

**BEFORE THE COMMISSIONERS ON BEHALF OF
THE OTAGO REGIONAL COUNCIL**

Consent No. RM20.079

BETWEEN

BENDIGO STATION LIMITED

Applicant

AND

OTAGO REGIONAL COUNCIL

Consent Authority

EVIDENCE OF WILLIAM JOHN NICOLSON

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ABBREVIATIONS

DOC	Department of Conservation
Bendigo Station	Bendigo Station Limited
MALF	Mean annual low flow
NPSFM14	National Policy Statement for Freshwater Management 2014
NPSFM20	National Policy Statement for Freshwater Management 2020
NRMP	Kai Tahu ki Otago Natural Resource Management Plan
ORC	Otago Regional Council
PC7	Proposed Plan Change 7 (Water Permits) to the Regional Plan: Water for Otago
pRPS	Proposed Regional Policy Statement
PORPS	Partially Operative Regional Policy Statement
RMA	Resource Management Act 1991
RPS	Regional Policy Statement 1998

Introduction

1. My full name is William John Nicolson. I am employed as an Environmental Scientist and Planner at Landpro Limited, a firm of consulting planners and surveyors. I hold the qualification of BAppSc (Hons, First Class) in Environmental Management from the University of Otago. I have been involved in environmental management and planning for the past 8 years, with the past 2.5 years at Landpro Ltd, providing consultancy services for a wide range of clients throughout New Zealand.
2. I am an associate member of the New Zealand Planning Institute, and an associate member of the Institute of Environmental Management and Assessment.
3. Over the past eight years, and particularly in the past two and a half with Landpro Ltd, I have undertaken a wide range of resource management-related work for a variety of clients, including preparing resource consent applications, preparing assessments of environmental effects (AEE's), stakeholder engagement and consent management services, with a particular focus on water resources.
4. I confirm that I have read and agree to comply with the Environment Court Code of Conduct for Expert Witnesses (Consolidated Practice Note 2014). This evidence is within my area of expertise, except where I state that I am relying on what I have been told by another person. I have not omitted to consider material facts known to me that might alter or detract from the opinions that I express.
5. In this matter, I have been engaged by Bendigo Station Limited to provide independent planning and resource management advisory services, including preparation of this evidence.
6. I am familiar with the proposal, was the author of the resource consent application, and have visited the site and surrounds.

7. In preparing this statement I have:
- Reviewed the Application for consent and associated s91 and s92 documentation
 - Reviewed the submissions from Aukaha and Fish and Game
 - Read the Section 42A report
 - Read the technical reports and associated evidence being called by the Applicants, including:
 - Mr Porter; Bendigo Station water use history, farm systems and infrastructure
 - Dr Allibone; aquatic ecology
 - Ms Bright; hydrology

Scope of Evidence

8. I have read the Section 42A report and generally agree with the findings of the report. I agree with the determination that the adverse effects of the proposed activities will be no more than minor¹. I also generally agree with the statutory planning analysis set out in the report, with some exceptions. I have provided some additional commentary on proposed changes to the recommended conditions to better reflect the matters I cover in my evidence below.
9. My evidence is structured as follows:
- Summary of Proposal
 - Specific questions from the s42A author
 - Summary of Consultation and Submissions
 - Status of the Application
 - Statutory Planning Assessment
 - Duration
 - Proposed Conditions of Consents

¹ Section 42A Report (RM20.079), Otago Regional Council, 22 April 2021 (Sections 7.2-7.9).

Summary of Proposal

10. A detailed overview of the Applicant's proposal is included in Section 2 of the Application, however I revisit the key details and potential points of contention below.
11. Bendigo Station holds two deemed permits subject to the present Application which authorise abstraction from Bendigo Creek. Water is taken from Bendigo Creek and conveyed to an out-of-creek reservoir (Bendigo Pond) via a recently upgraded piped gravity-fed system. The pipe length between the intake and reservoir is approximately 2 km.
12. From Bendigo Pond, the water is used to irrigate approx. 100 ha of pasture, and provides stock water and domestic water supply. Bendigo has plans for irrigation of an estimated ~82 ha of future vineyard via the same water source. Excess water in the reservoir is returned to Bendigo Creek via a spillway.
13. The Application was lodged prior to notification of PC7. In the Application, primary allocation was sought for both the existing irrigation areas and proposed areas – a practice that is not discouraged under the operative RPW. Supplementary allocation was sought to improve the Applicant's ability to fill the reservoir during times of high flow in the creek, however only an additional rate of take was sought for this – no additional volumes were sought under the supplementary allocation.
14. However, I agree with the approach recommended by Mr Horrell in Section 7.7.4 of the s42A report, which provides primary allocation for the existing areas of irrigation and supplementary allocation for the proposed areas of irrigation. This would mean that the allocations provided would be consistent with RPW Policies 6.4.2A (historic use) and 6.4.0A (efficient use). It would also mean that the new consents would be consistent with PC7 Policy 10A.2.1(b), which requires that there is no increase in irrigation area for deemed permit replacement consents. As the proposed irrigation areas would be serviced by water taken under the new supplementary permit, the correct PC7 Policy to apply is 10A.2.2 as opposed to 10A.2.1 as suggested by Mr Horrell.

15. The table below provides a summary of historic abstraction as calculated by Landpro (see Appendix A) and ORC, Aqualinc irrigation calculations, stock water and domestic requirements, allocation originally sought in the Application, allocation recommended by ORC and allocation now sought by the Applicant.

Table 1: Summary of water used and proposed for Bendigo Station

	Historic use ² (Landpro)	Historic use (ORC)	Aqualinc irrigation needs ³	Stock & other water needs ⁴	Allocation originally sought	Primary allocation (ORC)	Primary allocation now sought	Supplementary allocation (ORC)	Supplementary allocation now sought
Rate (L/s)	83.3	49.7	N/A	N/A	50 (primary); 110 (supplementary)	50	50	110	110
Monthly (m ³)	132,470	132,000	232,800	3,148	235,948	132,000	132,000	103,948	103,948
Annual (m ³)	1,048,170	1,046,200	1,080,568	63,632	1,080,568	857,778	857,778	196,936	196,936

16. As can be seen in the above table, I accept the recommendations made by Mr Horrell in terms of both primary and supplementary allocation. Overall, the proposal will result in a substantial paper reduction in primary allocation for Bendigo Creek. This is consistent with Policy 11 of the NPSFM20.
17. The duration sought was originally 25 years, and I still consider this to be a reasonable duration considering the Applicant's longstanding association and knowledge of Bendigo Creek, the Applicant being the only entity abstracting water from the creek, and a lack of connectivity with the Clutha River. However, Bendigo has agreed to reduce the

² Based on a filtered methodology, as outlined in Appendix A.

³ Based on 90%ile annual demand, as explained in the Application.

⁴ Based on 11,500 sheep at 5L/head/day, 1000 beef cattle @ 45 L/head/day, 1000 L/day domestic use & pond maintenance requirements as explained in the Application.

duration sought to 15 years to address concerns raised by submitters (Fish & Game and Aukaha).

Specific Questions from the s42A Author

18. In Section 5.5 of the s42A report, the author asks the Applicant to confirm whether there are any natural inland wetlands impacted by the proposal. I can confirm that there are no such wetlands to my knowledge.
19. In Section 7.3 of the s42A report, Mr Horrell asks the Applicant to re-confirm that no set residual flow is required in light of flow monitoring data obtained from the new meter in the creek. As I will discuss later in my evidence, metering indicates that during the driest part of the summer flows of at least 5 L/s have been maintained in the creek, approximately 750 m downstream from the take point. This equates to approximately 25% of MALF as calculated by Ms Bright in her evidence⁵. Further analysis of Bendigo Creek residual flows in Ms Bright's evidence supports this assumption⁶. On this basis, no residual flow is proposed for the activity and the original assessment stands.

Summary of Consultation and Submissions

20. Section 4.5.2 of the s42A report suitably summarises consultation undertaken between the Applicant and submitters. I revisit the concerns raised by Aukaha's submission below.
21. The submission provides no information relating directly to the Application or the subject watercourses, aside from a statement that no environmental flows have been set for Bendigo Creek and that a visual residual flow or no residual flow is not appropriate. I have observed this generalist approach to submissions on all deemed permit Applications that have been notified to Aukaha, as have other Landpro planners. It has been my experience that it is not possible to address their concerns in a manner that is acceptable to an Applicant. This reflects the relief by Aukaha not being feasible to implement.

⁵ Evidence of Ms Bright at [3.13]

⁶ Evidence of Ms Bright at [3.50]

22. Aukaha seeks the following decision on the Application:
- i. That the term of consent be no longer than 6 years.
 - ii. Retain existing requirements for water meter(s) and ensure results continue to be recorded and reported via telemetry.
 - iii. Retain existing requirements for fish screening over the intake structure.
 - iv. A minimum flow of 90% of MALF and an allocation limit of 30% of MALF.
23. With regards to the proposed 6-year consent term, Aukaha's key concern is that granting consents with longer terms would "lock in" unsustainable water use by preventing ORC from implementing changes in the new RPS and LWRP on those consents.
24. However, should the future LWRP set minimum flows for the catchment, ORC has the ability to review the consent, and indeed this is provided for in the review condition presented in the draft consent of the Section 42A report. I agree with this review condition. As an example, Condition 8(d)(v) of Draft Water Permit RM20.079.01 states that the Consent Authority may review "surface water allocation limits and minimum flows set out in any future regional plan, including any review of the Regional Plan: Water for Otago".
25. Being able to implement any newly developed minimum flow and allocation regime will ensure that, as noted in Section 4.5 of the RPW, *"the outcomes sought by Kai Tahu are the continued health and wellbeing of the water resources of the region, and cultural usage of these resources"*⁷.
26. Furthermore, as I have indicated later in my evidence, the proposal is generally consistent with the NPSFM20, which adopts Te Mana o te Wai as a guiding principle. As a result, I do not agree with Aukaha's

⁷ Otago Regional Water Plan, Section 4.5, Page 4-3.

statement that “granting of a long-term consent in this instance would be not support [sic] Te Mana o te Wai.”

27. As noted in the Application, the water take will continue to be metered in line with national requirements and applicable conditions of consent, and those results are and will continue to be telemetered to ORC.
28. Fish screening is not considered necessary, given the lack of fish in the vicinity of or upstream of the intake, and considering the determination in the fish survey report that “...the likelihood of migratory fish reaching the water abstraction site is low”⁸. Mr Horrell agrees and does not consider a fish screen to be necessary⁹.
29. I understand the percentage minimum flow and allocation limit sought in Aukaha’s submission are default limits they seek for all water takes. Such an approach does not take account of the specific characteristics of the waterway subject to this Application. A ‘minimum flow’ set at 90% of MALF would make little meaningful difference from an environmental effects point of view because it would not provide surface flow connectivity between Bendigo Creek and the Clutha River, given that the creek very rarely flows all the way to the Clutha, regardless of time of year or whether or not abstraction is occurring¹⁰. Additionally, Dr Allibone in his evidence¹¹ notes that this is a direct misuse of the draft National Environmental Standard on Ecological Flows and Water Levels, which proposed a 90% of MALF approach where there is insufficient knowledge of the ecological state of a given watercourse. In this case, there is sufficient knowledge of the state of Bendigo Creek from an ecological perspective, therefore applying this interim minimum flow is not appropriate.
30. For the same reasons, applying an allocation limit of 30% of MALF would likely make no significant difference to the connectivity or wetted reach of Bendigo Creek. Additionally, given the limited ecological values of the

⁸ S92 Response, 30 April 2020, Appendix A.

⁹ S42A report, Section 7.3.

¹⁰ Application AEE, Section 3.4.1.

¹¹ Evidence of Dr Allibone at [21].

creek, it is unclear what measurable benefit would be provided to these values with the imposition of this allocation limit.

31. Finally, after examining the Applicant's abstraction records in relation to flows in the creek at the Applicant's new monitoring station (750 m downstream from the take point), it appears that there is a residual flow provided past the intake regardless of flow level in the creek. What this means is that the intake never abstracts the full creek flow¹².
32. For example, on April 11, 2021, Bendigo were taking approximately 11.5 L/s from the creek. The flow monitoring data shows that approx. 5.9 L/s was in the creek 750 m downstream from the intake. Using a very basic assumption, this suggests that around 17.4 L/s was originally available in the creek at the take point (assuming no natural losses or gains in the creek over the 750 m reach). Thus an approximately 34% residual flow has been provided past the intake at extremely low natural flows in the creek (well below the Landpro-calculated MALF of 19.9 L/s). This suggests that the status quo operation of the intake is sufficiently providing for instream values.
33. Mr Horrell acknowledges in the s42A report that the status quo abstraction is providing a suitable residual flow, and that imposing a quantitative residual flow condition on the replacement consents would be impractical and unnecessary. Mr Horrell recommends a condition of consent that ensures the abstraction methodology continues to provide this residual, and I agree with this approach.
34. I consider that Aukaha's concerns as raised in their submission, however general, have been suitably addressed by the proposal. I do not consider the fish screening, minimum flow and allocation limit sought by Aukaha to be appropriate in this instance.

Status of Application

35. Section 6 of the s 42A report discusses the status of the Application. I agree with the activity status breakdown and that the overall activity

¹² As demonstrated in the evidence of Ms Bright at [3.51].

status for the Application is *discretionary*, given that the Application was lodged with Council prior to PC7 notification.¹³

36. This activity status differs from the activity determination provided in Section 4 of the Application AEE, primarily due to Mr Horrell considering that Bendigo Pond requires consent under the RPW, despite being located outside the bed of a watercourse. I note that the s 42A Report considers that the discharge of water to Bendigo Creek from a water race associated with the water bypassed by the Bendigo Pond is a permitted activity pursuant to RPW Rule 12.C.1.1.

