

**From:** [Nick Geddes](#)  
**To:** [Kirstyn Lindsay](#)  
**Subject:** RE: Further information request for RM20.049  
**Date:** Wednesday, 15 April 2020 7:06:27 a.m.  
**Attachments:** [RM20.0049 - Applicants Response to RFI - 07-04-20.doc](#)  
[Application AEE - Arrow Irrigation Co - 07-04-20.pdf](#)  
[Copy of AIC Monthly Bywash data.xlsx](#)  
[Appendix 5 - Arrow River Periphyton Assessment - Dec 2019.pdf](#)

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Morning Kirstyn,

Attachment 1 contains AIC's response to items listed in the information request you sent while the remainder of attachments support this response.

Please check to see if the Periphyton Assessment opens up ok, my pdf viewer struggles with it but it may just be my PC.

Happy to discuss any of the above or attached,

Regards, Nick

**Nick Geddes** | Planning Consultant | BSc Geog, Grad Dip Env Sci

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**From:** Kirstyn Lindsay <Kirstyn.Lindsay@orc.govt.nz>

**Sent:** Monday, 16 March 2020 7:55 AM

**To:** Nick Geddes <ngeddes@cfma.co.nz>

**Subject:** Further information request for RM20.049

Hi Nick

Please find attached a further information request for RM20.049.

Kind regards, Kirstyn

Consultant Planner

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**1. Please provide an assessment of effects of the proposal on the amenity and recreation values associated with the Arrow River.**

*An assessment of effects on other water users or other human use values (recreational values) has been undertaken in part 7.5 of the revised documentation attached to our email reply.*

*An assessment of effects on amenity values has been undertaken in part 7.3.2 of the revised documentation attached to our email reply.*

**2. Please provide an assessment of the efficient use of the irrigation of the curtilage, golf course and amenity areas identified in the application and the benefit this provides, compared to any potential reduction in amenity and recreation values associated with the Arrow River.**

*An assessment of the efficient use of the irrigation has been completed by Dr Anthony Davoren and his report considers curtilage, golf course and amenity areas identified in the application.*

*Benefits of curtilage, golf course and amenity areas identified in the application are discussed in part 7.6 "Positive Effects".*

*As per 1 above, amenity and recreation values have been assessed in part 7.3 and 7.5 respectively.*

*The conclusions reached in part 7.7 of the effects based assessment confirms the overall balance of effects is less than minor.*

**3. The residual flow set for this water take will have a major controlling effect on the possible minimum flows achievable in the Arrow River at the proposed downstream minimum flow site at Cornwall Street Road. Downstream of the Arrow Irrigation Company intake there are several tributaries of the Arrow River including Brackens Gully, Sawpit Gully and New Chum Gully, (Figure 1) that will provide additional water above whatever residual flow is set for the Arrow Irrigation take. However, the flows, and crucially the summer low flows, of these streams are unknown. An assessment of the suitability of the residual flow would benefit from knowing the low flows of the tributaries between the water take and Cornwall Road.**

*Our understanding of the RPW is that residual flows cannot override a minimum flow, if a consent is subject to a residual flow and a minimum flow both must be achieved for the consent holder to take water.*

*AIC's view is that the residual flow in concert with the future minimum flow will ensure the ecological values of the Arrow River are provided for. AIC has anticipated a minimum flow being set for the Arrow River and has actively participated in all meetings which ORC has held to date.*

*AIC is of the view that understanding the wider catchments hydrology and that of particular tributaries is the role of ORC especially as part of the minimum flow setting process. However, a natural inflow for the combined tributaries between the AIC intake and the Cornwall*

Street Flow Site has been calculated by deducting the naturalised flows at AIC's intake from the naturalised flow record at Cornwall Street supplied by ORC.

