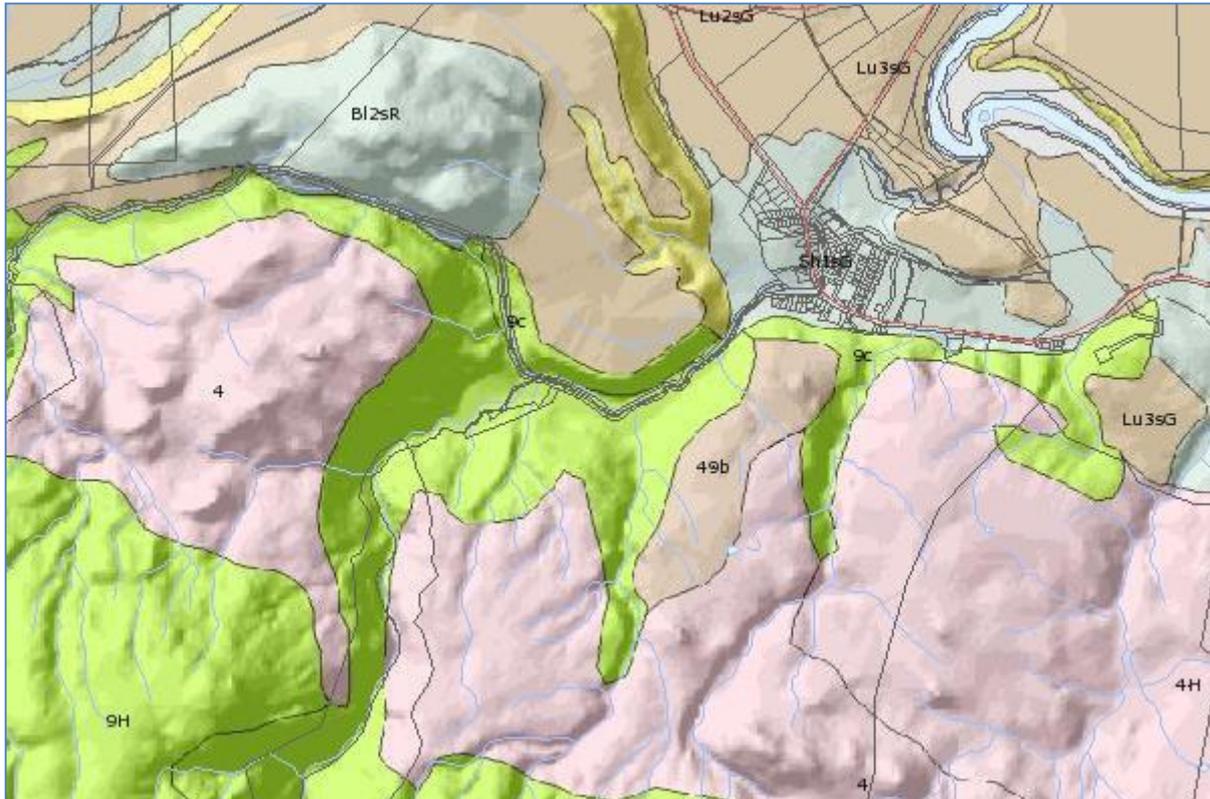


Figure 1: Soils of the Luggate Area – ref: ORC Grow Otago.

2.3 Climate

The average annual rainfall tends to be 651-700mm rising to 801-900mm on the Lake McKay terraces.

The median annual air temperature is 10.1-10.5 C with summer median 16.1- 16.5 C . Growing degree days range from 1401 – 2200 (5 C base) . In March / April the potential evapotranspiration is 71 – 85mm up to 220mm in November / December.

2.4 Surface Water

The properties access the water they currently use for irrigation and stock water from the North Branch of the Luggate Creek and the Alice Burn (South Branch of the Luggate Creek) The applicant is aware of one other permit to take water from the North branch of the Luggate Creek that of the Criffel Water Limited. This is located up stream of the Luggate Irrigation permits on the North Branch and the Luggate permits have historical priority rights over this permit.

Modelling of the Luggate Catchment was carried out by the ORC in 2006 to assess the flows required to sustain habitat – *Management Flows for Aquatic Ecosystems in Luggate Creek – ORC 206*. This report modelled the 7 day mean annual flow to be 454-550l/s.

The report states that there is currently 987 l/s (existing permitted take) primary allocation above the measurement point (which is located at the SH6 Bridge at Luggate township). This allocation

can affect flows when the river is at its 7 day mean annual low flow . Minimum flows to protect the ecological values of the Luggate Creek have been determined as follows.

Low Flow Period (November to April)	180L/s
High flow period (May to October)	500l/s

Based on the MALF and under part (a) of Policy 6.4.2. a Primary allocation limit of 500L/s determined was determined for the catchment. However, under Policy 6.4.2(b) the higher primary allocation of 987 l/s applies unless it is lowered during the process of replacing the Deemed permits. No supplementary allocation block has been set.

3. Description of Proposed Water Use.

3.1 Background to Water Use on the Partnership Properties.

Lake McKay Station and the properties supplied by Luggate Irrigation Company Ltd have been following a land development programme that spans the last 25 years. The installation of modern spray irrigation systems has been integral to this development. However there is a large cost involved in the irrigation infrastructure for this development and the development has been staged over a number of years. The continuation of the development programme is now dependent on securing the replacement of the water permits.

The programme started with the previous land owners (the Mathewsons) entering the land tenure review process for pastoral high country leases, around 1992. The land tenure review process was completed in February 2002 and resulted in 2,800 ha of the high country land going to the Department of Conservation and 5,600 ha of the lower altitude land being freeholded. Under the pastoral lease the development of land to exotic pasture and irrigation was limited by the lease agreement with the Crown. So the justification in the tenure review process for giving up the high country grazing land was that freeholding of the lower country would allow the land to be developed and irrigated with the Luggate Creek water permits.

The Mathewsons began the development process in the early 2000s by converting the Tin Hut terrace lands to pasture. This included pest eradication, fencing costs and pasture development. *See attached letter to ORC dated 3 Sept 2008 with further explanation on the early phase of the development programme.* – Appendix 6.

The Harveys purchased Lake McKay Station in 2008 and continued the development of the irrigation scheme on the improved pasture areas. The original water take for permit 97803 from the south branch of Luggate Creek (also referred to as the Aliceburn or the Fall burn) was via a 5km long water race and the first stage of the development of an irrigation Scheme was the installation of a pipeline in this water race. Piping the race has saved around 30 to 40 litres per second in losses in the race and this water is now used for irrigation. The installation of the pipeline and the distribution lines for the Stage 1 area was completed by 2012 and the Stage 2 area was commissioned in 2014 with a total cost of \$1.5M. (See attached reports from Waterforce with details of the Scheme and cost estimates in Appendix 6)

In the same period the Harveys purchased the Big River property on the north side of SH6 which, at the time, was irrigated by border dyke and contour flood irrigation by the Luggate Irrigation Co. water permits. In the period 2012- 2014 this area of 100 ha was converted into modern pasture

and spray irrigation with the installation of 2 centre pivots and accessory K line. The cost of the irrigation on its own was around \$1.5M and the conversion of the land and installation of an underpass under the highway additional to this.

The Big River property was sold to Crystal Rivers Ltd in 2017 who have extended the irrigation of the Big River block with K lines on the 8 ha at the north end of the block. They are also working on a conversion to spray irrigation on the neighbouring Umbers block (*see attached Plan "Irrigation Concept V1 – PGG Wrightsons Feb 2019 – Appendix 6*)

On Lake McKay Station the next stages for the irrigation development programme are the Home Block, supplied from the Luggate Irrigation Co. water permits and the Stage 3 and Stage 3 Extn areas supplied from the Alice Burn permits. (See Appendix 6 for reports from Waterforce for more detail on the proposed irrigation for these areas)

These plans represent the continual development of Lake McKay Station and the properties associated with Luggate Irrigation Ltd. The developments are costly and therefore must be done in stages with planned investment for the properties. Hence the 25-year development period to date.