Statutory Planning Assessment

37. The assessment in the Application against the relevant objectives and policies of the following documents remains valid and I still stand by this assessment:
- National Policy Statement for Freshwater Management 2014 (amended 2017) (NPSFM)
 - Resource Management (Management and Reporting of Water Takes) Regulations 2010 (RMR)
 - Partially Operative Regional Policy Statement for Otago 2019 (PORPS)
 - Proposed Regional Policy Statement for Otago 2015 (pRPS)
 - Regional Plan: Water for Otago (RPW)
 - Te Runanga o Ngai Tahu Freshwater Policy Statement
 - Kai Tahu ki Otago Natural Resource Management Plan (NRMP)
38. Below I give regard to the following statutory documents, either because those assessed in the Application merit further consideration, or because they were not a valid consideration at the time of writing the Application (but are now):
- Resource Management (National Environmental Standards for Freshwater) Regulations 2020 (NESF)

¹³ Resource Management Act 1991, s 88A.

- National Policy Statement for Freshwater Management 2020 (NPSFM20)
- Resource Management (Management and Reporting of Water Takes) Amendment Regulations 2020 (RMR20)
- Proposed Plan Change 7 (Water Permits) to the Regional Plan: Water for Otago (PC7)
- Kai Tahu ki Otago Natural Resource Management Plan (NRMP)

Resource Management (National Environmental Standards for Freshwater) Regulations 2020 (NESF)

39. The NESF came into force on September 3 2020, following the Application being accepted by Council. As such, the NESF was not assessed as part of the Application but is now a relevant document to consider. After assessing the proposal against the NESF, my understanding is that additional consent is not required under these regulations.

National Policy Statement for Freshwater Management 2020 (NPSFM20)

40. Similar to the NESF, the NPSFM20 came into force after the Application was lodged and so was not assessed at that time. The NPSFM20 is now a relevant document to consider under s 104(1)(b) of the Act. As such, I have provided an assessment of the Application against the NPSFM20 below.

Objective (1)

The objective of this National Policy Statement is to ensure that natural and physical resources are managed in a way that prioritises:

(a) first, the health and well-being of water bodies and freshwater ecosystems

(b) second, the health needs of people (such as drinking water)

(c) third, the ability of people and communities to provide for their social, economic, and cultural well-being, now and in the future.

41. My understanding of the new NPSFM is that it places the concept of Te Mana o te Wai at the forefront. As explained in Clause 1.3 of the NPSFM20, “Te Mana o te Wai is a concept that refers to the fundamental importance of water and recognises that protecting the health of freshwater protects the health and well-being of the wider environment.” Thus Objective (1) requires that the health and wellbeing of any water body is made first priority. Only after prioritising the health and well-being of the water body can you provide for the health, social, economic and cultural needs of people.
42. Considerable time and money has been invested in this Application to ensure that the health of Bendigo Creek could be better understood. We now know that Bendigo Creek is an intermittent watercourse and very rarely (even during the wetter months and outside the irrigation season) flows its full length to the Clutha River¹⁴. Further analysis of aerial imagery from 2005 to 2020 does not show a single instance where full connectivity between the creek and the Clutha River is achieved¹⁵.
43. The Applicant has made significant investments in water-related infrastructure to reduce water wastage and to more closely monitor the effects of the take on the hydrology of the creek. This includes a complete overhaul and upgrade of the water take, conveyance and storage system, and the installation of a water meter with telemetry on Bendigo Creek downstream from the take point. These were all voluntary investments which will have a positive impact on the health of Bendigo Creek.
44. With regards to Objective(1)(b), I understand that Bendigo Station’s single domestic take is the only domestic take from Bendigo Creek.
45. With regards to Objective(1)(c), the proposal will enable the Applicant to continue running a successful farming enterprise and provide for future development of marginal land into high-producing vineyards. Given the scale of Bendigo Station, this has positive ramifications for the wider community, as the Applicant supports a number of employees and

¹⁴ Application AEE, Section 3.4.1.

¹⁵ Application AEE, Appendix C page 10.

collaborates with DOC and Heritage New Zealand to ensure ongoing protection of and public access to historic mining areas and artefacts¹⁶. I note that the mining history associated with the hills above Bendigo Station, and with Bendigo Creek itself, is an important part of Central Otago's cultural heritage.

46. While I am not a cultural expert, I agree with Mr Horrell's assessment of effects on cultural and Kai Tahu values¹⁷. Considering Bendigo Creek's natural propensity to run dry several kilometres prior to the Clutha/Mata-Au, the provision of a residual flow below the intake regardless of what is being abstracted, and a lack of significant aquatic species, it would not appear that the proposal will have a notable impact on the physical attributes of the creek that contribute towards the mauri of the waterbody. In terms of ki uta ki tai, I understand that this concept recognises the importance of maintaining connection of water between the source and the sea. Applying this paradigm to Bendigo Creek, investigations suggest that this connection is provided first by surface water flows, then when those flows move to the subsurface zone the connection continues via groundwater. I note that the recommended Bendigo Aquifer is assumed to have around 13 million m³ of allocation remaining¹⁸, meaning the proposal is unlikely to significantly impact groundwater dynamics and hence ki uta ki tai. Finally, based on what I know of the area and the dynamics of the creek, whatever mahinga kai values that may have been provided by Bendigo Creek would also be unaffected by the proposal.
47. In light of the above, I consider that the Application is consistent with Objective (1).
48. The NPSFM20 policies most relevant to the Application are Policy 1, Policy 2, Policies 7-11, and Policy 15.

Policy 1

Freshwater is managed in a way that gives effect to Te Mana o te Wai.

¹⁶ Per Mr Porter's evidence.

¹⁷ S42A report, Section 7.9.

¹⁸ ORC Water Allocation – Consultants GIS portal, accessed 23/04/2021

49. In line with Paragraphs 41 to 47, above, I consider that the Application gives effect to Te Mana o te Wai.

Policy 2

Tangata whenua are actively involved in freshwater management (including decision-making processes), and Māori freshwater values are identified and provided for.

50. This policy appears to have more relevance to consent authorities than it does to the Applicant, however consideration of identified Māori freshwater values has been provided throughout Section 7 of the Application AEE. The Application was notified to Aukaha who lodged a submission. Furthermore, the Applicant endeavoured to involve Aukaha from the early stages of the Application, and has continued to seek resolution to perceived cultural issues via an informal pre-hearing meeting.

Policy 7

The loss of river extent and values is avoided to the extent practicable.

51. It is acknowledged that the proposed abstraction from Bendigo Creek will reduce its wetted reach to a certain extent. However, investigations in support of the Application indicate that this reduction is not significant¹⁹. Surface water connection between Bendigo Creek and the Clutha River occur very rarely, and to my knowledge there have not been any such instances in recent years. I consider that the Applicant has sought to avoid river extent loss as far as practicable by reducing their instantaneous primary allocation sought, installing a meter in the creek downstream of the intake to monitor residual and minimum flows, constructing a large reservoir to reduce instantaneous reliance and impact on the creek during low flows, and upgrading water take and conveyance infrastructure to ensure more efficient use of water abstracted from Bendigo Creek.

¹⁹ Application AEE, Sections 3.4.1 and 6.2; Evidence of Mr Allibone at [18]; Evidence of Ms Bright at [3.37].

52. There is no evidence to demonstrate a significant loss of values in Bendigo Creek.

Policy 8

The significant values of outstanding water bodies are protected

53. Bendigo Creek is not listed in Schedule 1A of the RPW and there are no known significant values associated with this water body. Given Bendigo Creek's only rare connection with the Clutha, it is unlikely that the proposal will have any measurable adverse effect on the significant values of the Clutha River.

Policy 9

The habitats of indigenous freshwater species are protected

54. There are no documented indigenous freshwater species in Bendigo Creek that require protection.

Policy 10

The habitat of trout and salmon is protected, insofar as this is consistent with Policy 9.

55. As indicated in the AEE, a small population of brown trout is present in Bendigo Creek, downstream from the take point. Work undertaken by Water Ways Consulting Ltd indicates that these are stunted individuals that have no sports fishing value and are a common occurrence in many small Otago streams²⁰.
56. As part of the same investigation, Water Ways Consulting concluded that while the activity is likely reducing the habitat available to these trout, this reduction is not significant²¹. It is also apparent from this work that current operation of the Applicant's abstraction is sufficient to ensure that wetted habitat is provided for this small population, meaning the proposal (with a proposed reduction in allocation) should ensure these limited trout values in Bendigo Creek are protected.

²⁰ Water Ways Consulting Ltd, Memo, 30 April 2020, pages 1 & 2.

²¹ Evidence of Mr Allibone, at [18].

Policy 11

Freshwater is allocated and used efficiently, all existing over-allocation is phased out, and future over-allocation is avoided.

57. Consideration of allocation in respect to the proposal has been provided to a sufficient extent in the Application and in my evidence herein. There will be a significant reduction in instantaneous, monthly and annual allocation as a result of the Application.
58. In recent years, the Applicant has invested heavily in upgrading the water take, conveyance, storage and use infrastructure to ensure freshwater is used as efficiently as possible.

Policy 15

Communities are enabled to provide for their social, economic, and cultural wellbeing in a way that is consistent with this National Policy Statement.

59. Enabling the Applicant to continue farming by providing the water they need to efficiently irrigate their land, along with providing critical stock water, will provide for not only the economic wellbeing of the Applicant themselves, but also the social and economic wellbeing of the wider community.
60. As noted in Mr Porter's evidence, Bendigo employs six on-farm staff and three families. Profits generated by the operation also support the Applicant's family and a number of charitable organisations²².
61. The Applicant also works closely with DOC and Heritage New Zealand to protect and/or enhance the high concentration of historic gold mining heritage areas within the farm boundary²³. This not only ensures preservation of important cultural heritage, it also provides accessibility for members of the public to experience these cultural relics.
62. As a result, I am comfortable stating that the proposal enables communities to provide for their social, economic and cultural wellbeing. I have addressed cultural aspects in earlier sections of my evidence, and

²² Evidence of Mr Porter at [2.3]

²³ Evidence of Mr Porter at [3.2]

do not consider that the Application presents a barrier to cultural wellbeing. Therefore, the proposal gives effect to Policy 15.

63. Overall, I consider that the Application achieves the objective and aligns with the policies of the NPSFM20.

Resource Management (Management and Reporting of Water Takes) Amendment Regulations 2020 (RMR20)

64. RMR20 came into effect on September 3 2020. To my knowledge, the Applicant's water metering and reporting is in accordance with the amendments listed in RMR20.

Regional Policy Statement (RPS), Proposed Regional Policy Statement (pRPS) & Partially Operative Regional Policy Statement (PORPS)

65. The pRPS and PORPS have been given due consideration in Section 7 of the Application, while the RPS is reflected in the policies and rules of the RPW and as such has also been assessed in Section 7 of the Application's AEE. I also agree with Mr Horrell's assessment of these documents in relation to the Application, with the exception of the recommended ceasing of discharge from the pond back to Bendigo Creek. Justification for my disagreement regarding the overflow are provided later in my evidence.

Regional Plan: Water for Otago

66. I agree with Mr Horrell's assessment of the activity against the policies of the RPW, with the exception of the recommended ceasing of discharge from the pond back to Bendigo Creek.
67. While I note that I am not a cultural expert, I consider that sufficient consideration of cultural values and effects is provided in the Application in relation to the regional planning framework, particularly Section 7.2.6 of the AEE. Further consideration of iwi values and effects in other sections of my evidence builds on this initial cultural effects assessment.

Proposed Plan Change 7

68. PC7 was notified on March 18 2020 and subsequently re-notified by the Environmental Protection Authority. PC7 introduces objectives, policies and rules in relation to deemed permit and surface water permit Applications. PC7 is intended by ORC to provide an interim planning framework for the assessment of Applications to renew deemed permits expiring in 2021 and any other water permits expiring prior to 31 December 2025, when a new Land and Water Regional Plan is expected to be operative. PC7 also seeks to impose a requirement for short-duration consents for all new water permits.
69. PC7 provisions have immediate legal effect. However, the Application was lodged prior to PC7 notification and pursuant to s 88A of the Act, it retains its discretionary activity status under the operative RPW.
70. Policy 10A.2.1 directs Council to avoid granting replacement consents except where certain provisions are met. I agree with this Mr Horrell's assessment stated in the s42A report that all of these provisions are met by the proposal.
71. As discussed in the Section 42A report, PC7 Policy 10A.2.2 applies to the "new" retakes only. I do not agree with Mr Horrell's assessment that this policy applies to "all water permits including both replacements and new takes"²⁴. This is on the basis of the context of the other two PC7 policies, which place emphasis on "replace" as opposed to "new" in 10A.2.2. I also note that on other deemed permit Applications I have been involved in, Council has considered that 10A.2.2 only applies to new water permits, not replacement permits as is the case in this instance. As such, this policy should only apply to the retake element of RM20.079.01. Applying a 6-year term to just one aspect of a consent that would otherwise merit a 15-year term does not make sense in my opinion, and it appears that Mr Horrell concurs, given the 15-year term recommended for RM20.079.01.
72. Policy 10A.2.3 of PC7 provides direction on consent duration for replacement deemed permits and water permits to take and use water.

²⁴ S42A report, page 56.

The Applicant has amended the Application to reduce the term sought to 15 years to align with this policy. I agree with Mr Horrell's assessment of RM20.079.01 against this policy.