The summary flow statistic for this assessment has been tabulated by Mr Matt Hickey and appears below:

Min (l/s)	7-day MALF (l/s)	Median (l/s)	Mean (l/s)	Max (l/s)
158	385	682	836	11488

4. Table 1.6 of the application and accompanying text indicate approximately 30% of the water abstracted is by-washed to the Kawarau River and Lake Wakatipu. Calculating the average rate of take of the by-washed water during the irrigation season indicates that the by-wash requires an average of between 125 L/s and 128 L/s to be taken from the Arrow River. The application does not indicate whether this water requirement (and by-washing) is constant throughout the season or whether it fluctuates as water demand varies. Therefore, further information is required on how the by-wash varies through the year. Please provide monthly by-wash data for the last two years.

Monthly by-wash data for the last two years is contained in an PDF file attached to our email reply.

5. Please investigate methods to reduce by-wash especially during the summer and autumn low flow period when the Arrow River is expected to be flowing below 1,000 L/s.

Methods to reduce by-wash have been considered in part 1.1.4 "Operation & Management" and 1.2.1 "Efficiency" of revised documentation attached to our email reply.

6. The application also notes there is a by-wash discharge at Bush Creek. Please provide information on the volume of water and seasonal timing of this by-wash discharge.

The monthly by-wash data provided to address item 4 above has been tabled to identify each of the by wash points including Bush Creek.

7. Please detail the size of the area used to calculate the flow statistics below:

Table 1. Flow Statistics Based on Natural Daily Average Flows During the Irrigation Season (Oct – April Incl.) at the AIC Intake.

Min (l/s)	7-day MALF (l/s)	Median (l/s)	Mean (l/s)	Max (l/s)
563	1371	2428	2974	40875

Mr Hickey confirms that the size of the area used to calculate the flow statistics above is 153km<sup>2</sup>.

8. The residual flow assessment undertaken by Hickey (2020(027)) indicates that the flow at the AIC intake can fall below 200 L/s and notes that a 500 L/s residual flow is considerably better than flows less than 200 L/s. The assessment does present a residual flow period in Table 4 of the application. This shows that the residual flow will

not be reached on four out of six irrigation seasons. Please model 600 L/s and 700 L/s residual flows to determine the duration of irrigation take restrictions with these higher residual flows and also determine the actual water volume still available for abstraction for the six years with take data.

Mr Hickey has considered the above and provides the following additional comments:

Increasing the residual flow at the AIC intake to 600 l/s and 700 l/s will not influence flows below AIC intake except for the 2015/16 and 2017/18 seasons compared to what was observed. However, in the 2015/16 and 2017/18 seasons residual flows of 600 l/s and 700 l/s would result in a significant increase in time spent rationing for AIC. For example in the 2015/16 season lifting the residual flow from 500 l/s to 600 l/s would double the time of rationing in an already dry season (Table 2).

Table 1. Days of restriction with different residual flows at the AIC intake.

Irrigation Season	Total days at 500 l/s below the proposed take	Maximum consecutive days at 500 l/s below the proposed take	Total days at 600 l/s below the proposed take	Maximum consecutive days at 600 l/s below the proposed take	Total days at 700 l/s below the proposed take	Maximum consecutive days at 700 l/s below the proposed take
2013/14	0	0	0	0	0	0
2014/15*	0	0	0	0	0	0
2015/16 <sup>#</sup>	16	10	36	10 <sup>#</sup>	54	18
2016/17	0	0	0	0	0	0
2017/18	14	12	21	12	31	12 <sup>#</sup>
2018/19	0	0	0	0	0	0
Average	5	4	10	4	14	5

<sup>#</sup>Two periods where flows are held at this flow during the irrigation season

Table 2 showed that for four of the six season of record flows would have exceeded 700 l/s below the AIC intake at all times with the observed pattern of take. Therefore only the 2015/16 and 2017/18 irrigation season have been assessed for the water access in m<sup>3</sup> that would be lost between 2013 and 2019 with the imposition of a residual flow of 500 l/s, 600 l/s and 700 l/s compared to what was taken (Table 3).

Table 2. Water access lost by AIC in dry seasons with increasingly higher residual flows.