The option of taking the Luggate Irrigation Ltd requirements from the Clutha has been investigated on two occasions. One when the original Pivot scheme was developed in 2010 and again in 2017. This part of the Clutha has been investigated as part of the proposed Upper Clutha hydro scheme. Drilling in the area has shown that in this area the Clutha is flowing on the old lake bed which is very impervious and therefore it is not possible to extract water from a bore beside the river. Extraction would only be possible by an expensive buried pipe intake on the bed of the river.

Part of Lake McKay Stn is being subdivided off for residential development. This was purchased by Minaret Resources Ltd formed by Murray Frost. The 12 ha area on the outskirts of Luggate has recently been approved in the proposed QLDC District Plan for residential zoning. The Upper Clutha area has experienced rapid growth in the last few years and there is a shortage of land for residential development. The 82-hectare block on the terraces to the north west of Luggate has access to SH6 and is considered suitable for residential development. The current Plans are for 250 lots on this land in a combination of rural residential and rural lifestyle developments. The ORC generally recommends an allowance for rural dwellings of 3000 l/day summer and 1000 l/day winter. Accordingly, the water supply scheme will be designed to deliver up to 3000 l/day for 250 dwellings which requires a continuous flow of 9 l/s. The water supply will be pumped from the LIC water race to tank storage on the Home Block terrace. There are no other alternatives for domestic supply in the Luggate area. The existing township is supplied partly from a groundwater supply and partly from Dead Horse creek (the next catchment to the south of Luggate Creek). The groundwater supply is from a thin shallow aquifer in the alluvial fans between the two creeks and has no available capacity for future housing developments.

3.2 Proposed Use of Water

The application is to take up to 362 l/s of water from Luggate Creek for the purpose of irrigation stockwater and residential use. The breakdown of the use for each activity is shown in the following Table. (The water requirements are based on the maximum demand during a dry period):

Current use:

Block	Use	Irrigated area (ha)	LIC Irrigation required (l/s)	LMS Irrigation required (l/s)
Big River (108ha) and Umbers (22ha)	Pasture (0.7 l/s/ha)	130	91	
Loss in water race (10%)			8	
Stage 1	Pasture (0.6 l/s/ha)	85		51
Stage 2	Pasture (0.6 l/s/ha)	83		50
Stage 1&2	stockwater			1
Big River	stockwater		1	
Sub Total		298	100	102

Total Current Area Irrigated is 298 ha and the irrigation requirement is 200 l/s.

The stock water requirement is 2 l/s.

Future Planned Development:

Block	Use	Irrigated Area (ha)	Water requirement from LIC permits. (l/s)	Water requirements from LMS permits. (l/s)
Umbers (incl 8 ha of Big River and 22ha by SH6)	Pasture (0.7 l/s/ ha)	78	55	
stockwater			1	
Stage 3	Pasture (0.6 l/s/ ha)	110		66
Stage 3 stockwater	1l/s			1
Home Block	Pasture (0.7 l/s/ha)	40	28	
Home Block	Residential (3000 l/day/ household)	250 houses	9	
Sub Total		228 ha	93	67

Table 2: Water Use – Current and Future Use

The Future Irrigation area is 228 ha and the irrigation requirement is 149 l/s.

The stock water and the residential use requirement is 11 l/s.

The Total Irrigation Area (Current use + future development) is 526 ha

And the Total water requirement is 362 l/s (includes the residential and stockwater components)

3.3 Revised Application for Replacement Water permits

Given the above proposed water use our revised application is for water permits to take up to 326 litres per second from three existing points of take. Hence the application is for the following amounts of water;

The daily volume applied for is 31,277 m³/day

The monthly volume applied for is 931,279 m³ per month

The Annual Volume applied for is 4,761,024 m³ per year

The amounts for stock water and residential supply for 250 houses are included in these volumes.

The daily and monthly volume are the maximum amount of water required in the event of no rain for a month and are based on current use. The annual volume is calculated using the Aqualinc Guidelines which includes an allowance for rainfall related to the climate zone of the respective irrigation areas and for less evapotranspiration during the shoulder seasons of spring and autumn. (See Section 3.4 below for - Analysis under Aqualinc Guidelines).

As noted in Section 3.4 the water requirements for the "Big River" irrigation area are based on an application of 6mm/day or 0.7 l/sec/ha relevant to this area being a drier zone than the Lake McKay Station terraces area which has a lesser water demand of 0.6 l/sec/ha.

The water requirement for residential use is based on 9 l/s (being 3000 l/day for 250 houses). This would also apply to the monthly volume applied for which is taken as a month in mid-summer with no rainfall when it is possible that the maximum take could be required for the duration of the month.

The average amount of 2000 l/day for residential use has been used in the calculation of the annual volume required (ie. 2000 l/day being the average of 3000 l/day for maximum summer use and 1000 l/day during the winter months).

It is our preference that the new permits are issued separately to the two Partners in this application as follows;

- Lake McKay Station Limited - for a take of 170 l/s from the upstream point of take in the south branch of Luggate Creek at grid reference E1300464 N5032792 and a point of take in a tributary of the south branch at E1301861 N5033204.
- Luggate Irrigation Company Ltd – for a take of up to 192 l/s from either; a point of take in the south branch of Luggate Ck at map grid reference E1302755 N5037562 or a point of take in the north branch of Luggate Ck at E1302961 N5037944.

The existing Discharge permit 98104 that is held by Lake McKay Station for the takes from the tributaries of the South branch will be surrendered as water is no longer discharged into the tributary creek and then retaken downstream. Water from the main south branch point of take stays in the pipeline and the water from the tributary is fed into the pipeline via a junction box/ break tank that is installed in the main pipeline (See photos in Appendix 5 - ORC Inspection Report).

3.3.1 Requested Term of Consent

The application seeks to obtain consent for a 35 year term. The applicants preference is that the consents do not commence until 2 October 2021 being the day after the mining privileges and deemed permits held by the Partners have expired.

3.3.2 Difference from Initial application for RM18-345

The initial application for RM18-345 was for a combined water take of 423 l/s, 1,096,416 m³/month, and 6,578,496 m³ / year.

The revised application is for 61 l/s less than the instantaneous rate, 165,137 m³ less than the monthly rate and 1,817,472 m³ less than the annual rate.

This reduction in water allocation applied for relates to a reduction in the possible land area irrigated by 90 hectares.

3.4 Description of Existing Water Supply Scheme and Use.

The Luggate Irrigation Company (LIC) intake is a surface take from the Alice Burn (south branch of Luggate Creek for Permits WR7285, 7286, 7289) and an additional take from the North Branch of the Luggate Creek (WR7284). These are combined into one water race which runs parallel to Luggate Ck for around 1.5km to the edge of Luggate township and then runs to the NW along the foot of the terrace for 2.5 km, ending in a storage dam in the Big River block (see Appendix 1 - Irrigation Area Plan). This take supplies the requirements for the Umbers block and the Big River area. The water race is authorised by the existing water race licence WR7286 and does not cross through any DoC land.

There is an open flume measuring device in the water race downstream of the two points of take which is shown on the Irrigation Areas Plan as WM0671. The ORC Compliance Water Inspection Sheet (Jan 2018) has more description on the water race and measuring device (refer Appendix 4). Note the Compliance Report describes the North Branch take as WR7284 and WR7286 when it is only WR7284. The point of take for WR7286 is located with the other permits from the south branch point of take.

The flume measuring device was installed in 2013 for the LIC permits. The flow records from these water permits for the period from September 2013 to May 2019 is shown in Appendix 2. The flows over the 6 year period are in the range of 60 l/s to 180 l/s. In the years 2013 to 2014 the Big River block was in the development phase and the pivot irrigators had just been installed and the flows required were around 60 to 80 l/s. This included an estimated loss of around 8 l/s (10 %) of flow in the race. Flows have increased to 90 – 120 l/s range in the following years (2015 -2017) as K line was added to the peripheral areas in the Big River block and when the Umbers block is irrigated. The race has a capacity of approximately 200 l/sec although currently when flows are higher than 150 l/s in the race, then excess water is bywashed back to Luggate Creek at a point about 1km downstream of the flow gauge. The period of high flows of + 200 l/s in the record for July to December 2016 was a malfunction of the flow meter.