73. I note that the "hold the line" approach presented by the notified PC7 actively discourages further investment in infrastructure, given the strong policy direction proposed through PC7 regarding term. This presents an additional limitation on further investment with financial and lending constraints presented by the shortened consent terms. Bendigo may consider installing an automated valve system at the intake to minimise overflows back to the creek²⁵. However, this cost is significant and would not occur if a short term consent were granted.
74. Given that the proposal is generally in accordance with the NPSFM20 as outlined earlier, I consider little value in giving significant weighting to the provisions of PC7. Additionally, it seems an inefficient approach to assign a term of 6 years to one permit and 15 years to two others, considering how closely linked all three permits will be. However, I note in prior deemed permit decisions following notification of PC7 that there has been a strong tendency to give considerable weighting to 10A.2.2, therefore it is likely a foregone conclusion. On this basis, I accept all of the terms recommended by Mr Horrell, as discussed further below. Overall, the proposal with amendments as recommended by Mr Horrell is fully consistent with the provisions of PC7.

Kai Tahu ki Otago Natural Resource Management Plan (NRMP)

75. While I am of the opinion that sufficient consideration of the NRMP was provided in the Application, I note that the 25-year term originally sought and the 15 years now sought is consistent with the provisions of the NRMP. Mr Porter's evidence notes that 15 years is required as a minimum to enable further enhancements to the Bendigo Creek water take and use system (such as installation of an automated intake valve linked to a level sensor on Bendigo Pond) – thereby further improving water use efficiency. Efficient water use is one of the guiding principles

²⁵ Evidence of Mr Porter at [4.3]

of the Kai Tahu NRMP, therefore restricting the consent terms to 6 years as requested by Aukaha would not be consistent with that plan. Further discussion of duration is provided below.

Duration

76. Mr Horrell has recommended a consent term of 15 years for RM20.079.01 and RM20.079.03, and a term of 6 years for RM20.079.02. While I still consider that the 25-year term originally sought is appropriate for all of the subject permits, the Applicant reduced the term sought in order to obtain Fish & Game written approval and in an attempt to satisfy Aukaha's concerns raised in their submission. Furthermore, and as indicated above, prior decisions have placed significant weighting on PC7 Policy 10A.2.2, meaning the likelihood of getting a longer term than 15 years on a new permit is relatively low. On this basis, I accept all of the consent terms recommended by Mr Horrell.
77. Overall, I agree with Mr Horrell's assessment of the Application against RPW Policy 6.4.19. Given that the proposed purpose of use is enduring (to well past 15 years), the take is the only consented abstraction in the Bendigo Creek catchment, the hydrology and ecology of Bendigo Creek is relatively well understood while any unforeseen adverse effects to the creek can be mitigated via review conditions, and the Applicant has invested heavily in water infrastructure utilising best practice and will continue to invest in water infrastructure, 15 years on RM20.079.01 and RM20.079.03 would be the shortest viable term for the Applicant to continue operating their farm efficiently and profitably.

Proposed Consent Conditions

78. Appendix B contains draft consent conditions utilising track changes to highlight areas of proposed amendments from those recommended in the Section 42A report.
79. Generally, I agree with the draft conditions of consent, except where I indicate otherwise. Significant changes that merit further explanation are discussed in more detail below. All other changes sought are largely

administrative, and have been captured via track changes and comments in Appendix B.

80. The key changes sought are as follows:

i. RM20.079.01

– Removal of Condition 4. Mr Horrell considers that the operation of this overflow is an inefficient use of water, however I do not consider this to be the case. As discussed in Mr Porter's evidence, the overflow provides several critical functions to the farm, including:

(1) Providing an emergency spillway for when inflows exceed pond capacity. Because the pond is located in a natural depression, it does receive a small amount of runoff from the area to the north of the pond. This means that during large rain events when the pond is close to capacity, the overflow is necessary to provide a controlled discharge of runoff. Note that the catchment area for this runoff is well below 50 hectares (a permitted activity threshold under RPW Rule 12.3.2.1(a)).

(2) Providing an emergency spillway in the event that inflows from Bendigo Creek exceed pond capacity prior to the Applicant being able to go up and close the intake valve. This is not a common occurrence, but the overflow nonetheless provides a critical contingency in this event. Mr Horrell's recommendation would mean the Applicant could no longer operate this overflow even in emergencies, which could result in water overtopping the dam and compromising structural integrity, or having an adverse effect on the enhancements to the area provided by Bendigo.

- (3) Providing stock drinking water for grazing land to the south of the pond. Mr Porter has indicated that stock are not present often enough in these paddocks to make installation of reticulated stock drinking supply financially viable - particularly in light of the reduced term now sought.
- Discharge from Bendigo Pond via the overflow is a permitted activity pursuant to Rule 12.C.1.1. On this basis and the points above, my view is that a condition is not appropriate. The permitted activity provision of the RPW considers that any adverse effect arising from this activity is acceptable. Although it forms part of the Application, the operation of the overflow is a continued activity that was present with the former duck pond as outlined by Mr Porter. The s 42A Report author does not provide a direct connection between the adverse effect arising from the use of the overflow and the requirement for the activity to cease after two years. I do not consider that there is any requirement under the operative RPW to discontinue occasional use of the overflow. I note that the hydrological and ecological investigations carried out as part of the Application were inclusive of the overflow operation, therefore continued operation of the overflow as needed would not alter the level of effect on the environment.
- ii. RM20.079.02
 - Removal of Condition 3. It is my understanding that the supplementary allocation blocks developed in accordance with RPW Method 15.8.1A are intended to ensure that Policy 6.4.9(a) is not contravened where there are multiple supplementary takes within the same catchment. In this instance, there is only the Applicant's proposed supplementary take, and it is likely that this will remain the case for at least the duration of the consent. On this basis, I don't consider that applying the supplementary allocation blocks provide any environmental benefit, and introduce

unnecessary administrative steps for both the Applicant and Council.

- Amendment to Condition 5. RPW Policy 6.4.9(a) requires that “no less than 50% of the natural flow remains instream...”. My interpretation of Condition 5 is that it would not ensure that 50% of the natural flow would remain in Bendigo Creek. For example, where the creek is flowing at 150 L/s upstream of the intake, the Applicant could take up to 50 L/s primary allocation and 50 L/s supplementary allocation (totalling 100 L/s abstraction), leaving only one third of flows in the creek to comply with the 50 L/s minimum flow at the in-creek meter. It is not the Applicant’s intention to take more flow from the creek than is environmentally acceptable, therefore I propose that Condition 5 be simplified to the following: “This consent must not be exercised when flows in Bendigo Creek at NZTM 2000: E1314483 N5018116 are below 50% of the natural flow.” The onus is therefore on the Applicant to use the in-creek meter in conjunction with their abstraction meter to determine what the minimum flow is, and ensure that abstraction does not occur below the moving threshold. In my opinion, this would provide a better environmental outcome for Bendigo Creek than would the s42A recommended condition. If not using Method 15.8.1A presents an issue from a policies perspective, it may be that applying RPW Policy 6.4.10 is more appropriate in this instance.

Conclusion

81. I am of the view that the effects of the proposed activities will be no more than minor, and that the proposal is generally consistent with all relevant objectives and policies, including those of the NPSFM20. Therefore, I support the recommendation that consents RM20.079.01 and RM20.079.03 should be granted to the Applicant in accordance with the

draft conditions attached in Appendix B, for a term of 15 years. I also accept the 6-year term recommended for RM20.079.02.

Date: 3 May 2021

William Nicolson

APPENDIX A – HISTORIC ABSTRACTION ANALYSIS

APPENDIX B – PROPOSED CONDITIONS WITH TRACK CHANGES



Project Memorandum

3 May 2021

Landpro Reference: S15298

Council Reference: RM20.079

To: Will Nicolson, Planner, Landpro Ltd

From: Christina Bright, Hydrologist, Landpro Ltd

Subject: Historic Water Use Assessment – Bendigo Station

Tables and graphs on the following pages summarise monthly and seasonal water abstraction data for:

WR1233CR & WR3908CR WM1515 Bendigo Creek

The applicant's water meter was installed in February 2019 and therefore there is a limited abstraction record available for historical water use analysis. The 2019/2020 season is the only complete hydrological year available on record.

Table 1 summarises the historic maximum abstraction. The 'RAW' maximum rate of take shown is the raw record with no data filtering or exclusion of outliers or spikes in the data. For this record, there was one clear outlier on the 10 March 2020 where the exceedance noted on record was $>200 \text{ m}^3/\text{s}$, this is mostly likely a malfunction of the meter and the exceedance removed from the RAW record, the take was not operational immediately before or after the exceedance occurred, and therefore is recorded as an outlier and data removed. Incorrect readings, exceedances or zeros can often be the result faulty equipment, flood or weather events, or other legitimate issues. The filtered data is the raw abstraction record filtered where if the instantaneous (RAW) record contains exceedances, the consented maximum has been specified as the maximum recorded rate of take for exceedances within the water meters margin of error, and these exceedances are acknowledged. If there have been no exceedances, the maximum recorded rate is the maximum of the raw instantaneous record. The margin of error is consistent with the margin of error associated to a pipe (5%) and this approach accounts somewhat for metering outliers, or errors. Data was processed using excel software. The data filtering approach is consistent with recent deemed permit hearing decisions (see: Long Gully Race Society RM17.176; and Queensbury Ridges Ltd (pending appeal) RM19.312) and the method proposed by the Otago Water

Resources Group¹ and Landpro Ltd². The abstraction records were sourced from the Otago Regional Council’s Hilltop Database directly. The water meter has been verified and so this record of abstraction is true and accurate. The consented maximum is that which may be taken under the exiting permit.

Table 3 Appendix to this memo includes the monthly, seasonal, and annual abstraction volumes. Figure 1 below shows the instantaneous abstraction record.

Table 1: Summary of historical maximums calculated from a variety of methods.

Historical Maximum Permits WR1233CR & WR3908CR - WM1515 Bendigo Creek				
Data record:	Raw Record - full record, 7-Feb-2019 11:40:00 to 20-Feb-2021 11:00:00 Filtered – 2019 to 2021; gaps filled nil; exceedance 10 March meter malfunction, removed. Minimal other minor exceedance and capped at consent maximum within 5% margin of error for a pipe meter. PC7 calculation (amended 10A.4) – 2015 to 2020			
	Consent¹	Actual²	Filtered³	WPPC - PC7⁴
Rate of Take l/s	83.3	156.9	83.3	67.5
Daily m ³	7,197	6,571	6,571	5,495
Monthly m ³	218,792	132,470	132,470	126,514
Annual m ³	2,625,509	1,048,170	1,048,170	1,048,170

¹ Consent Maximum, i.e., the on-paper allocation

² Based on maximum recorded abstraction across full record.

³ Filtered data have been audited so that justified exceedances have been removed.

⁴ Method within schedule 10A.4 outlined in Plan Change 7 – Water Permits Plan Change (WPPC).

¹ Submission by Otago Water Users Resource Group on Proposed Water Permits Plan Change (Plan Change 7) to the Regional Plan: Water for Otago (4 May 2020).

² Evidence in chief of Christina Bright on Proposed Water Permits Plan Change (Plan Change 7) to the Regional Plan: Water for Otago (5 February 2021)

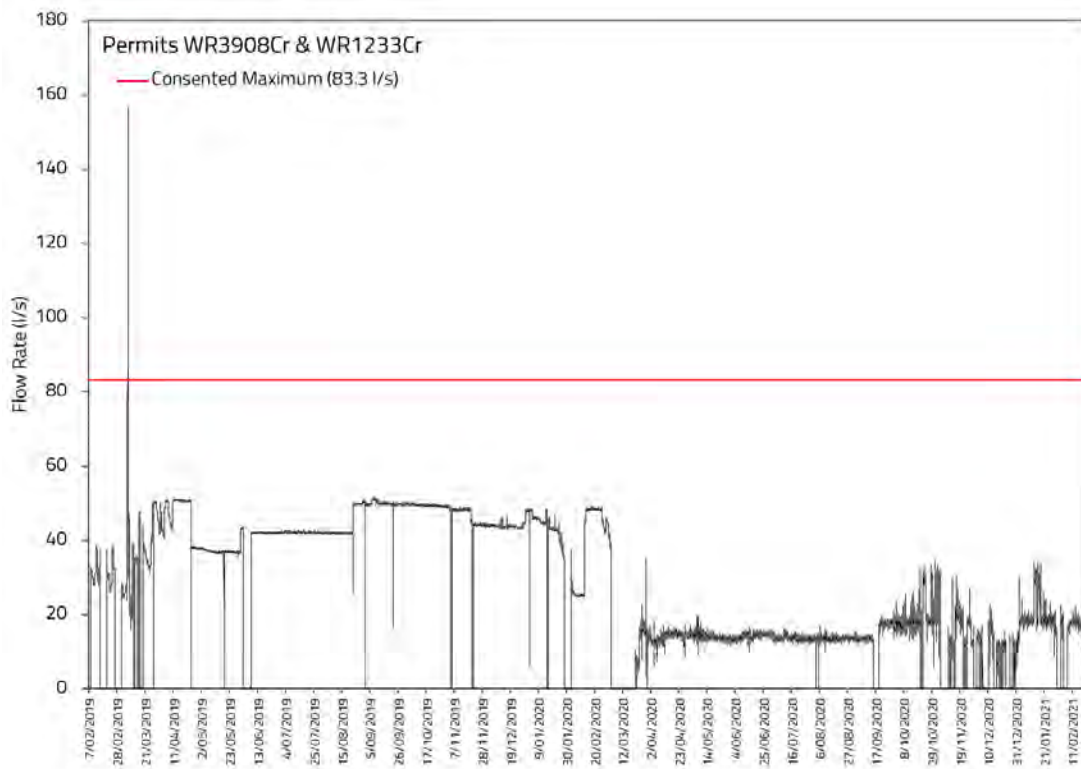


Figure 1: Abstraction record for Bendigo Creek WR1233CR & WR3908CR, February 2019 – February 2021.

As part of preparing this memo, I have reviewed the Section 42A report prepared by the ORC processing officer and provide the below comments with regards to historical maximum use.