Irrigation Season	Water unable to be taken due to 500 l/s residual flow (m <sup>3</sup> )	Water unable to be taken due to 600 l/s residual flow (m <sup>3</sup> )	Water unable to be taken due to 700 l/s residual flow (m <sup>3</sup> )
2015/16	251,652	473,704	813,436
2017/18	215,317	369,827	588,762

When viewing the volumes in Table 3 it is important to keep in mind the timing of this potential loss in volume, it is not an average loss across the season but a specific loss for the most part at a time when water is required to meet peak demand.

- The application in Appendix 5 is supposed to report the results of a periphyton assessment for the Arrow River conducted by Ryder Environmental. The periphyton report appears to start on page 38 of the report which is just Arrow River photographs

**on different dates. Therefore, please provide the full report so that the periphyton report can be assessed.**

*Please find attached to our email reply a full copy of the periphyton assessment.*

Arrow Irrigation Monthly Bywash Flows 17-18 Season

Month	Bush Creek (m3/Month)	Bush Creek Avg Monthly Rate of bywash (m3/s)	Mooney (m3/Month)	Mooney Avg Monthly Rate of bywash (m3/s)	Morven Ferry (m3/Month)	Morven Ferry Avg Monthly Rate of bywash (m3/s)	Hanson Road (m3/Month)	Hanson Rd Avg Monthly Rate of bywash (m3/s)
Sep-17	35,000	0.014	17,300	0.007	10,621	0.004	10,000	0.004
Oct-17	160,000	0.060	86,144	0.032	37,176	0.014	15,000	0.006
Nov-17	241,523	0.093	75,048	0.029	30,000	0.012	21,483	0.008
Dec-17	195,011	0.073	47,695	0.018	25,000	0.009	32,379	0.012
Jan-18	117,545	0.044	44,681	0.017	25,000	0.009	23,007	0.009
Feb-18	0	0.000	117,954	0.049	24,930	0.010	60,382	0.025
Mar-18	153,414	0.057	174,449	0.065	53,613	0.020	58,516	0.022
Apr-18	122,849	0.047	212,631	0.082	61,234	0.024	29,236	0.011
May-18	10,232	0.004	65,011	0.024	18,606	0.007	5,394	0.002
Jun-18	0	0.000	0	0.000	457	0.000	979	0.000
<b>Total 17-18</b>	<b>1,035,574</b>	<b>0.039</b>	<b>840,913</b>	<b>0.032</b>	<b>286,637</b>	<b>0.011</b>	<b>256,376</b>	<b>0.010</b>

2017/18 Monthly  
Avg Bywash Rate  
(m3/s) 0.092

Arrow Irrigation Monthly Bywash Flows 18-19 Season

Month	Bush Creek (m3/Month)	Bush Creek Avg Monthly Rate of bywash (m3/s)	Mooney (m3/Month)	Mooney Avg Monthly Rate of bywash (m3/s)	Morven Ferry (m3/Month)	Morven Ferry Avg Monthly Rate of bywash (m3/s)	Hanson Road (m3/Month)	Hanson Rd Avg Monthly Rate of bywash (m3/s)
Sep-18	123,576	0.048	68,796	0.027	41,615	0.016	26,861	0.010
Oct-18	82,059	0.031	134,827	0.050	59,225	0.022	39,714	0.015
Nov-18	233,174	0.090	146,139	0.056	50,843	0.020	58,274	0.022
Dec-18	11,924	0.004	140,353	0.052	37,081	0.014	18,491	0.007
Jan-19	158,512	0.059	87,353	0.033	62,783	0.023	100,229	0.037
Feb-19	142,120	0.059	115,080	0.048	63,195	0.026	49,521	0.020
Mar-19	0	0.000	159,720	0.060	45,656	0.017	44,814	0.017
Apr-19	0	0.000	247,826	0.096	49,099	0.019	67,139	0.026
May-19	0	0.000	58,291	0.022	14,982	0.006	19,700	0.007
Jun-19	0	0.000	0	0.000	0	0.000	0	0.000
<b>Total 18/19</b>	<b>751,365</b>	<b>0.029</b>	<b>1,158,385</b>	<b>0.044</b>	<b>424,479</b>	<b>0.016</b>	<b>424,743</b>	<b>0.016</b>

2018/19  
 Monthly  
 Avg  
 Bywash 0.106