The take for the Lake McKay Stn water permits of 97803 & 2008.519 is further south in the Alice Burn at an altitude of around 900m (see Irrigation Areas Plan in Appendix 1). As noted above, the water from this intake flows through a 4 km pipeline to the Tin Hut Creek terraces where it powers a K Line irrigation scheme under gravity. The existing water permit for 97803 included three points of take, being the south branch of Luggate Creek (mainstem), two tributaries of the south branch and from Tin Hut Creek. When the pipeline was installed it was only practical to include an intake from the main stem (Aliceburn) and an intake from the larger of the two tributaries which is located at approximately 1.7 km along the pipeline from the Aliceburn Intake (see Appendix 5 for ORC Compliance Water Inspection Report - Lake McKay Station Ltd - for map grid reference and photos of points of take).

It was not feasible to connect the flow from Tin Hut creek into the pipeline and hence this point of take has not been used in recent years and will be surrendered.

The flow meter for this water take (WM0487) is located in the pipeline approximately 3.7 km from the point of take for the reasons that this was past the point where the tributary flow feeds into the pipeline and at place where telemetry was available. (see location on Irrigation Areas Plan in Appendix 1). The flow meter was installed in 2013. The flows for the period 2013 to 2015 were in the range of 50 to 80 l/s with the main supply to the Stage 1 area and partial supply to the Stage 2 area as it was developed in in 2014. The Stage 2 area was completed in 2015 and the flows in the period 2015 to 2019 are in the range of 80 to 100 l/s (see Appendix 3).

The calculations for water use have included an allowance for stockwater within the permits as shown.

The development of the terrace areas on Lake McKay Station is included in a 25-year development programme that was initiated when the property went through Pastoral Lease Tenure Review in the mid-nineties. The Scheme has been designed to supply the Stage 3 and Stage 3 extension areas (see Irrigation Areas Plan) and the development of pasture and installation of irrigation to these areas is dependent on securing the water permits

3.4 Analysis of water use relative to the Aqualinc Guidelines.

The ORC refers to the Aqualinc Report - *Guidelines for Reasonable Irrigation Water Requirements in the Otago Region - July 2017* - as the recommended water requirement when processing water permit applications. The Guidelines are designed around a recommended water use for irrigation dependent on the relevant rainfall zone, soil type, and land use or crop type.

3.4.1 Analysis of Irrigation Areas and Aqualinc Guidelines

The Aqualinc Guidelines define the Mean Annual Rainfall (MAR) zones for Otago. The areas irrigated by the Lake McKay Stn (LMS) and the Luggate Irrigation Co (LIC) are in different MAR zones due to the difference in altitude and proximity to the north end of the Pisa Range. The LIC areas (The Big River and Umbers Block) are on the valley floor at an altitude of 250 to 300m asl and are in an MAR

zone of 500- 600mm. Whereas the LMS irrigation areas on the Tin Hut and Dead Horse Creek terraces are at an altitude of 450 to 500m asl, on the flank of the Pisa Range, and in a higher MAR zone of 600- 700mm (ref: Fig 2: Distribution of MAR within the Region – Page 7- Aqualinc Guidelines 2017).

The soils on the Big River block and Umbers Block are Luggate shallow sandy loams which have a low PAW (Plant Available Water). (Section 2 .2 Soils)

The Soils on the Lake McKay Terraces are Conroy Hill (silt loams- Loess) soils which also have low to very low PAW. (see Figure 2: Plan of Profile Available Water from Grow Otago – below)

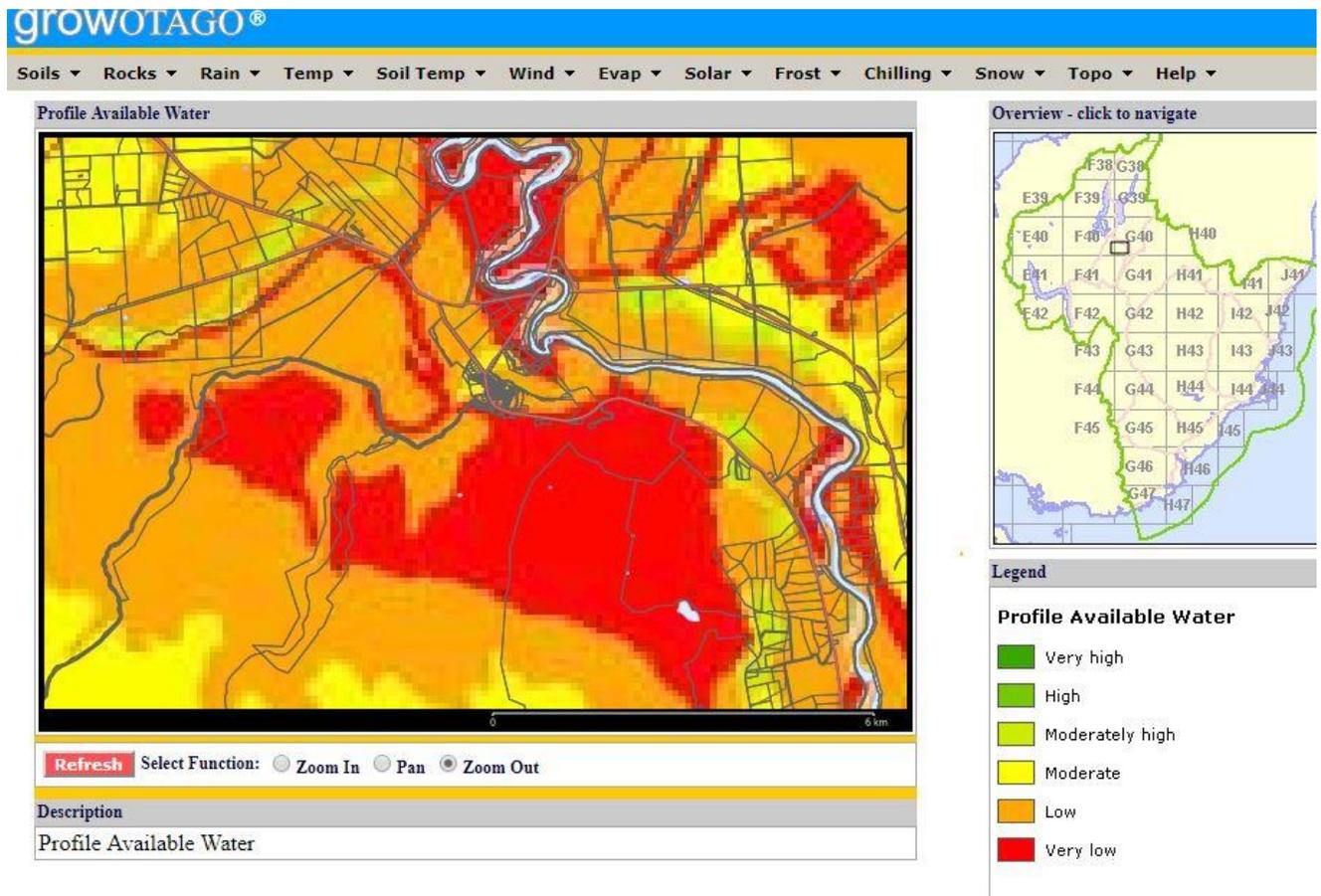


Fig 2. Profile (or Plant) Available Water (PAW) for the Luggate area. ref: ORC Grow Otago.

Hence in the Aqualinc Guidelines (Table 5, Pg 18) – a low PAW of 40 is used for assessing water demand in both areas.

The predominant crop type in the irrigation areas is pasture.