Table 2 summarises the historical maximum use calculated by ORC, and the use data calculated here by Landpro Ltd. Note that Table 2 includes the volumes applied for, that based on the apportioning of primary and supplementary allocation should be read alongside by further comments below on determining primary and supplementary allocation.

The applied for rate is consistent with the pattern of taking that occurs 95% of time, i.e., 50 l/s is the 95%ile, and given the abstraction record had only one instance where the consent maximum of 83.3 l/s has been meet, this approach is suitable in this case, and I agree with the proposed rate of 50 l/s. Based on historic use, I agree with ORC’s recommended instantaneous rate of take of 50 l/s. This is demonstrated to have been taken historically. The volumes sought by the applicant include both the

primary and the supplementary allocation. The monthly and annual volumes calculated are consistent with ORC's water use analysis, and only minor discrepancies exist (Table 2).

Given the approach taken by ORC's processing offer regarding primary and supplementary allocation, I agree that the primary allocation monthly limit reflect the historical pattern of use (132,470 m³/month). The supplementary allocation monthly limit recommended by ORC's processing officer is that as applied for in Table 2, and I agree with this.

As the applicant's current pattern of taking reflects winter water taking, and higher flow taking for storage, the annual volumes abstracted historically are higher than what is required for irrigation of 100ha of pasture, stock drinking water, and domestic water requirements. Therefore, ORC's processing officer has recommended that the primary allocation annual volume limit be determined as the sum of these above water requirements, i.e., Aqualinc annual water demand for 100ha of pasture, plus stock water and domestic water (total: 857,778 m³/year). ORC recommend the supplementary allocation annual limit be the difference between the primary annual limit and the historical maximum abstraction. In principle I agree with this and see no issues with the recommendation of ORC.

I note for transparency that ORC's processing officer has recommended an combined primary and annual allocation limit of 1,054,714 m³/year and is inconsistent with Table 2. The discrepancies are minor, and I agree with the ORC recommended annual limit.

Table 2; Summary of applied for rate and volumes versus historical water use calculated by ORC and Landpro Ltd.

	Applied for	ORC Water Use	Applicant Water Use
Rate (l/s)	50 l/s	49.7 l/s	Record demonstrates one instances where 83.3 l/s consent maximum is reached; otherwise, the 95%ile is 50 l/s. I agree with the applied for rate.
Monthly (m ³ /month)	235,948 m ³	132,000 m ³	132,470 m ³
Annual (m ³ /year)	1,080,598 m ³	1,046,200 m ³	1,048,170 m ³

If any further questions, please do not hesitate to contact me.

Kind Regards



Christina Bright
Hydrologist

Table 3: Monthly, seasonal, annual totals for Bendigo Creek.

WR1233CR & WR3908CR - WM1515 Bendigo Creek														
Monthly, Annual and Seasonal Volumes (m ³) - Filtered abstraction record at 5% over the consent maximum daily volume (m ³) based on the consented maximum rate in l/s.														
	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	March	April	May	June	Annual Total	Season total
2018/2019 *								34,114	76,591	120,557	98,712	87,424	417,398	231,262
2019/2020	112,799	117,128	128,694	132,470	113,459	117,507	103,853	89,318	22,682	36,151	37,480	36,629		615,440
2020/2021 *	36,721	35,491	33,530	49,904	32,001	16,880	49,152	21,424						169,361
Maximum	112,799	117,128	128,694	132,470	113,459	117,507	103,853	89,318	76,591	120,557	98,712	87,424	417,398	615,440

*incomplete season



Our Reference: A1400994

Consent No. RM20.079.01

WATER PERMIT

Pursuant to Section 104C of the Resource Management Act 1991, the Otago Regional Council grants consent to:

Name: Bendigo Station Limited

Address: 1460 Tarras-Cromwell ~~Road~~, RD 3, Cromwell

To take and use surface water as a primary allocation from Bendigo Creek ~~for the~~ and to retake and use water from the Bendigo Station Pond for the purposes of irrigation, stock water supply and domestic supply

For a term expiring 15 years from commencement of this consent

Locations of Points of Abstraction: Bendigo Creek: approximately 5.7 kilometres south east of the intersection of Bendigo Loop Road and Tarras-Cromwell Road (State Highway 7).

Bendigo Station Pond: Approximately 4 kilometres south east of the intersection of Bendigo Loop Road and Tarras-Cromwell Road (State Highway 7).

Legal Description of land at point of abstraction:

Bendigo Creek: Section 21 SO 24641

Bendigo Station Pond: Lot 8 DP 517385

Legal Description of land s where water is to be used: Lot 6 DP 525495, Lot 5 DP ~~5472855~~17385, Lot 3 DP 391334, Lot 4 DP 391334, Part Lot 10 DP 391334, Lot 8 DP 517385, Lot 3 DP 459561, Lot 7 DP 517385, Lot 3 DP 525495, Lot 4 DP 525495, Lot 1 DP 525495, Lot 2 DP 525495 and Lot 6 DP 517385

Map Reference at point of abstraction:

Bendigo Creek: NZTM 2000: E1314483 N5018116

Bendigo Station Pond: NZTM 2000: E1313447 N5019532

Conditions

Specific

1. a) The take and use of surface water from Bendigo Creek and to retake primary allocation water from a reservoir for the irrigation of 100 hectares of pasture, stock water supply and domestic supply at the map

references and land legally described above must be carried out in accordance with the plans and all information submitted with the application, detailed below and all referenced by the Consent Authority as consent number RM20.079:

- i. The application and supporting information received by the Consent Authority on 10 March 2020 and addendums to application made on 22 May 2020 and 8 October 2020;
 - ii. Further information response received on 14 May 2020; and
 - iii. Hearing evidence *[Date] February 2021*.
- b) If there are any inconsistencies between any conditions of this consent and the application, the conditions of consent must prevail.
2. This permit must not be exercised until Deemed Permits WR1233CR and WR3908CR have been surrendered or expired.
3. a) The rate of abstraction as primary allocation must not exceed 50 litres per second.
- b) The volume of abstraction under this permit must not exceed:
- i. 132,000 cubic metres per month; and
 - ii. 857,778 cubic metres in each 12-month period, commencing 1 July of any year and ending 30 June of the following year.
4. ~~This consent only authorises water to be by washed via the reservoir spillway into Bendigo Creek as shown in Appendix 1 of this permit until [2 years after commencement date]. The Consent Holder must provide written notice within 20 working days of 23 November 2022 to the Consent Authority that the by wash has ceased and details of how water is retained within the reservoir.~~
5. (a) The method for taking water at NZTM 2000 E1314483 N5018116 must be via an open pipe positioned above the bed of Bendigo Creek as described in the Application and Assessment of Environmental Effects received by the Consent Authority on 10 May 2020 and as shown in **Appendix 2**, unless clause (b) applies.
- (b) The method for taking water at NZTM 2000 E1314483 N5018116 may be modified, provided the following is adhered to:
- (i) A continuous connected residual flow is maintained at all times immediately downstream of the point of take for a distance of no less than 750 metres;
 - (ii) The Consent Authority is notified of the change in method of taking no less than 15 working days before any changes to the intake are undertaken; and
 - (iii) The Consent Holder must notify the Consent Authority in writing of the completion of the intake establishment no less than 10 working days following completion of works as outlined in (ii), and must provide photographs of the ~~renew~~ method of intake. Photographs must be in colour and be no smaller than 200 x 150 millimetres in size and be in JPEG form.

Commented [WN1]: Seek to remove this in the first instance, due to the justification provided in the main body of my evidence. In the event that the commissioner determines that such a condition should remain, I propose that the following wording be used instead: "The Consent Holder must minimise discharges from the reservoir via the spillway wherever practicable" OR "The Consent Holder shall avoid unutilised discharges from the reservoir via the spillway wherever practicable."

Performance Monitoring

6.
 - a) Prior to the first exercise of this consent, the Consent Holder must install:
 - i. A water meter that will measure the rate and the volume of water taken to within an accuracy of +/- 5% over the meter's nominal flow range. The water meter must be capable of output to a datalogger.
 - ii. A datalogger that time stamps a pulse from the flow meter at least once every 15 minutes and has the capacity to hold at least twelve months data of water taken.
 - iii. A telemetry unit which sends all of the data to the Consent Authority.
 - b) Provide telemetry data once daily to the Consent Authority. The Consent Holder must ensure data compatibility with the Consent Authority's time-series database and conform with Consent Authority's data standards.
 - c) Within 20 working days of the installation of the water meter / datalogger/ telemetry unit, any subsequent replacement of the water meter / datalogger/ telemetry unit and at 5-yearly intervals thereafter, and at any time when requested by the Council, the Consent Holder must provide written certification to the Consent Authority signed by a suitably qualified person certifying, and demonstrating by means of a clear diagram, that:
 - i. Each device is installed in accordance with the manufacturer's specifications;
 - ii. Data from the recording device can be readily accessed and/or retrieved in accordance with the conditions above; and
 - iii. That the water meter has been verified as accurate.
 - d) The water meter / datalogger / telemetry unit must be installed and maintained throughout the duration of the consent in accordance with the manufacturer's instructions.
 - e) All practicable measures must be taken to ensure that the water meter and recording device(s) are fully functional at all times.
 - f) The Consent Holder must ensure the water meter returns accurate readings at all times including by routinely checking the device and removing any ice or debris build up.
 - g) The Consent Holder must report any malfunction of the water meter / datalogger/ telemetry unit to the Consent Authority within 5 working days of observation of the malfunction. The malfunction must be repaired within 10 working days of observation of the malfunction and the Consent Holder must provide proof of the repair, including photographic evidence of any physical repairs, to the Consent Authority within 5 working days of the completion of repairs. Photographs must be in colour and be no smaller than 200 x 150 millimetres in size and be in JPEG form.
7. A water use efficiency report must be provided to the Consent Authority by 31 July each year for the period commencing 1 July the previous year and ending 30 June the current year. The report must assess the water use over the previous 12 months in respect of the efficient use of water for the purposes consented. This report must include, but not necessarily be limited to, the following:
 - a) Area, crop type, number of harvests per year, and timing;
 - b) Annual summary of water usage (month by month, and related to crops in the ground);
 - c) Reasons why use may have varied from the previous year;
 - d) Information demonstrating irrigation equipment that has been used and decision-making regarding efficiency of use (e.g. soil moisture data,

- irrigation scheduling, meter accuracy checks, computer control of irrigation) and any changes planned for the coming year;
- e) Measures undertaken to avoid loss or wastage of water including any bypass of water;
 - f) Any changes or modifications to irrigation (and water conveyance) infrastructure; and
 - g) Water conservation steps taken.

General

8. The Consent Holder must take all practicable steps to ensure that at all times:
- a) There is no leakage from pipes and structures;
 - b) The use of water is confined to targeted areas, as illustrated on the attached plan as **Appendix 3** to this consent with the exception of the area identified in red;
 - c) That the volume of water used for irrigation does not exceed that required for the soil to reach field capacity and avoids the use of water onto non-productive land such as impermeable surfaces; and
 - d) That irrigation to land must not occur when the moisture content of the soils is at or above field capacity.
 - e) ~~Prior to the first exercise of this consent, the Consent Holder, the Consent Holder must install a backflow prevention device to ensure water and/or contaminants cannot return to the water source.~~

Commented [WN2]: I assume recommendation of this condition is an error, given that the take is passive, drains via a steep gradient, and the risk of contaminated water backflow is virtually nonexistent.

Review

9. The Consent Authority may, in accordance with sections 128 and 129 of the Resource Management Act 1991, serve notice on the Consent Holder of its intention to review the conditions of this resource consent within three months of each anniversary of the commencement of this resource consent or within two months of any enforcement action taken by the Consent Authority in relation to the exercise of this resource consent, for the purpose of:
- a) Determining whether the conditions of this resource consent are adequate to deal with any adverse effect on the environment which may arise from the exercise of the resource consent and which it is appropriate to deal with at a later stage, or which becomes evident after the date of commencement of the resource consent;
 - b) Ensuring the conditions of this resource consent are consistent with any National Environmental Standards, relevant plans, and/or the Otago Regional Policy Statement;
 - c) Reviewing the frequency of monitoring or reporting required under this resource consent;
 - d) Reducing the consented instantaneous rate of abstraction, maximum monthly abstraction volume, and/or maximum annual abstraction volume (Condition 3); and/or changing the monitoring, operating, and reporting requirements (Conditions 5 and 6), in response to and/or to implement:
 - i. the results of monitoring carried out under this resource consent;
 - ii. water availability, including alternative water sources;
 - iii. actual water use;
 - iv. efficiency of water use;

- v. surface water allocation limits and minimum flows set out in any future regional plan, including any review of the Regional Plan: Water for Otago;
 - vi. surface water quality limits set out in any future regional plan, including any review of the Regional Plan: Water for Otago; and/or
 - vii. new statutory requirements for measuring, recording or data transmission.
- e) Imposing a minimum flow restriction as a condition on this resource consent if and when an operative regional plan sets a minimum flow for the catchment.

Notes to Consent Holder

1. *If you require a replacement water permit upon the expiry date of this water permit, any new application should be lodged at least 6 months prior to the expiry date of this water permit. Applying at least 6 months before the expiry date may enable you to continue to exercise this permit until a decision is made on the replacement application. Failure to apply at least 3 months in advance of the expiry date may result in any primary allocation status being lost. A late application may result in the application being treated as supplementary allocation if any such allocation is available.*
2. *For the purposes of Condition 7, 'Field Capacity' means the amount of water that is able to be held in the soil after excess water has runoff.*
3. *It is the responsibility of the consent holder to ensure that the water abstracted under this resource consent is of suitable quality for its intended use. Where water is to be used for human consumption, the consent holder should have the water tested prior to use and should discuss the water testing and treatment requirements with a representative of the Ministry of Health and should consider the following Drinking Water Standards*
4. *For the purposes of Condition 5, the water meter, data logger and telemetry unit should be safely accessible by the Consent Authority and its contractors at all times. The Water Measuring Device Verification Form and Calibration Form are available on the Consent Authority's website.*
5. *Section 126 of the Resource Management Act 1991 provides that the Consent Authority may cancel this consent by written notice served on the Consent Holder if the consent has been exercised in the past but has not been exercised during the preceding five years.*
6. *The Consent Holder is responsible for obtaining all other necessary consents, permits, and licences, including those under the Building Act 2004, the Biosecurity Act 1993, the Conservation Act 1987, and the Heritage New Zealand Pouhere Taonga Act 2014. This consent does not remove the need to comply with all other applicable Acts (including the Property Law Act 2007 and the Health and Safety at Work Act 2015), regulations, relevant Bylaws, and rules of law. This consent does not constitute building consent approval. Please check whether a building consent is required under the Building Act 2004.*



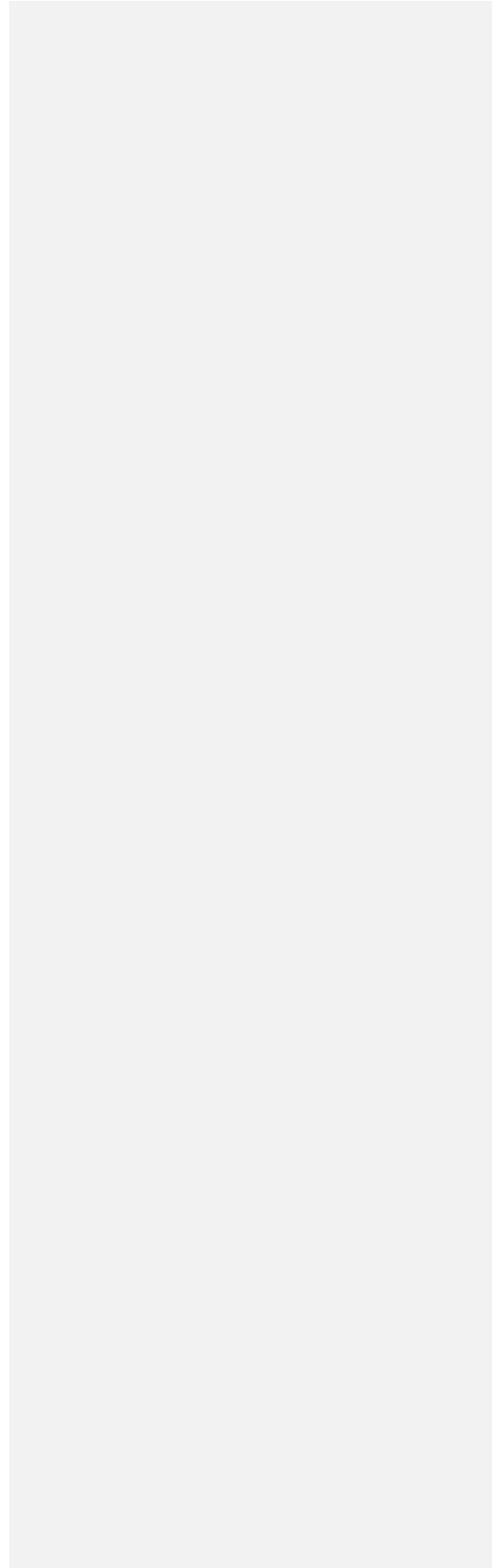
7. *Under section 125 of the RMA, this consent lapses five years after the date it is granted unless:
 - a. *The consent is given effect to; or*
 - b. *The Consent Authority extends the period after which the consent lapses.**
8. *Where information is required to be provided to the Consent Authority, this is to be provided in writing to watermetering@orc.govt.nz, and the email heading is to reference RM20.079.01 and the condition/s the information relates to.*
9. *The Consent Holder will be required to pay the Consent Authority an annual administration and monitoring charge to recover the actual and reasonable costs incurred to ensure ongoing compliance with the conditions attached to this consent, collected in accordance with Section 36 of the Resource Management Act 1991.*
10. *The consent holder must be aware of any rules that relate to the control of farm contaminants in runoff and leaching of nutrients to groundwater in relevant Otago regional plans and National Environmental Standards.*
11. *Water may be taken at any time for reasonable domestic or stock water purposes where and the taking or use does not, or is not likely to, have an adverse effect on the environment in accordance with Section 14 of the Resource Management Act 1991.*

Appendix 1 to Water Permit RM20.079.01: By-wash location

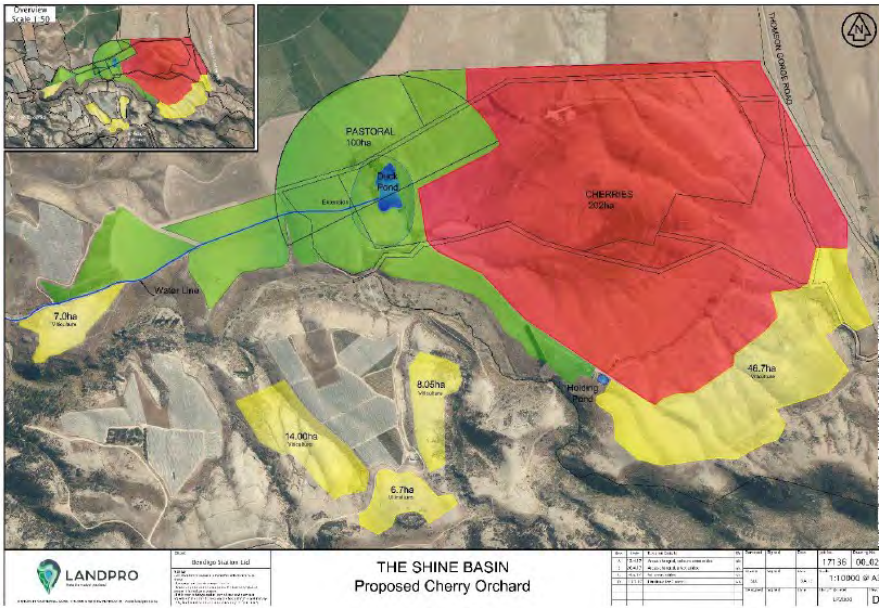


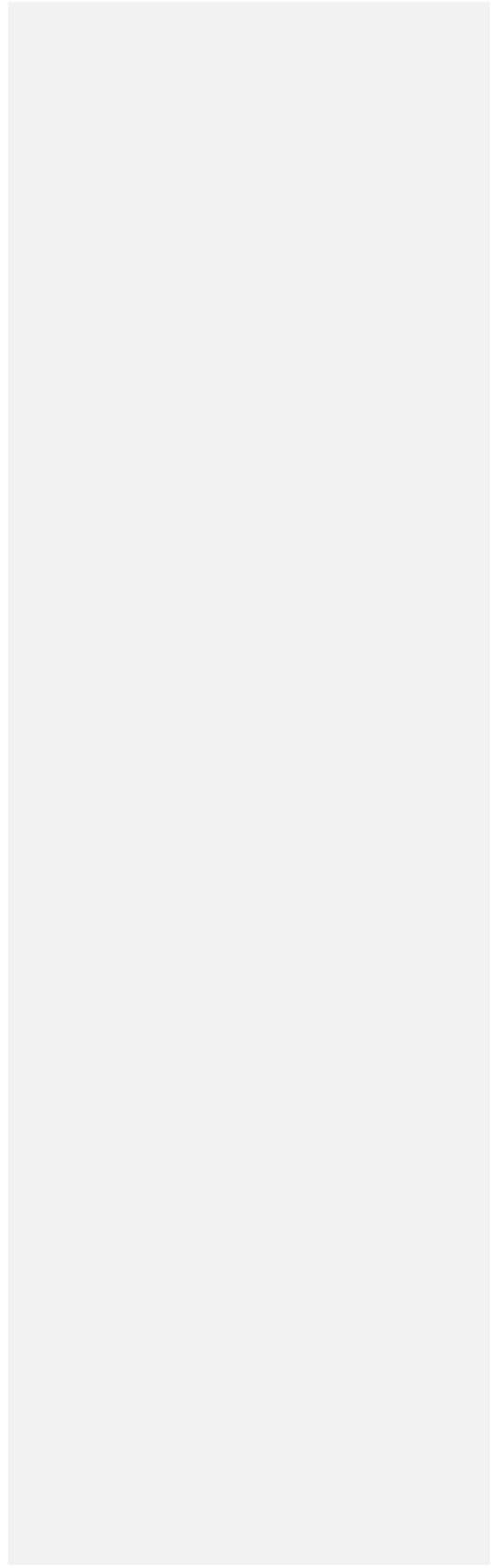
Appendix 2 to Water Permit RM20.079.01: Photographs (two)
showing intake structure





Appendix 2.3 to Water Permit RM20.079.01: Irrigation Areas







Our Reference: A1400995

Consent No. RM20.079.02

WATER PERMIT

Pursuant to Section 104C of the Resource Management Act 1991, the Otago Regional Council grants consent to:

Name: Bendigo Station Limited

Address: 1460 Tarras-Cromwell, RD 3, Cromwell

To take and use surface water as a supplementary allocation from Bendigo Creek and to retake and use water from a reservoir for the purpose of irrigation, stock water supply and domestic supply

For a term expiring 6 years from the commencement date

Locations of Points of Abstraction: **Bendigo Creek:** approximately 5.7 kilometres south east of the intersection of Bendigo Loop Road and Tarras-Cromwell Road (State Highway 7).
Bendigo Station Pond: Approximately 4 kilometres south east of the intersection of Bendigo Loop Road and Tarras-Cromwell Road (State Highway 7).

Legal Description of land at point of abstraction:

Bendigo Creek: Section 21 SO 24641

Bendigo Station Pond: Lot 8 DP 517385

Legal Description of land s where water is to be used: Lot 6 DP 525495, Lot 5 DP 517285517385, Lot 3 DP 391334, Lot 4 DP 391334, Part Lot 10 DP 391334, Lot 8 DP 517385, Lot 3 DP 459561, Lot 7 DP 517385, Lot 3 DP 525495, Lot 4 DP 525495, Lot 1 DP 525495, Lot 2 DP 525495 and Lot 6 DP 517385

Map References at points of abstraction:

Bendigo Creek: NZTM 2000: E1314483 N5018116

Bendigo Station Pond: NZTM 2000: E1313447 N5019532

Conditions

Specific

1. a) The take and use of surface water as supplementary allocation from Bendigo Creek and the retake and use of water from a reservoir for the irrigation of ~~*182.4 hectares~~, stock water supply and domestic supply at the map references and land legally described above must be carried out in accordance with the plans and all information submitted with the application, detailed below and all referenced by the Consent Authority as consent number RM20.079:
 - i. The application and supporting information received by the Consent Authority on 10 March 2020 and addendums to application made on 22 May 2020 and 8 October 2020;
 - ii. Further information response received on 14 May 2020; and
 - iii. Hearing evidence [Date] Month 2020.

Commented [WN3]: Area of existing pasture 100 ha and proposed vineyards (82.4 ha) as specified in the AEE

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- b) If there are any inconsistencies between any conditions of this consent and the application, the conditions of consent must prevail.
2. This Consent must only be exercised in conjunction with Water Permit RM20.079.01.
3. ~~The rate of abstraction as supplementary allocation must not exceed:~~
~~a) 100 litres per second when flows in Bendigo Creek at NZTM 2000 E1314218 N5018598 are at or above 50 litres per second;~~
~~b) 110 litres per second when flows in Bendigo Creek at NZTM 2000 E1314218 N5018598 are at or above 150 litres per second;~~
~~c) 160 litres per second combined with Water Permit RM20.079.01 when flows in Bendigo Creek at NZTM 2000 E1314218 N5018598 are at or above 430.6 litres per second;~~
4. The combined volume of abstraction from Bendigo Creek in conjunction with RM20.079.01 must not exceed:
 a) 235,948 cubic metres per month; and
 b) 1,054,714 cubic metres in each 12-month period, commencing 1 July of any year and ending 30 June of the following year.
5. This consent must not be exercised when flows in Bendigo Creek at NZTM 2000: ~~E1314483 N5018116 E1314218 N5018598~~ are below ~~50 L/s~~50% of the natural flow.

Commented [WN4]: It is unclear how this condition should be interpreted. Suggest revising to make its purpose more clear, as presently it is not actionable or enforceable.

Commented [WN5]: Propose this is removed, as detailed in my evidence.

Commented [WN6]: Reasoning for this provided in my evidence.

Performance Monitoring

6. a) Prior to the first exercise of this consent, the Consent Holder must at their own expense, install, operate and maintain a river flow recorder (sensor, logger, and associated equipment) within 20 metres of NZTM 2000 E1314218 N5018598;
- b) Within 3 months of installing the recorder, and then at a minimum of five yearly intervals, the location, structures and equipment to be used for the purpose of determining flows as required by Condition 6(a) must be verified and provide written certification to the Consent Authority assigned by a suitably qualified and experienced person.
- c) and demonstrating by means of a clear diagram, that:
 i. the recorder is installed in accordance with the manufacturer's specifications;
 ii. Data from the recording device can be readily accessed and/or retrieved in accordance with the conditions above; and
 iii. that the recorder has been verified as accurate.
- d) The Consent Holder shall provide evidence of the verification required by Condition 6(b) in writing to the Consent Authority within one month of the verification being completed.
- e) All malfunctions of the flow recorder during the exercise of this consent shall be repaired and reported to the Consent Authority within 5 working days of discovery by the Consent Holder or notification to the Consent Holder. In the event of an equipment malfunction the consent holder must cease the taking of supplementary allocation.
- f) The recorder must be installed and maintained throughout the duration of the consent in accordance with the manufacturer's instructions.
- g) The Consent Holder must ensure the recorder returns accurate readings at all times including by routinely checking the device and removing any ice or debris build up.