Given the above criteria the appropriate reference in the Aqualinc Guidelines is in Table 5 on Pg 18 and the irrigation water demand for pasture for the two areas is shown in the below Table:

Irrigation Area	MAR ZONE	peak daily demand PAW value of 40	Max monthly demand (mm/ month)	Annual Demand Maximum (mm/yr)
LIC (Big River, Umbers and Home block)	550	5.5mm	171	875
LMS (Lake McKay Stn Terraces - Stages 1 -3)	650	5.4mm	167	821

Table 3: Irrigation Demand – based on Aqualinc Guidelines 2017 – Table 5: Irrigation water demand for pasture

3.4.2 Current Use - Luggate Irrigation Company – Big River, Umber, and Home Block areas.

The actual water use for this area is shown in the flow records in Appendix 2 – “Luggate Irrigation Co. Flow rates”, where the flows are in the range of 90 to 120 l/s. This flows are higher than the Aqualinc water requirement of 90 l/s due to losses in the water race of around 10- 15 l/s. The records show some periods of higher flows of up to 200 l/s at which times some of the excess water is by- washed back to Luggate Creek from the water race.

In practice, peak daily demand on the Big River Block is found to be around 6mm per day during summer dry periods. This is higher than the Aqualinc Guidelines figure of 5.5mm. The higher demand is most likely due to increased wind speeds over this area due to a narrowing of the Upper Clutha Valley between Luggate and Tarras. The increased wind speed has the effect of increasing the evapo – transpiration on the more exposed valley floor sites. A water demand of 6mm per day is the equivalent of a continuous flow of 0.7 litres per second per hectare. This continuous flow of 0.7 l/s/ha is the water demand used in the “Water Use” table presented in Section 3.2 above. For example, the Table refers to a water demand for the Big River and Umbers block (current use) of 91 l/s which has been calculated by the area of 130 ha x 0.7 l/s/ha.

3.4.3 Current Use Lake McKay Station - Stage 1, 2 & 3 areas.

The actual water use for the Stage 1 & 2 areas is shown in the graphs in Appendix 3 labelled “Flow rate WM0487 Lake McKay Stn”. In these graphs over the 5-year period the water flow records are in the range of 90 to 110 l/s. This is an average of 100 l/s - hence actual water use in the Stage 1 & 2 areas is similar to that forecast in the Aqualinc Guidelines

The Aqualinc Guidelines have a peak daily demand of 5.4 mm water depth per day for the terrace areas on Lake McKay Station. A water depth of 5.4mm over 1 hectare equals 54,000 litres. The continuous flow required to deliver 54,000 litres over a 24-hour period is 0.62 litres per second. Hence the water demand in the Table is expressed as 0.6 l/s/ha and the water demand for the Stage 1 area of 85 ha is 51 l/s (ie. 85 x 0.6 l/s/ha). The demand for the Stage 2 area is shown in the Table is 50 l/s (ie. 83 x 0.6 l/s/ha). Hence the combined demand for irrigation for Stage 1 & 2 areas is 101 l/s

3.4.4 Proposed Month Allocation

The Luggate Partnership application is for a proposed monthly maximum allocation of 931,279 m³. This month volume includes the current and future hectares, stock water and a volume for residential use and is calculated as in the following Table;

Water Use Activity	Month Volume - Calculation on current use rates.	Month Vol (current use)	Aqualinc Estimated Monthly Vol
LIC hectares- current and future 130+ 78+ 40 = 248 ha	248 ha x 0.7 l/s/ha x 3,600s x 24 hours x 31 days (divided 1000 for litres to m3)	464,970 m3	248 ha x 1,710 m3/ha 424,080 m3
LMS hectares – current and future 85 + 83 + 110 = 278 ha	278 ha x 0.6 l/s/ha x 3600s x 24 hours x 30 days. (divided 1000 for litres to m3) (NB: 1 day less due to accumulated time during month for moving K lines)	432,345m3	278 ha x 1,670 m3/ha 464,260m3
	Irrigation requirement subtotal	897,315 m3	888,340 m3
Stock water (to 4 areas). 1 +1 +1 +1 = 4 l/s	4 l/s x 3600s x 24 hours x 31 days (divided 1000 for litres to m3)	10,714 m3	10,714 m3
Residential (max requirement) 250 x 3000 l/ day	250 x 3000 l/day x 31 days	23,250 m3	23,250m3
	Total water requirement for month	931,279 m3	922,304 m3

Table 4: Water use - Calculation of water requirement per month.

Also included; the monthly water requirement is calculated using the Aqualinc Guidelines monthly demand of; 171mm/ hectare for the LIC area, and 167mm/ hectare for the LMS area, and is shown in the last column of this Table for comparison. The Aqualinc Estimate is around 9,000 m3 lower for the month allocation than the proposed monthly allocation for the Revised application. The difference is most likely due to the slightly higher application rate for the LIC area that has been found to be required for the pivot irrigators on this site (see Section 3.4.2 above).

3.4.5 Annual Allocation

The Annual allocation applied for is 4,761,024 m3. This volume was calculated using the Aqualinc estimates for “Annual Demand maximum” as shown in the below Table. The stock water allocation is similar to the monthly allocation (continuous flow of 4 l/s as above), but extended for 365 days. The residential allocation is calculated using an average water requirement of 2000 l/day for 365 days, due to a lower demand over the winter months.

Water use Activity	Annual Use - based on Aqualinc - Annual demand maximum.	Annual Vol
LIC hectares- current and future 130+ 78+ 40 = 248 ha	248 ha x (875 mm/yr x 10m3) (conversion from mm water depth (mm) to m3 is x 10m3)	2,170,000 m3
LMS hectares – current and future 85 + 83 + 110 = 278 ha	278 ha x (821 mm/yr x 10m3)	2,282,380 m3
	Irrigation requirement subtotal	4,452,380 m3

Stock water (to 4 areas). 1 +1 +1 +1 = 4 l/s	4 l/s x 3600s x 24 hours x 365 days (divided 1000 for litres to m3)	126,144 m3
Residential (max requirement) 250 x 3000 l/ day	250 x 2000 l/day x 365 days	182,500 m3
	Total water requirement for Year	4,761,024m3

Table 5: Water use - Calculation of annual water requirement.

4. Assessment of Environmental Effects

4.1 Flows in Luggate Creek.

The obvious effects of the abstraction of water for irrigation is decreasing the flows in Luggate Creek. Flows in the main stem Luggate Creek are recorded at the ORC recorder at the SH6 bridge in Luggate town. The ORC recorder was installed in December 2015 and there are three and a half years of flow records available- see Fig 3 below:

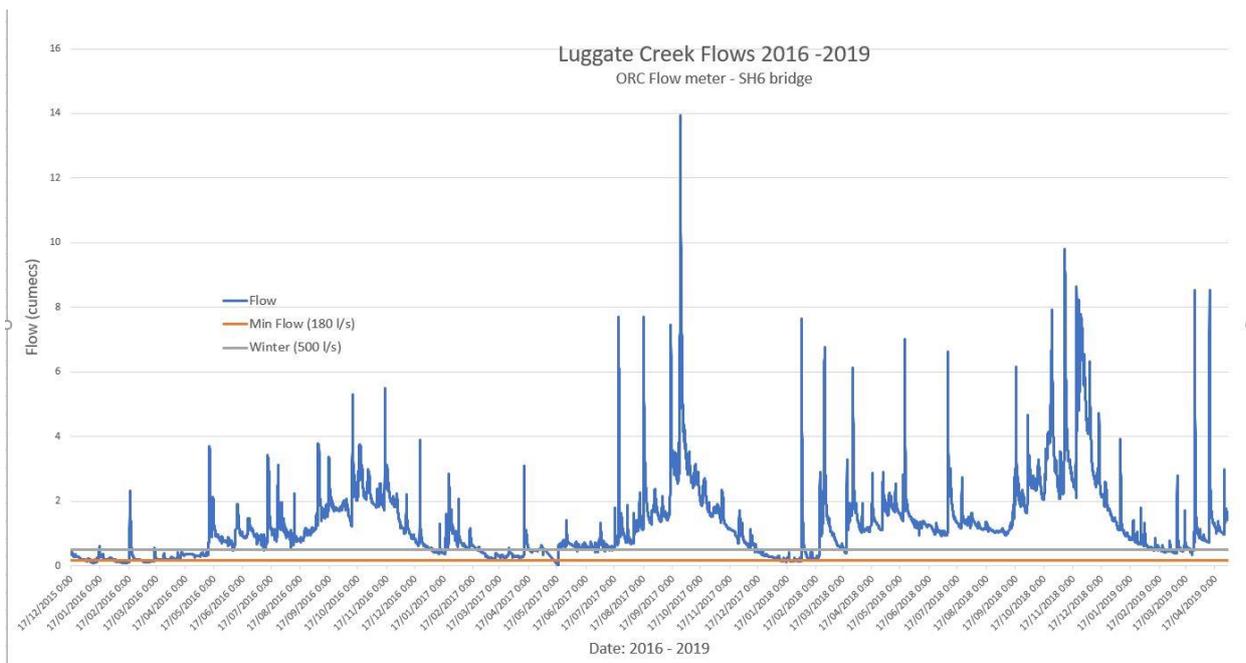


Figure 3: Luggate Ck flows at SH6 bridge recorder 2016 -2019

Over this period the Creek has had a range of flows from the minimum flow at 180 l/s to flows of 6 – 8 cumecs during rainfall events. On average the flows are in the range of 1 to 3 cumecs. In regard to the duration of low flows, over the last 4 year period flows of less than 500 l/s occurred for 4 to 8 weeks periods per year and usually in the months of February and March. Although it is noted that in the summer of 2015/16 the low flow period extended from December 2015 through to April 2016. Luggate Partners report that there are two factors affecting the duration of low flow periods, one is the obvious one of climate, albeit low rainfall and hot temperatures. The other factor is the water users in the catchment improving their observance of low flow monitoring and reducing their water takes as the flow approaches the minimum flow level. Prior to 2015, before the ORC flow site was

installed, it was difficult to monitor low flows and to know when to reduce their irrigation takes. Since the ORC recorder was installed the monitoring of low flows has been increasingly active and in the last two irrigation seasons the low flow level of 180 l/s has not been breached.

The potential adverse effects of reduced flows are;

- a) less water available for other water users (irrigation or domestic water takes).
- b) less water available for recreation users
- c) decrease in freshwater habitat

In regard to a) - there are no other water abstractions downstream of the Luggate Partners points of take.

In regard to b) – the main recreational uses of Luggate Creek are landscape enjoyment (ie. seeing and walking beside the Creek), swimming (there is a public swimming area near the rec reserve in Luggate), and fishing. In the minimum flow setting process we understand that the recreational uses were determined to be acceptable when flows are above the minimum flow level of 180 l/s. The public swimming hole near the rec reserve at the Luggate domain is still popular at low flows.

In regard to fishing; the Luggate Creek is not noted as a significant sports fishery although it is valued for brown trout spawning and recruitment for the Upper Clutha fisheries (ref: Management Flows for Aquatic Ecosystems in Luggate Creek - ORC 2006)

In regard to c) - the effects on the freshwater habitat are discussed in the next section.

4.2 Description of Freshwater Habitat and Potential Effects

4.2.1 Natural Values

The ORC Water Plan Schedule 1A identifies the natural values of Luggate Creek as Weedfree, Rare fish (significant habitat for Koaro), rare indigenous vertebrates (predominantly upstream in the north branch),

4.2.2 Water Quality

The ORC monitors a range of parameters in water ways throughout Otago and produces a “State of the Environment Report” every 5 years. The most recent report was in 2016 and Luggate Creek was rated as “good” (see Appendix 9 for SOE report).

4.2.3 Fish Surveys

The NZFFD (NZ Freshwater Fish Database) has seventeen records of surveys for the Luggate catchment. Nine of these records are for sites in the high-altitude areas of the catchment (over 1300m) in Luggate Ck, Princess Burn and Cliff Burn. No fish were recorded at these sites.

“In the lower reaches three fish species have been recorded, rainbow trout, brown trout and koaro. Brown trout are by far the most dominant species in the lower reaches from near the confluence of the north and south branches out to the Clutha. Rainbow trout occupy a reach from the Criffel intake weir to about 3km downstream where the lower gorge section separates them from the dominant brown trout area further downstream. Koaro have been reported four times in the NZFFD

surveys and on each occasion either noted as being rare with only 1 or two fish caught. Three of the four records are for sites below the lower gorge and one upstream of the lower gorge” – excerpt from a Report by Waterways Consulting - June 2016.

The most recent fish surveys were carried out by the ORC (Ross Dungey) in May 2018. The survey in the south branch near the Luggate Irrigation intake identified all brown trout and the survey upstream in the south branch at the Lake McKay Station intake found no fish. Invertebrate surveys at both intakes found a range of stone fly, caddis and mayflies that are a sign of good water quality and a healthy instream ecosystem. (See results Appendix 7).

Although not noted in any of the surveys in the NZFFD, Long finned eels (tuna) have been observed in the lower catchment in the deeper pools near Kingan Cres.

4.3 Effects of Abstraction on Fresh Water Habitat

Reduced flows from abstraction have the potential to reduce the area of fresh water habitat and affect the health of the fresh water ecosystem. The water takes for irrigation have been occurring at the current level of abstraction for the past 40 years and the creek has maintained a good water quality standard as noted in the above referenced studies. Most likely due to the low flow periods being of relatively short duration of 4 to 6 weeks (< 500 l/s) and the minimum flow level being maintained over these periods. As noted above the SOE report 2016 rated the water quality in Luggate Creek as good and the macroinvertebrate community health as “good” (see Appendix 9 SoE Report, Table 7).

Although no site specific studies have been carried out on habitat and flow variation for this application, the ORC report on “Management Flows for Aquatic Ecosystems in Luggate Creek” in 2006 reported on IFIM studies carried out at the time.

IFIM or “Instream Flow Incremental Methodology” considers the effects of flow changes on instream values such as river morphology, physical habitat, water temperature, water quality and sediment processes. The results from ORC IFIM work in 2006 are presented in the following Table:

Fish Species	Optimum Flow (m3/sec)	Flow below which habitat declines (m3/sec)
Koaro	0.7	0.3
Adult Brown trout	1.0	0.5
Yearling brown trout	0.5	0.25
Brown trout fry	0.4	0.25
Brown trout spawning	0.4	0.25

IFIM studies based on 7- day MALF = 0.55m3/s.

Following these studies and following consultation with the local community and environmental groups the minimum flow regime for Luggate Creek was set at of 500 l/s in the winter months (May – September) and 180 l/s during the summer seasons (October to April).

The reasons given for this minimum flow regime were;

- the fish population is dominated by brown trout and during the summer months predominantly juvenile brown trout are present and a low flow of 180 l/s was considered adequate to maintain habitat for juvenile brown trout.

- Adult brown trout are not usually present in the creek during the summer months but return to the creek in the winter period for spawning. Hence the higher minimum flow of 500 l/s was set for winter months.
- The low incidence of indigenous fish species is more likely due to the dominance of brown trout rather than the low flow regime.
- The breakdown of the IFIM study for Koaro shows that 70 % of habitat is retained at flows of 180 l/s – (see Appendix 7 for IFIM analysis for Koaro)
- The creek retains its landscape and recreational values at that flow.

With the recent reports of long finned eel in the catchment the IFIM analysis for this species was obtained from Ian Jowett. The analysis shows that 85% of habitat is retained at 180l/s (see Appendix 7 for IFIM analysis report).

In the last 4 years, the level of abstraction by the Luggate Partners has been in the range of 200 to 250 l/s and the abstraction by the Criffel Water group is in the range of 400 to 550 l/s. Given that the minimum flow is in place for Luggate Creek and with both parties rationing their takes during dry periods, the instream habitat condition has a retained high rating in the ORC monitoring report with this level of abstraction, and therefore it is considered that the continuation of this level of abstraction will have less than minor adverse effects on the instream habitat values.