- h) The flow recorder and the surrounding waterway must be available at all reasonable times for inspection by the Consent Authority for the purposes of assessing compliance with the conditions of this consent.
 - i) The flow recorder must record water flow at intervals of 15 minutes or less, and must update data at least daily to a database which is accessible to authorised users, including the Consent Authority.
- 7.
- a) Prior to the first exercise of this consent, the Consent Holder must install:
 - i. Water meter that will measure the rate and the volume of water taken to within an accuracy of +/- 5% over the meter's nominal flow range. The water meter must be capable of output to a datalogger.
 - ii. A datalogger that time stamps a pulse from the flow meter at least once every 15 minutes and has the capacity to hold at least twelve months data of water taken.
 - iii. A telemetry unit which sends all of the data to the Consent Authority.
 - b) Provide telemetry data once daily to the Consent Authority. The Consent Holder must ensure data compatibility with the Consent Authority's time-series database and conform with Consent Authority's data standards.
 - c) Within 20 working days of the installation of the water meter / datalogger/ telemetry unit, any subsequent replacement of the water meter / datalogger/ telemetry unit and at 5-yearly intervals thereafter, and at any time when requested by the Council, the Consent Holder must provide written certification to the Consent Authority signed by a suitably qualified person certifying, and demonstrating by means of a clear diagram, that:
 - i. Each device is installed in accordance with the manufacturer's specifications;
 - ii. Data from the recording device can be readily accessed and/or retrieved in accordance with the conditions above; and
 - iii. That the water meter has been verified as accurate.
 - d) The water meter / datalogger / telemetry unit must be installed and maintained throughout the duration of the consent in accordance with the manufacturer's instructions.
 - e) All practicable measures must be taken to ensure that the water meter and recording device(s) are fully functional at all times.
 - f) The Consent Holder must ensure the water meter returns accurate readings at all times including by routinely checking the device and removing any ice or debris build up.
 - g) The Consent Holder must report any malfunction of the water meter / datalogger/ telemetry unit to the Consent Authority within 5 working days of observation of the malfunction. The malfunction must be repaired within 10 working days of observation of the malfunction and the Consent Holder must provide proof of the repair, including photographic evidence of any physical repairs, to the Consent Authority within 5 working days of the completion of repairs. Photographs must be in colour and be no smaller than 200 x 150 millimetres in size and be in JPEG form.

Review

- 8. The Consent Authority may, in accordance with sections 128 and 129 of the Resource Management Act 1991, serve notice on the Consent Holder of its intention to review the conditions of this resource consent within three months of each anniversary of the commencement of this resource consent or within

two months of any enforcement action taken by the Consent Authority in relation to the exercise of this resource consent, for the purpose of:

- a) Determining whether the conditions of this resource consent are adequate to deal with any adverse effect on the environment which may arise from the exercise of the resource consent and which it is appropriate to deal with at a later stage, or which becomes evident after the date of commencement of the resource consent;
- b) Ensuring the conditions of this resource consent are consistent with any National Environmental Standards, relevant plans, and/or the Otago Regional Policy Statement;
- c) Reviewing the frequency of monitoring or reporting required under this resource consent;
- d) Reducing the consented instantaneous rate of abstraction, maximum monthly abstraction volume, and/or maximum annual abstraction volume (Condition 3); altering the minimum flow (Condition 5); and/or changing the monitoring, operating, and reporting requirements (Conditions 6 and 7), in response to and/or to implement:
 - i. the results of monitoring carried out under this resource consent;
 - ii. water availability, including alternative water sources;
 - iii. actual water use;
 - iv. efficiency of water use;
 - v. surface water allocation limits and minimum flows set out in any future regional plan, including any review of the Regional Plan: Water for Otago;
 - vi. surface water quality limits set out in any future regional plan, including any review of the Regional Plan: Water for Otago; and/or
 - vii. new statutory requirements for measuring, recording or data transmission.
- e) Imposing a minimum flow restriction as a condition on this resource consent if and when an operative regional plan sets a minimum flow for the catchment.

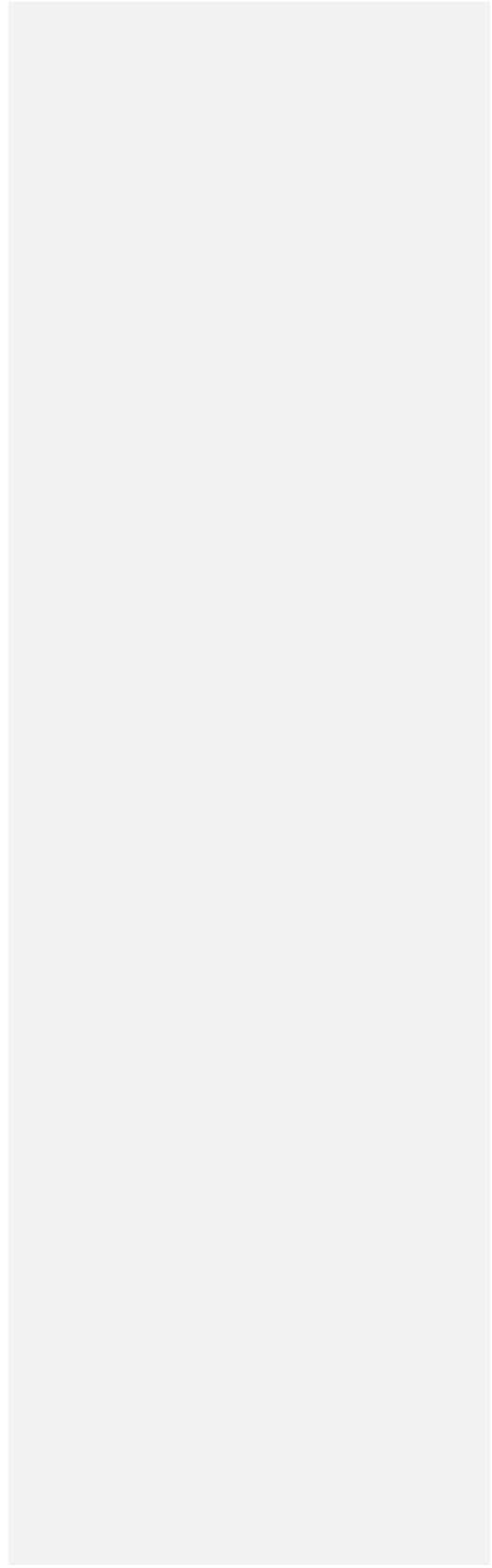
Notes to Consent Holder

1. *Note: the water meter, data logger, telemetry unit and river flow recorder must be safely accessible by the Consent Authority and its contractors at all times. The Water Measuring Device Verification Form and Calibration Form are available on the Consent Authority's website.*
2. *It is the responsibility of the consent holder to ensure that the water abstracted under this resource consent is of suitable quality for its intended use. Where water is to be used for human consumption, the consent holder should have the water tested prior to use and should discuss the water testing and treatment requirements with a representative of the Ministry of Health and should consider the following Drinking Water Standards.*
3. *It is the responsibility of the consent holder to ensure that the water abstracted under this resource consent is of suitable quality for its intended use. Where water is to be used for human consumption, the consent holder should have the water tested prior to use and should discuss the water testing and treatment requirements with a representative of the Ministry of Health and should consider the following Drinking Water Standards*
4. *For the purposes of Condition 5, the water meter, data logger and telemetry unit should be safely accessible by the Consent Authority and its contractors at all*



times. The Water Measuring Device Verification Form and Calibration Form are available on the Consent Authority's website.

5. Section 126 of the Resource Management Act 1991 provides that the Consent Authority may cancel this consent by written notice served on the Consent Holder if the consent has been exercised in the past but has not been exercised during the preceding five years.
6. The Consent Holder is responsible for obtaining all other necessary consents, permits, and licences, including those under the Building Act 2004, the Biosecurity Act 1993, the Conservation Act 1987, and the Heritage New Zealand Pouhere Taonga Act 2014. This consent does not remove the need to comply with all other applicable Acts (including the Property Law Act 2007 and the Health and Safety at Work Act 2015), regulations, relevant Bylaws, and rules of law. This consent does not constitute building consent approval. Please check whether a building consent is required under the Building Act 2004.
7. Under section 125 of the RMA, this consent lapses five years after the date it is granted unless:
 - a. The consent is given effect to; or
 - b. The Consent Authority extends the period after which the consent lapses.
8. Where information is required to be provided to the Consent Authority, this is to be provided in writing to watermetering@orc.govt.nz, and the email heading is to reference [RM20.079.04-02](#) and the condition/s the information relates to.
9. The Consent Holder will be required to pay the Consent Authority an annual administration and monitoring charge to recover the actual and reasonable costs incurred to ensure ongoing compliance with the conditions attached to this consent, collected in accordance with Section 36 of the Resource Management Act 1991.
10. The consent holder must be aware of any rules that relate to the control of farm contaminants in runoff and leaching of nutrients to groundwater in relevant Otago regional plans and National Environmental Standards.
11. Water may be taken at any time for reasonable domestic or stock water purposes where and the taking or use does not, or is not likely to, have an adverse effect on the environment in accordance with Section 14 of the Resource Management Act 1991.





Our Reference: A1400996

Consent No. RM20.079.03

WATER PERMIT

Pursuant to Section 104B of the Resource Management Act 1991, the Otago Regional Council grants consent to:

Name: Bendigo Station Limited

Address: 1460 Tarras-Cromwell, RD 3, Cromwell

To dam water within a reservoir for the purpose of irrigation, stock water supply and domestic supply

For a term expiring 15 years from the commencement of this consent

Location of Damming: Approximately 4 kilometres south east of the intersection of Bendigo Loop Road and Tarras-Cromwell Road (State Highway 7).

Legal Description of land at point of damming: Lot 8 DP 517385

Map Reference at point of damming: NZTM 2000: E1313447 N5019532

Conditions

Specific

1. a) The damming of water within a reservoir at the map references and land legally described above must be carried out in accordance with the plans and all information submitted with the application, detailed below and all referenced by the Consent Authority as consent number RM20.079:
 - i. The application and supporting information received by the Consent Authority on 10 March 2020 and addendums to application made on 22 May 2020 and 8 October 2020;
 - ii. Additional application received by the Consent Authority on 26 May 2020 and addendum provided 11 June 2020;
 - iii. Further information response received on 14 May 2020; and
 - iv. Hearing evidence [Date] Month 2020.b) If there are any inconsistencies between any conditions of this consent and the application, the conditions of consent must prevail.
2. Water taken and used by this consent must be restricted to surface water contained within the reservoir identified as "inner pond" as shown in **Appendix 1**.
3. The maximum volume of water impounded must not exceed 53,820 cubic metres.
4. The Consent Holder must immediately notify the Consent Authority if the Consent Holder has reasonable grounds for considering that the dam is, or has become, dangerous.

Commented [WN7]: Retake of water from this dam has been addressed via RM20.079.01-02, meaning this constitutes double-up. Suggest rewording accordingly.

Performance Monitoring

5. a) Within the first anniversary of the exercise of this consent, and every 5 years thereafter, the Consent Holder must review the dam's classification.
- b) The Consent Holder must also review the dam's classification if, at any time:
- any building work that requires a building consent is carried out on the dam; and
 - the building work results, or could result, in a change to the potential impact of a failure of the dam on person, property, or the environment.
- c) In reviewing the classification of the dam, the Consent Holder must:
- apply the criteria and standards for dam safety set out in the New Zealand Dam Safety Guidelines 2015 published by the New Zealand Society of Large Dams (NZSOLD);
 - give the dam one of the following classifications: low potential impact, medium potential impact or high potential impact; and
 - submit the classification of the dam to a Chartered Professional Engineer experienced in dam safety for audit.
- d) Within one month of the review, the consent holder must provide the Consent Authority with the classification given by the consent holder to the dam and a certificate from a **Recognised Engineer** that:
- states that the classification of the dam accords with the New Zealand Dam Safety Guidelines 2015; and
 - states that the engineer is a Chartered Professional Engineer experienced in dam safety.
- e) If the review changes the classification of the dam from low potential impact to medium potential impact or high potential impact, the Consent Authority may review the conditions of this consent to impose conditions relating to dam safety. Conditions must be consistent with any relevant National Environmental Standards, Regulations, plans and/or the Otago Regional Policy Statement.

Commented [WN8]: Pending Mr Horrell's response to Minute 2

Commented [WN9]: Pending Mr Horrell's response to Minute 2

General

6. The dam, spillway and associated structures must be operated and maintained to ensure that, at all times, they are structurally sound, pose no undue risk to human life, property, or the natural environment, and are able to perform satisfactorily to their approved design standard.
7. The damming of water must not cause flooding, erosion, land instability, sedimentation, or property damage of any other person's property.

Review

8. The Consent Authority may, in accordance with sections 128 and 129 of the Resource Management Act 1991, serve notice on the Consent Holder of its intention to review the conditions of this resource consent within three months of each anniversary of the commencement of this resource consent or within two months of any enforcement action taken by the Consent Authority in relation to the exercise of this resource consent, for the purpose of:
- Determining whether the conditions of this resource consent are adequate to deal with any adverse effect on the environment which may arise from the exercise of the resource consent and which it is



- appropriate to deal with at a later stage, or which becomes evident after the date of commencement of the resource consent;
- b) Ensuring the conditions of this resource consent are consistent with any National Environmental Standards, relevant plans, and/or the Otago Regional Policy Statement;
 - c) Reviewing the frequency of monitoring or reporting required under this consent;
 - d) Reviewing the need for public liability insurance cover to be held by the Consent Holder;
 - e) Reviewing the conditions of this consent to impose conditions relating to dam safety if the potential impact classification of the dam changes from low to medium or low to high, in accordance with Condition 5.

Notes to Consent Holder

1. *For the purposes of Condition 5, a **Recognised Engineer** means: an engineer described in Section 149 of the Building Act 2004, and has some or all of the following competencies:*
 - *geotechnical principles;*
 - *design principles including structural, geotechnical, seismic, hydrologic and hydraulic principles;*
 - *dam construction techniques;*
 - *operation and maintenance of dams;*
 - *surveillance processes;*
 - *response to dam safety issues;*
 - *emergency planning and emergency response;*
 - *resolution of potential dam safety deficiencies; and*
 - *dam safety critical plant systems.*
2. *The Consent Holder is responsible for obtaining all other necessary consents, permits, and licences, including those under the Building Act 2004, the Biosecurity Act 1993, the Conservation Act 1987, and the Heritage New Zealand Pouhere Taonga Act 2014. This consent does not remove the need to comply with all other applicable Acts (including the Property Law Act 2007 and the Health and Safety at Work Act 2015), regulations, relevant Bylaws, and rules of law. This consent does not constitute building consent approval. Please check whether a building consent is required under the Building Act 2004.*
3. *The Consent Holder will be required to pay the Consent Authority an annual administration and monitoring charge to recover the actual and reasonable costs incurred to ensure ongoing compliance with the conditions attached to this consent, collected in accordance with Section 36 of the Resource Management Act 1991.*
4. *The consent holder must be aware of any rules that relate to the control of farm contaminants in runoff and leaching of nutrients to groundwater in relevant Otago regional plans and National Environmental Standards.*

**BEFORE THE COMMISSIONERS ON BEHALF OF THE
OTAGO REGIONAL COUNCIL**

Application numbers: RM20.079 – Bendigo Station Limited

UNDER

the Resource Management Act 1991

IN THE MATTER

of an application for resource consent by

Bendigo Station Limited.

to renew deemed permits

STATEMENT OF EVIDENCE OF CHRISTINA ELYSE BRIGHT

3 May 2021

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1. QUALIFICATIONS AND EXPERTISE

- 1.1 My name is Christina Elyse Bright, and I am employed as a Hydrologist at Landpro Ltd, a firm of consulting planners and surveyors. I hold the qualification of a Bachelor of Science (Hons) Geography (2014) and was awarded my Doctor of Philosophy in March 2021. My PhD will be conferred on 8 May 2021. Both degrees are from the University of Otago. I have been a hydrologist at Landpro Ltd since December 2017, providing consultancy services in the field of hydrology for a wide range of clients. In this time, I have undertaken a variety of hydrology related work, including field assessments, interpretation, and reporting. In this time, I have prepared evidence for hearings, including participating as an expert witness in the Plan Change 7 Environment Court hearing.
- 1.2 In this matter, I have been engaged by Bendigo Station Limited (referred to hereon as the applicant) to provide independent technical services including the preparation of technical hydrology reports to support the resource consent documentation, liaising with other consultants involved in the preparation of the application, and preparation of this evidence.
- 1.3 I have visited the site and carried out the hydrological assessments and I am therefore familiar with the proposed scheme.

2. CODE OF CONDUCT FOR EXPERT WITNESSES

- 2.1 I have read the Code of Conduct for Expert Witnesses within the Environment Court Consolidated Practice Note 2014 and I agree to comply with that Code. This evidence is within my area of expertise, except where I state I am relying on what I have been told by another person. To the best of my knowledge, I have not omitted to consider any material facts known to me that might alter or detract from the opinions I express.

3. SCOPE OF EVIDENCE

- 3.1 As the technical hydrologist for the applicant, I will be presenting on a range of matters as outlined below:
 - The hydrological information available for the Bendigo Creek;

- The natural hydrology, including the 7-day mean annual low flow (7-day MALF) of the Bendigo Creek, including comment on the assessment made to determine the extent of flow losses that occur in the middle reaches of the waterway, including the extent that dry periods occur;
- How this hydrological information relates to any residual flow and/or the overflow channel used to discharge water to Bendigo Creek;
- Supplementary allocation minimum flow; and
- Assessment of the appropriate rate of take based on historical abstraction records for primary and supplementary allocations.

3.2 Some figures and tables are reproduced here from the Technical Comment dated 24 February 2020 for ease of reading.

Hydrological Information

3.3 Hydrological monitoring has been carried out in Bendigo Creek since February 2020. In reference to comments made in the s42A report¹, an update on this monitoring data is provided with this brief of evidence. As part of this on-going flow monitoring, the site has been visited 5 times by Landpro since installation in February 2020. Landpro manage the site, including maintenance of the flow-stage rating, and Van Walt Ltd are the data hosts.

3.4 The site was visited in March 2021 which extended the rating for the site to include 5 gaugings, the most recent of these captured a low stream flow, at 33 l/s. The rating for the site has been updated and quality codes assigned to the record, refer to paragraph [3.10] of this evidence. The calculated 7day-MALF from this record is provided in Table 1 below.

¹ Page 16, approximate paragraph 3.

This is an estimate of the 7day-MALF only for the 2020/2021 hydrological year that is complete only for the period 1 July 2020 to 27 April 2021 but captures the relevant period where low flows are most likely to occur, i.e., the summer period of December 2020 to March 2021. This 7day-MALF of 6.6 l/s suggests that the 2020/2021 season has experienced particularly low flows in comparison to other estimates of MALF summarised in Table 1.

- 3.5 Other hydrological information related to the Bendigo Creek includes the assessment completed in January 2020 by Landpro Ltd where I carried out a longitudinal flow gauging assessment to assess the potential for flow losses.

7-Day MALF for the Bendigo Creek

- 3.6 Table 1 summarises the various estimates of 7-day MALF for Bendigo Creek. The 7-day MALF has previously been calculated by the applicant and the Otago Regional Council (ORC) or estimated using NIWA’s SHINY model² for Bendigo Creek.

Table 1: Summary of 7-Day MALF estimates for Bendigo Creek.

Site	7Day-MALF	Source
Bendigo Creek (immediately U/S permit WR3908Cr & WR1233Cr)	63 l/s	NIWA SHINY model for reach where water is abstracted.
	33 l/s	Rain Effects Limited ³ correlation to Lauder Creek flows.
	6.6 l/s	Bendigo Creek 2020/2021 season, available data for 1 July 2020 to 27 April 2021.
	19.9 l/s	Extended data record for Bendigo Creek using correlated flow to Lauder Creek flow monitoring site

² SHINY is a model developed by NIWA and a tool utilized by the Otago Regional Council for modelling flow statistics in catchments where little hydrological information is available, as well as other relevant ecological variables (Booker & Whitehead, 2017).

³ Page 7, para 5. of Rain Effect Limited report appended to S42A report.

	16 l/s	Provided by Charles Horrell to Rain Effects Limited ⁴
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- 3.7 SHINY estimates of the 7day-MALF are significantly greater than the estimates calculated by me using an extended flow record, Rain Effects, and the ORC. Rain Effects accurately describes the possible risk of relying on the NIWA SHINY statistics⁵, and I agree that this is a possible overestimation, and therefore we should not rely on NIWA SHINY statistics for Bendigo Creek.
- 3.8 Rain Effects Ltd applied a correlation between the flows recorded in Bendigo Creek and the Lauder Creek at Cattleyards flow site, which is a flow record unaffected by abstraction. This approach relies on similarities in the rainfall-runoff behaviour of the two catchments. At Figure 4 of the Rain Effects assessment this approach is considered suitable, and I agree.
- 3.9 I am confident in the calculated estimates of low flows for the Bendigo Creek using the method followed by Rain Effects, given the data available at the time. Following the suggestion⁶ that the short record could be improved by including additional data collected since June 2020, and/or improving the low flow rating, I have re-examined the correlation between the Bendigo Creek flow site (referred to as Bendigo) (with abstraction data added back in), and the Lauder Creek at Cattleyards flows site (referred to as Lauder).
- 3.10 The rating for the period from 12-Feb-2020 10:00:00 to present has been re-calculated since initial installation of the site. Landpro have completed five gauging's that lie within the 8% deviation threshold. The rating is quality coded QC500⁷ (fair quality⁸) to a stage of 266mm (equivalent flow of 49 l/s) and QC300 (estimated⁹) above a flow level of 49 l/s due to lack of gauging data above this level; a flow of 238 l/s is the highest flow recorded within the rating, measurement of flows at this level have a greater uncertainty due to the rating being suited to the measurement of lower flows. A high flow gauging would be beneficial

⁴ Page 5, para 2. of Rain Effects Limited report appended to S42A report.

⁵ Page 5, para. 5 of Rain Effects Limited report appended to S42A report.

⁶ Page 6, para. 5 of Rain Effects Limited report appended to S42A report.

⁷ Following the NEMS standard.

⁸ Rating is fair predictor of flow.

⁹ Rating is indirectly determined or estimates, and not verified by gauging.

to the fit of the upper range of the rating curve to improve the determination of flows above 49 l/s.

- 3.11 The correlation between the Bendigo and Lauder sites when including all data has a strong correlation ($r_s=0.89$), which is to be expected given the geographical location of the two catchments. When rating the two sites, the relationship is weak with all data included and looks to be affected by higher flow events in the Lauder Catchment that do not have a commensurate higher flow event in the Bendigo Catchment, likely a consequence of poorly rated high flows in the Bendigo Creek catchment. Also, possibly a consequence of rainfall characteristics and/or the Bendigo flow site being overcome by flows at this level; the relationship between flows $>3.0 \text{ m}^3/\text{s}$ in Lauder to Bendigo is poor ($R^2, 0.09$). Therefore, this data¹⁰ was excluded to improve the rating between the Lauder and Bendigo flow sites. The resulting relationship is good ($R^2, 0.75$), but not strong, and the relationship with some caution can be used to extend the Bendigo Creek flow record and give a reasonable picture of flows in Bendigo Creek for the years of available flow data for Lauder Creek.
- 3.12 The extended record provides 4 complete seasons of data (2009/2010, and 2017/2018 to 2019/2020) that generates a 7day-MALF estimate of 19.9 l/s and a mean flow of 86.3 l/s for Bendigo Creek at the flow monitoring site which is near the abstraction site.
- 3.13 The above calculated estimates of 7day-MALF and mean flow using the extended record are consistent, but lower than the Rain Effects estimate of 7day-MALF and mean flow. The estimates made by me using an extended flow record are likely appropriate for use in describing the natural hydrology of Bendigo Creek as this has used more data. Given the Bendigo Creek flow record has been re-calculated using an updated rating, and a better rating fit at the low flow end (within the 8% deviation threshold), in my opinion the natural 7day-MALF of Bendigo Creek is likely to approximate 20 l/s.

Flow losses – General Comments

¹⁰ High flow event in Lauder Creek where no commensurate flow response in Bendigo Creek occurred 28th to 29th of June 2020. And the 2nd to 9th of January 2021. It is possible with flows this high the Bendigo Creek site inaccurately records flow.

- 3.14 The extent of losses below the Bendigo Station abstraction point has been identified by the applicants. Flow gaugings were carried out 16 January 2020, and intentionally targeted a period when flow losses were likely to be most extreme during summer. The assessment was completed with all abstraction turned off 24 hours prior.
- 3.15 Losing or gaining reaches were defined in the hydrological assessment using the assumption that surface water flow interacts with the hyporheic zone (sub-surface zone below the riverbed within alluvial gravels). This is due to factors such as topography, geology, and geomorphology that control a rivers thermal regime and the movement of water between the river as surface water and shallow groundwater in the hyporheic zone.
- 3.16 It has been acknowledged for some time by the applicant that Bendigo Creek flows never reach the Clutha/Mata-Au river. This knowledge informed the assessment of the Bendigo Creek.
- 3.17 Similar naturally intermittent behaviour of Central Otago waterways was acknowledged in the recent hearing decision for Long Gully Stream¹¹, decision for the Amisfield Burn and Park Burn water users¹², and decision for Queensbury Ridges Limited¹³, where it has been determined as not uncharacteristic for Central Otago streams to have naturally intermittent flows.
- 3.18 Historical imagery supports that there is permanently no connection between the Bendigo Creek and the Clutha River/Mata-au naturally. Appendix A to the report titled “Hydrological assessment for flow loses/gains – Bendigo Creek” that I prepared in February 2020 confirms that on average, Bendigo Creek is dry 4.5km upstream from the confluence with the Clutha/Mata-Au.
- 3.19 When assessing the hydrological benefit or requirement of a residual flow, it is common to compare the maximum rate of take to the 7day-MALF to emphasise the amount of water allocated (which is based on maximum amounts). In my opinion this is an overly simplistic assessment method for determining the effects of an allocation on low flows and

¹¹ Decision Report Long Gully Race Society. 23 July 2020. Paragraph 064.

¹² Decision reports on RM20.003, RM20.005, and RM20.007.

¹³ Decision Report Queensbury Ridges Limited. RM19.312.

any requirement for a residual flow. This does not consider the natural flow variability of the system and potential for flow losses that naturally occur or the effects of these things.