This application is for an increase in the amount of water taken by the Luggate Partners from the current level of around 250 l/s to up to 362 l/s for planned the development areas. With observation of the minimum flow levels and the rationing regime between the two main abstractors in place, it is considered that the proposed increase in abstraction rates in some years may increase the amount of time that rationing is required (depending on the dryness of the season) but is not expected to have an adverse effect on the instream values.

4.4 A possible solution to increasing populations of indigenous fish species.

At a recent meeting with affected parties we heard that Aukaha and DoC were keen to increase the populations of indigenous fish species in the Luggate Creek and were wanting to have the minimum flow increased as a means to promote this. Given that brown trout are the dominant predator on indigenous species, particularly non-migratory galaxiids, we wonder whether increasing the minimum flow will allow much increase in indigenous fish populations while the trout are still in the catchment. We note in the Fish and Game spawning survey (see Appendix 7) on the fish barrier effect of the weir at the SH6 bridge at Luggate and how the access for brown trout had been improved with the retrofitting of a fish ladder to the weir. The Luggate Partners suggest that an option for increasing the indigenous fish population may be best achieved by excluding trout from a part of the catchment rather than increasing the minimum flows. A barrier could be installed in above the confluence in either the north or south branches of the Creek or possibly at the SH6 bridge given that the weir under the bridge already functions as a barrier to trout access. It may be possible to exclude trout from the catchment upstream of the bridge if the fish ladder was removed and the barrier effect of the weir was increased. This may be an option for Fish and Game, DoC, and Iwi representatives to discuss, depending on the preference for species distribution in the catchment.

4.5 Residual Flows at intakes

The purpose of residual flows is to maintain the values of the creek downstream of the point of take and, although the residual flow does contribute to the minimum flow, the logic in assessing a residual flow is not necessarily to provide the “make up” flow for a minimum flow further downstream. As well as maintaining the habitat immediately downstream of the point of take, the residual flow could also allow for “losing” reaches downstream and/ or other takes. It is our observation that in the lower reaches of the Luggate Ck (ie. downstream of the lower gorge and downstream of the confluence of the north and south branches) that the bed of the creek is reasonable uniform and there are no ‘losing” or “gaining” reaches. Similarly for the section of the south branch from the point of take 97803 and 2008.519 down to the confluence with the main stem. The section of the south branch from this point of take down to the Luggate Irrigation Co. point of take is a steep gradient, boulder stream bed that does not appear to have any losing or gaining reaches. Hence a residual flow at the points of take would be based solely on maintaining the habitat immediately downstream of the point of take.

The ORC RSU has provided an assessment report dated 10th oct 2018 on the initial application RM18-34. The report made the following comments in regard to residual flows at the points of take in the south branch;

“The upper Aliceburn is a perennial water way and supports a very healthy invertebrate community, these values need to be maintained. The lower Aliceburn supports a population of brown and rainbow trout and flows need to be maintained for outmigration”.

The recommended residual flow then is “a flow that provides a continuous connected flow with Luggate Creek (main stem)”.

A survey of flows at various locations in the lower catchment during a low flow period was carried out on 26th February 2015 by Environmental Consultancy Services. see Report attached in Appendix 8). On this day the flow at the Luggate Creek bridge was 229 l/s and the flow in the south branch, measured above the ford on the access track was 25 l/s. See below photo of the ford on the access track taken at the time of the flow survey.

Plate 6 : Alice Burn at ford – 25 l/s



The flow shown in the photo is a good example of a connecting flow during a low flow event. The Luggate Partners preference for a residual flow condition is “for the maintenance of a connecting flow” rather a measured flow volume. We view this as a practical option for a residual flow as it is relatively easy to visually assess whether there is a connecting flow and it does not require the instalment of a flow measuring device downstream of the points of take which would be a costly exercise. The average cost for installing a flow device is around \$12,000 provided the site is suitable. Further, installation of flow device in the main stem of a tributary is problematic in regard to dealing with flood flows.

In reality, it is considered that most of the time it will be necessary to reduce water abstractions for maintaining the minimum flow at the SH6 bridge before it is necessary to reduce abstractions to maintain a residual flow level at the south or north branch above the confluence.

4.5 Fish screening on the intakes.

The ORC RSU report has recommended a condition that;

“The LIC intakes in the lower south branch (WR7286) and the intake in the north branch should be screened to prevent the ingress of small fish. The screen should have a minimum mesh size of 3mm and design characteristics (approach velocity, sweep velocity) should be consistent with best practice guidelines (see Jamieson et al 2007).”

Installing and maintaining 3 mm screens on these two intakes is not a very practical option as screens of this smaller mesh size will require frequent manual cleaning and there is no power supply near these intakes to install automated self-cleaning screens.

Further Fish and Game carried out a spawning survey of the lower reaches of Luggate Ck in May 2017 - see Appendix 7 for Fish & Game Council Report- June 2017 - Luggate Creek Spawning Survey. The report from this survey notes that most of the redds (spawning burrows) that were identified in the survey were in the irrigation channel (water race) that runs from the intake in the south branch of Luggate Ck. This is the LIC water race that crosses the north branch in an overhead pipe and joins into the main water race that flows out to the Big River Block to the north. If the intake in the south branch to this water race was screened, then the section of race that is currently used for spawning will no longer be accessible to any fish.

A possible solution to this is that a fish screen is installed further downstream in the water race at the by wash point just upstream of flume flow meter in the race. This would be advantageous for LIC in that only one screen would need to be installed and the location near the flume flow meter would be easier for maintenance as the flume also needs regular maintenance visits for any debris accumulation. This would allow fish access to the “spawning section” of the water race and full access back to the Creek via the bywash channel, as well as prevent smaller fish being washed down the water race beyond the flume.

We believe that this option will also address DoCs concern that any water that is not required for irrigation is left in the creek near the intakes and not bywashed back to the Creek further down the water race. With the above proposed set up the bywash immediately upstream of the flume will be the main bywash point back to the Creek and the other bywash point further along the water race (approx. 1km downstream of the flume) will be discontinued.

No fish were observed in the survey undertaken at the upper intake in the Aliceburn and we agree that no fish screen is required at this intake.

5. Positive effects of the Replacement Permits

The proposed consent once commenced will have a net benefit to the Luggate Creek catchment because the takes will become subject to the rationing scheme and the minimum flow requirements. Mining privileges and deemed permits are not currently subject to conditions for a minimum flow and observance of the minimum flow is voluntary. Therefore, the ecosystem values of the Luggate Creek will be better protected under the new permits

The scale and significance of the water take activity should not be significantly different to the current effects on the Creek provided the rationing and minimum flow regimes are in place to manage any adverse effects of the takes on the values of the Luggate Creek. The granting of the consent will provide the security to allow further investment in irrigation and land development, giving increases in agricultural production. This will improve the economic sustainability of these farming operations and the ‘flow on’ benefits to the Upper Clutha community.

6. Statutory Matters

6.1 Overriding Documents

The overriding documents for the water permit applications are, the National Policy Statement for Freshwater Management 2014, the Regional Policy Statement for Otago (RPS), the Regional Plan: Water for Otago, Kai Tahu ki Otago Natural Resources Management Plan and the Resource Management Act 1991.

a. National Policy Statement for Freshwater Management

The application is considered to be consistent with the objectives of the NPS for Freshwater. Particularly Objective B3 which seeks to improve and maximise the efficient use of water.

b. Regional Policy Statement

The application is considered to consistent with the RPS and in particular Objectives 6.4.1, 6.4.2 and 6.4.8 and 6.5.2 and 6.5.3.

c. Regional Plan : Water

The objective, policy and the rule framework for the Regional Plan: Water for Otago (RPW) recognises the importance of the integrated and sustainable management of Otago’s water resources. The Plan is aimed at enabling the use and development of water where this can be undertaken in a sustainable manner, providing a framework for activities such as discharges to water, taking and using water and structures and bed disturbance activities in riverbeds. The RPW became operative in May 2014 following Council resolution.

The RPW identifies the significant resource management issues and objectives of particular relevance to the Region. The specific policies and objectives in relation to the ground water take are

outlined in section 6 of the RPW and include aims to ensure allocation is sufficient, within defined parameters, will not compromise surface water quality and respect other water users. It is considered that the amount of water proposed to be abstracted is reasonable for the volume of water required for the applicant's purpose for efficient irrigation and residential supply.

The applicant seeks to take water at a rate less than that authorised under the deemed permits and mining privileges held by the Partners. The maximum rate that is proposed to be taken is higher than the water taken in the last five years although Policy 6.4.2A states that no more water than has been taken in the last five years should be provided in the consent. This policy focused on the efficient use of water. The principle reason that this policy was adopted is to ensure that conflict between users is minimised and the underutilised primary allocation is reduced in order to lower the supplementary minimum flows.

The Partners have water sharing agreements for the water permits applied for in this application. There is only one other party that takes water from the Luggate Creek which is Criffel Water Limited. The water take points of the Partners are either downstream from the Criffel water point of take or from the Aliceburn (south branch) of Luggate Creek. Thus, the Partners take does not directly affect Criffel Water Limited. However the sharing of the water resource from Luggate Creek and the maintaining of the minimum flow are matters that require the water users in the catchment to collaborate on resource sharing.

The applicant proposes a rationing scheme between the users of the Alice Burn water and the North Branch of the Luggate Creek that will maintain the minimum flow set at the bridge at SH6.

d. Kai Tahu ki Otago

The proposed application has had regard to the specific policies and objectives of Kia Tahu ki Otago Natural Resources Management Plan. The proposal is considered to be generally consistent with those objectives and policies contained within the Plan.

e. Resource Management Act 1991

A decision on discretionary resource consent application must be made in accordance with the purpose and the principles of the RMA (Part 2) and must have regard to the matters set out in section 104 of the Act.

(a) Purpose and Principles of the RMA (Part 2)

Part 2 of the Act sets out the purpose and principles of the Act as follows;

(1) The purpose of this Act is to promote the sustainable management of natural and physical resources.

(2) In this Act, **sustainable management** means managing the use, development, and protection of natural and physical resources in a way, or at a rate, which enables people and communities to provide for their social, economic, and cultural well-being and for their health and safety while—

(a) sustaining the potential of natural and physical resources (excluding minerals) to meet the reasonably foreseeable needs of future generations; and

(b) safeguarding the life-supporting capacity of air, water, soil, and ecosystems; and

(c) avoiding, remedying, or mitigating any adverse effects of activities on the environment

6.2 ORC Water Plan - Matters for Discretion

This application is made under Rule 12.1.4.4 of the Regional Plan: Water as an application to replace existing water permits that are primary allocation in a Schedule 2A catchment. This is a 'restricted discretionary' activity and the matters that the Council can restrict its discretion to are listed in Rule 12.1.4.8 and are discussed as follows:

(i) *The Primary and Supplementary allocation limits for the catchment;*

Under the WP the primary allocation for the Luggate catchment in Schedule 2A is 500 l/s. Under Rule 6.4.2(b) the primary allocation limit is the sum of current consented primary takes from the Luggate Catchment which is 1013 l/sec (which is the sum of 590 l/sec consented to the Criffel scheme, 254 l/sec to Luggate Irrigation Company and 169 l/sec to Lake McKay Station Ltd.)

This summary of the current consented takes is different to the ORC Report "Management Flows for Aquatic Ecosystems in Luggate Ck" which stated the current consented takes as 987 l/s and is not correct. This application is proposing to surrender 61 l/s of primary allocation water and therefore under the "sinking lid" policy the consented primary allocation will reduce by 61 l/s to a total of 951 l/s.

Due to the high primary allocation, there is no supplementary allocation limit for this catchment.

(ii) *Whether the proposed take is primary or supplementary allocation for that catchment*

The applicant is seeking consent to take 362 l/sec which is less than the primary allocation permits currently held by the applicant of 424 l/s. As noted above the applicant is surrendering 62 l/s of primary allocation water and therefore the overall primary allocation for the catchment will reduce by 62 l/s.

(iii) *The rate, volume, timing and frequency of water to be taken and used.*

The proposed rate, volume and frequency is as follows;

Maximum take rate : 362 l/sec

Hourly rate of 1,303.2 m³/hr

Monthly volume = 931,279 m³/month

Annual volume = 4,761,024 m³/ year

(iv) *The proposed methods of take, delivery and application of the water taken*

The water take for the Lake McKay permit will be via the point of take in the Alice Burn Branch of the Luggate which is subsurface gravel gallery intake to a gravity fed pipeline. The 4km pipeline, which replaced an open water race, feeds a K line irrigation scheme of 168 ha. The Luggate Irrigation Company take is from the Alice Burn and the north branch of Luggate Ck. Both points of take are directed into a water race which carries the water to the Umbers block and the Big River irrigation pond on the other side of Highway 6. On the Big River block the irrigation method is centre pivot and K line on the peripheral areas. On the Umbers Block the irrigation method is surface contour and is being upgraded to K Line. Extensions of both schemes are proposed with this application.

(v) The source of water available to be taken

All the water taken will come from the North and South (or Alice Burn) branches of the Luggate Creek. The Alice Burn flows directly from Lake McKay on the Pisa Range. The values of the Luggate Creek have been fully assessed by the ORC Report and minimum flows set to protect the ecosystem functioning of the Creek. The consent will be subject to a rationing scheme which will maintain the minimum flow regime and as such the natural and recreational values of the Creek are protected.

(vi) The location of the use of the water when it will be taken out of a local catchment.

The location of the irrigation areas is shown on the Plan in Appendix 1 entitled "Irrigation Areas". The areas are within the catchment area for Luggate Creek.

(vii) Competing and lawful local demand for the water

The Partners are aware of the one other permit to take water from the Luggate Creek being that held by CWL from the North Branch for 590 l/sec. The Partners propose that CWL should be part of the rationing scheme proposed in this application to achieve sharing of the water resource.

(viii) The minimum flow applied to the take of water, if consent is granted.

Schedule 2A of the Otago Regional Plan identifies the minimum flow for the Luggate Catchment as 180 L/sec from 1 November to 30 April and 500 L/sec from May to October. The minimum flow is to be measured at the SH6 Bridge at Luggate township. As outlined the minimum flow has been set to protect the ecosystem values of the Luggate Creek.

(ix) Where the minimum flow is to be measured if consent is granted

The measurement point for the Luggate Creek is at the SH6 Luggate Bridge at the Luggate township. This measurement point is below the confluence of the North and South branches of the Luggate creek and has been operating for the last 4 years.

(x) Any need for a residual flow at the point of take.

Residual flows for the points of take have been proposed as in Section 4.5 above. Although with the hydrology of Luggate Creek and the location of the points of take in the catchment, at most times the reduction of abstractions of water to maintain the minimum flow at the SH6 bridge will also maintain the residual flows immediately downstream of the points of take.

(xi) Any need to prevent fish entering the intake and to locate the new points of take to avoid adverse effects of fish spawning sites.

For the LIC intakes, a fish screen is proposed in the water race downstream of the intakes at the site of the flow device in the race. This is proposed to allow the continuation of trout access to the upper sections of the race for spawning.

For the Lake McKay Stn take in the upper Aliceburn, the surveys have shown no fish in the Creek at this altitude and therefore a screen is not required.

(xii) Any actual or potential effects on any ground water.

N/A

(xiii) Any adverse effects on any lawful take of water, if the consent is granted including potential bore interference.

With the high allocation of primary take water in the catchment it is necessary for the water users to collaborate on their water use to make sure that the min flows and residual flows are maintained. The applicant has proposed a rationing scheme for the two water user groups to operate under. Rationing would be implemented if the Luggate Ck flows are approaching the minimum flow, which is likely to be in the period of October to April.

The rationing regime proposes that each take would be reduced proportionally to achieve the targeted minimum flow. For example, if the increase in flow in Luggate Ck of 100 l/ sec was needed to maintain 180 l/sec, then a 10.5 % reduction in the water users takes would be required as in the following Table:

Luggate Creek Minimum flow rationing Scheme

Entity	Permit take	Proposed 10.5 % reduction In abstraction (l/sec)	Example for 100 l/sec increase in main stream flow	New Take
CWL	590	62	62	528
Luggate Irr	202	21	21	181
Lake McKay	169	18	18	151
	961	101	101	860

Any residual flows at the point of take as set by this consent process will also be maintained so that freshwater habitat values are sustained.

(xiv) Whether the taking of the water under the permits should be restricted to allow the exercise of another permit.

There are no permits or water takes downstream from the Luggate Irrigation takes. The proposed rationing scheme will allow sharing of the water resource.

(xv) Any arrangement for cooperation with other takers or users.

The proposed rationing regime as described above. CWL need to be part of the rationing scheme to maintain the minimum flow required and this is being discussed with CWL.

(xvi) Any water storage facility available for the water take and its capacity.

There is no current additional storage capacity. The building of water storage dam is being considered to improve the water surety for the East extension area for Lake McKay Stn and for the extension of the Big River/Umbers irrigation areas.

(xvii) Duration of the resource consent

The application seeks a term of consent of 35 years. The beginning of the Term to be the 2 October 2021.

(xviii) The information, monitoring and metering requirements.

Both the Lake McKay Stn and LIC intakes have compliant water meters (See Appendix 4 & 5). Flow records from these devices for the last 3.5 years are included in Appendices 2 and 3.

(xix) Bond

N/A

(xx) The review of conditions of the resource consent.

It is accepted that a review condition is a standard condition of consent for ORC water permits that allows the Council to review conditions of consents should unanticipated adverse effects arise from the operation of the consents.

7.0 Consultation with affected parties

The ORC advised that the following groups are affected parties for this application; Department of Conservation, Fish and Game Otago, Aukaha, Te o Marama, Ngai Tahu, Public Health South, New Zealand Transport Agency (NZTA), and Land Information NZ (LINZ).

The initial application for RM18-345 was sent to all these parties in November 2018.

Following the sending of the initial application the following has occurred with the affected parties;

- LINZ emailed on 28th October 2018 and advised that they considered they were not affected parties for this application.
- NZTA were considered an affected party because the LIC water race flows through a culvert under SH6 at the base of the Luggate Hill. NZTA requested an Engineers report on the culvert to assess that it was still fit for purpose. The report was completed and sent to NZTA on 24th May 2019. NZTA requested some further information on a road safety aspect of the Water race and this was sent to them on 7th June 2019. Our understanding is that there are no further concerns for NZTA and we are waiting for their written approval.
- On the 9th May a site visit was held at Lake McKay Station and all affected parties were invited. Those that attended were DoC, F&G, Public Health South, Aukaha, and Ngāi Tahu. The applicant for the Criffel Water Ltd application, Mandy Bell, also attended which was helpful for consultation with this group and discussion of the effects on the wider catchment.
- On 4th June a further meeting was held in Alexandra with DoC, F&G, Aukaha, and Ngāi tahu representatives. The meeting was convened by Criffel Water Ltd with the aim of clarifying the water use by the user groups and for the affected parties to advise on their concerns for the catchment.
- On 27th June an email response from Ngāi Tahu was received describing their concerns, suggesting some options for management of the water abstraction from the catchment and requesting further consultation. This revised application has adopted two of these options

for managing water abstraction which is reducing the amount of water taken and promoting a water sharing (rationing) method for flows above the minimum flow.

- On the 2nd July an email response from DoC was received describing their concerns for the catchment and requesting some further information. In this Revised application, we have included information to respond to these concerns as follows;
 - The overall amount of water applied for has been reduced and the proposed use for the water that is being applied for has been clarified.
 - The description of the points of take and identification of any reaches where there may be fish passage issues.
 - The results of IFIM studies in the catchment for indigenous fish species has been included.
 - Residual flows at the points of take and options for fish screening have been proposed.
 - A proposed remedy to manage the LIC take to minimise the amount of excess water taken into the race and to bywash any excess water near the intakes.
 - Confirmation that the water race and pipeline do not cross any DoC land.
 - A suggestion for the enhancement of indigenous species in the catchment could be achieved with a fish barrier for trout in the lower catchment.
 - As a result of the feedback received from the affected parties at these two meetings the Luggate Partners have amended this application with a reduced amount of take and proposed residual flows and fish screening.

8.0 Notification

The initial application for RM18-345 was lodged with the ORC in September 2018. The decision was that the application could proceed on a non-notified basis and the application was placed on hold while the applicant consulted with affected parties. Following consultation with affected parties we have addressed some of the concerns of the affected parties with a revised application for a reduced amount of take and proposed conditions for residual flows and screening. We request that the revised application is progressed by “Limited Notification” to the affected parties.

9.0 Summary

The Partners seek consent in this application to take water for irrigation and residential use from three points of take in Luggate Creek. The application is for water permits for the two groups as follows;

- Lake McKay Station Limited - for a take of 170 l/s from the upstream point of take in the south branch of Luggate Creek at grid reference E1300464 N5032792 and a point of take in a tributary of the south branch at E1301861 N5033204.
- Luggate Irrigation Company Ltd – for a take of up to 192 l/s from either a point of take in the south branch of Luggate Ck at map grid reference E1302755 N5037562 or a point of take in the north branch of Luggate Ck at E1302961 N5037944.

The proposed take is a replacement of the existing water permits held by the two groups with a reduced take of 61 l/s less than the existing permits. The volume of water applied for is within the

primary allocation for the Luggate catchment. The water will irrigate 300 ha of existing irrigated land and allow for up to 228 ha of land to be developed with irrigation. It also includes a take for stockwater of up to 6 l/s and for supply of 9 l/s for a residential development of 250 houses on the outskirts of Luggate. The supply for domestic use is critical as the other water supplies for Luggate township are at full capacity.

The application is considered to be consistent with the objectives of the NPS for Freshwater, particularly Objective B3 which seeks to improve and maximise the efficient use of water. With the existing minimum flows set for the catchment, the proposed rationing regime, proposed conditions for residual flow and screening in the water race, it is considered that the water abstraction will have less than minor effects on the Luggate Catchment

The granting of the permits will provide a security of water supply for the permit holders which will promote the investment of efficient irrigation systems within the command area. This will improve the economic sustainability of these properties and indirectly benefit the wider Upper Clutha community.

List of Appendices

Appendix 1: Plan of Irrigation Areas and Points of Take.

Appendix 2: Flow records from WM0671
Luggate Irrigation Company - Permits WR7284, WR7285, WR7286, WR7298

Appendix 3: Flow records from WM0487
Lake McKay Station – permits 97803, 2008.519

Appendix 4: ORC Water Inspection Record – Luggate Irrigation Company.

Appendix 5: ORC Water Inspection Record – Lake McKay Station.

Appendix 6: Background Information for Irrigation Development Programme.

Appendix 7: Fish Survey Record IFIM Summaries, Fish & Game Spawning Survey -2017

Appendix 8: Luggate Creek Low Flow Survey - 26 Feb 2015

Appendix 9: ORC State of The Environment Report

Appendix 10: ORC Research Science Unit Assessment Report

Appendix 11: Existing Water Permits

Appendix 12: Land Titles for Irrigated Land.

APPENDIX 1

Plan of Irrigation Areas and Points of Take.

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Flow records from WM0671

Luggate Irrigation Company - Permits WR7284, WR7285, WR7286,
WR7298.

APPENDIX 3

Flow records from WM0487

Lake McKay Station – permits 97803, 2008.519.

APPENDIX 4

ORC Water Inspection Record – Luggate Irrigation Company.

APPENDIX 5

ORC Water Inspection Record – Lake McKay Station.

Appendix 6

Background Information for Irrigation Development Programme.

Appendix 7

Fish Survey Record – 2018

IFIM Summaries

Fish & Game Spawning Survey -2017

Appendix 8

Luggate Creek Low Flow Survey - 26 Feb 2015

Appendix 9

ORC State of The Environment Report

Appendix 10

ORC Research Science Unit Assessment Report

Appendix 11

Existing Water Permits

Appendix 12

Land Titles for Irrigated Land.