Measured Flow Losses

- 3.20 Figure 1 (taken from the technical comment) provides an overview of the flow gaugings completed at various sites on Bendigo Creek.
- 3.21 The differential gaugings in the middle reach of Bendigo Creek (Site 1 to Site 2) shows little change in flows (a flow loss of 1.3 l/s).
- 3.22 The differential gaugings between Site 2 and Site 3 show a loss of 23 l/s, with a further 40.3 l/s flow loss to the point where Bendigo Creek was dry at Site 4, i.e., there were no surface flows. The total loss across the reach surveyed was 64.6 l/s. This flow loss is greater than the natural 7day-MALF for Bendigo Creek and demonstrates that flows in the lowest reaches of Bendigo Creek are naturally intermittent.¹⁴

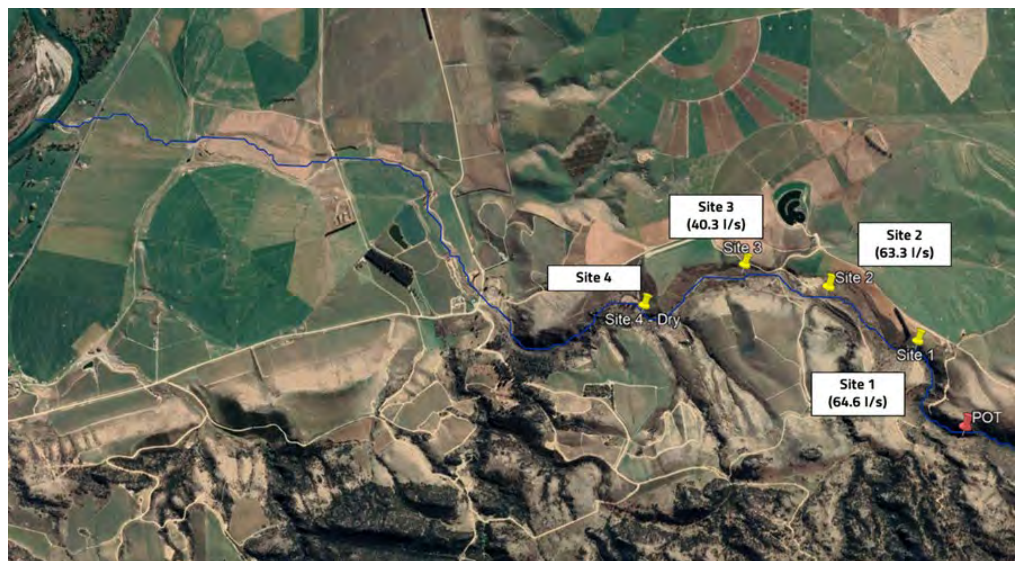


Figure 1: Flow gauging results (yellow marker) as measured 16 January 2020. The point of take (POT) was shut-off.

¹⁴ Intermittent is used to describe stream reaches that cease to flow for periods of the year because the stream bed is periodically above the water table, and therefore only flow at certain times of the year. Sources: Waikato Regional Plan (2010) & Environment Guide New Zealand – Freshwater.

3.23 The longitudinal gaugings indicate that the intake is situated in a flow neutral reach on schist geology, upstream of where flow losses are expected to occur. There is then a transition to a significant losing reach across the loess and alluvium geology downstream from Site 2 (Figure 2 taken from the Technical Comment).

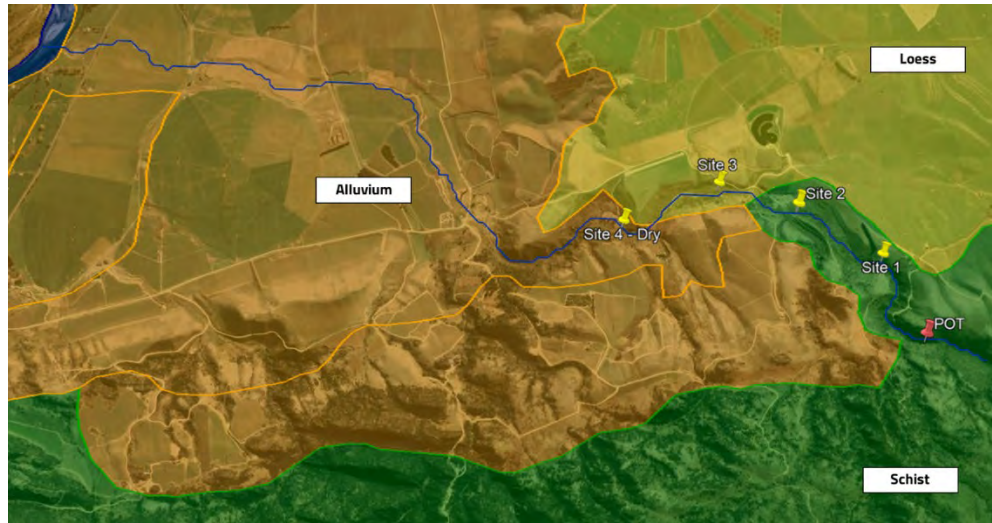


Figure 2 Geology of Bendigo Creek downstream from abstraction point (Source: LRIS Geology plotted in GoogleEarth Pro).

3.24 This geology of the river channel and alluvial bed morphology promotes flow interaction within the sub-surface zone and losses through the loose alluvial gravels to shallow groundwater.

3.25 The average water loss rate is approximately 0.11 l/s per meter over the 2.7km drying identified during the 2020 survey. This drying reach is approximately where the transition is from hard schist lithology to alluvium and loess where flow losses are expected to occur.

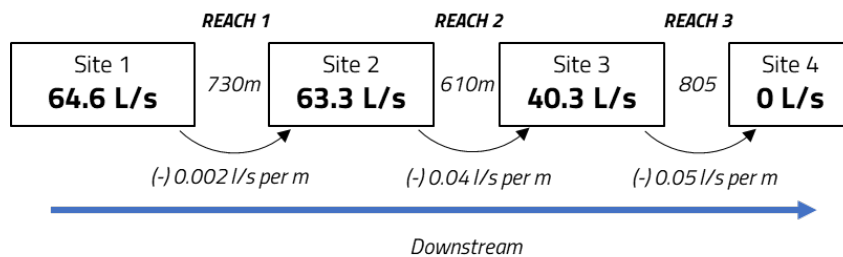


Figure 3: Rates of flow loss along Bendigo Creek, where (-) denotes flow loss based on results of hydrological survey 16 January 2020.

- 3.26 In the Tonkin + Taylor report dated 2 November 2020, the flow required to overcome flow losses in the catchment is incorrectly calculated as 190 l/s. Flow losses are assumed to start from Site 2, where the drying reach began as identified on the 16 January 2020 and surface flows persistent for 1,415m downstream to where flow ceased (Site 4). Tonkin + Taylor incorrectly reports this flow losing reach as being 2,145m¹⁵ which is the total length of the surveyed reach and includes the flow neutral reach between Site 1 and Site 2. Therefore, assuming flow losses do not occur until Site 2 where there is a significant change in geology, and a flow loss rate of 0.045 l/s/m (between Site 2 and Site 4), a hypothetical flow of 297 l/s would be required at Site 2 to provide for flow connectivity with the Clutha/Mata-Au that is 6.6 km downstream from Site 2.
- 3.27 Note, this assumes a continuous flow loss rate of 0.045 l/s occurs along Bendigo Creek, when in reality the effect of flow losses are likely exacerbated in the lower reaches due to the thermal regime of the river, and/or flow losses will fluctuate.
- 3.28 There are three options for testing whether a flow of 297 l/s has historically occurred in the Bendigo Creek:
1. Review the available flow record for Bendigo Creek with the abstraction that has occurred added back into the flow record as the flow site is downstream from the point of take;
 2. Review historical imagery to assess the time of year when the creek bed is dry, as higher flows typically occur during summer flows, spring, and winter, and historical imagery can be used as a proxy for understanding where and when a dry creek bed occurs; and
 3. Extend the flow record for Bendigo Creek using the nearby Lauder Creek flow site.

¹⁵ This is a possible issue with an email sent to Will Nicolson dated 23 October 2020, where I made this same error. The assessment provided in this brief of evidence corrects this error.

3.29 The following assessment works through the above three options.

3.30 Since installation of the continuous flow site, there have been no flows recorded in Bendigo Creek at or above 297 l/s; the maximum on record is approx. 180 l/s. The record is plotted in Figure 4 (measured flow, plus abstraction). Therefore, it is incredibly unlikely a flow connection with the Clutha/Mata-au has occurred since February 2020.

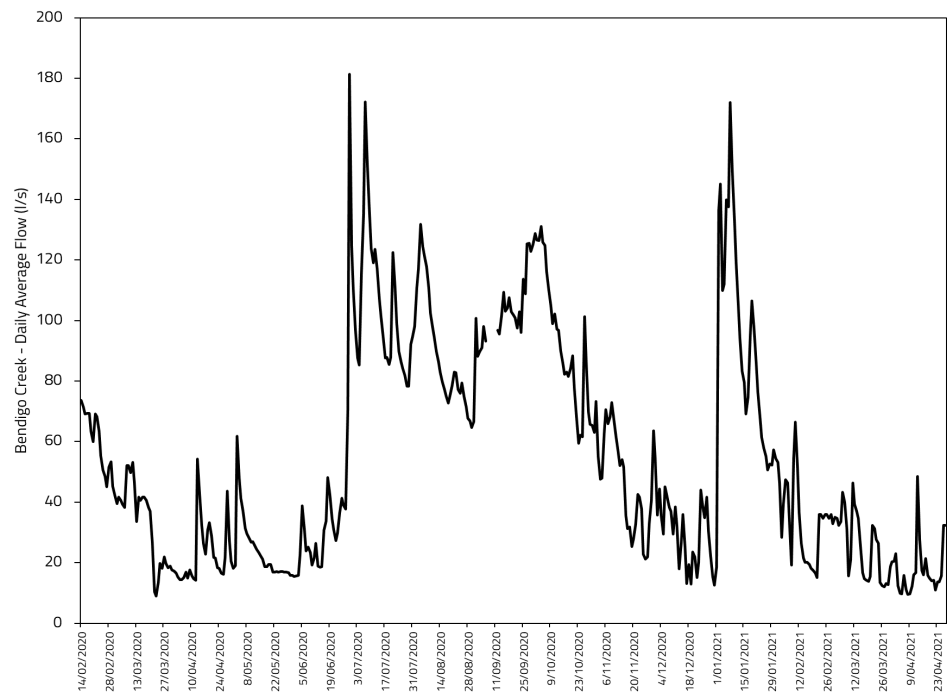


Figure 4: Bendigo Creek flow record, 13-Feb-2020 to 28-Apr-2021.

3.31 Historical aerial imagery was reviewed and described in the Technical Comment. This review suggests that the creek ceases to flow on average 4.5km upstream from the confluence with the Clutha River. The 16 January 2020 survey identified zero flows approx. 5km upstream from the confluence, consistent with the historical behaviour. The assessment of historic aerial imagery identified that the dry reach of Bendigo Creek varies seasonally and can be dry across all seasons. There is no historical imagery available via GoogleEarth Pro that shows a connection to the Clutha/Mata-au.

3.32 The extended Bendigo Creek record is plotted in Figure 5 below, the red line represents the 297 l/s flow that is estimated as being needed to allow for a connection with the

Clutha/Mata-au River. The green dashed line represents the mean flow for Bendigo Creek at this location in the catchment (86.3 l/s) (refer to paragraph [3.12]) that was calculated from the extended Bendigo Creek flow record. Based on gauging results, assuming flows are approximately equal at Site 1 and Site 2, and using the extended flow record in Figure 5, there may have been occasions where a connection could have been made to the Clutha/Mata-au, but under average flow connections (86.3 l/s) a connection to the Clutha/Mata-au is not possible.

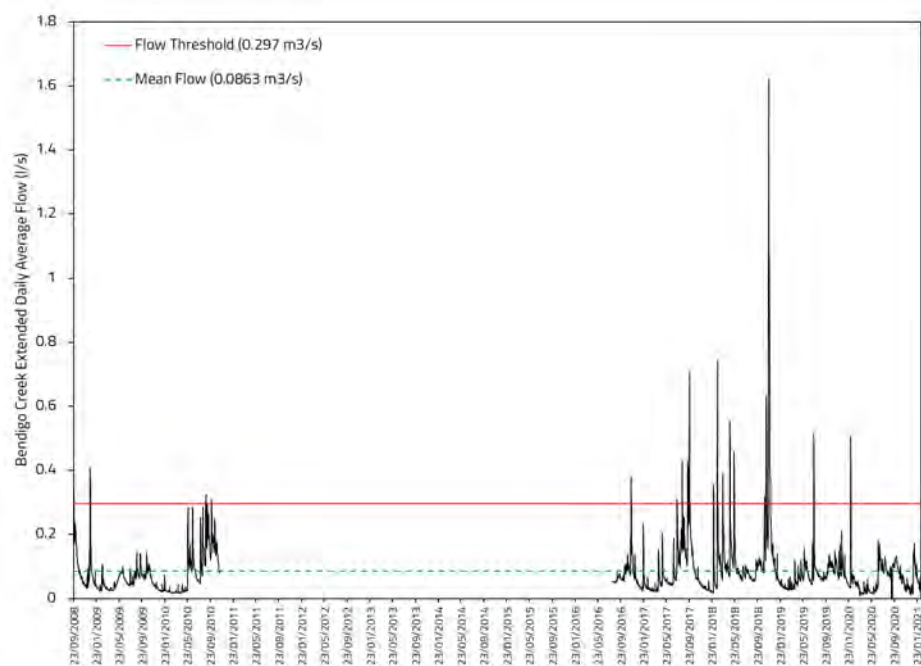


Figure 5: Bendigo Creek extended flow record, 23-Sep-2008 to 13-Feb-2020, from 13-Feb-2020 record is actual Bendigo Creek flow from Figure 4.

3.33 A flow duration curve¹⁶ for Bendigo Creek where the monitoring station is installed has been plotted using the extended flow record. This flow duration curve shows that flows above 297 l/s have occurred less than 2% of the time over the length of available record, represented by the vertical grey line in Figure 6.

¹⁶ The flow-duration curve is a cumulative frequency curve that show the percent of time specified discharges were equaled or exceeded during a given period.

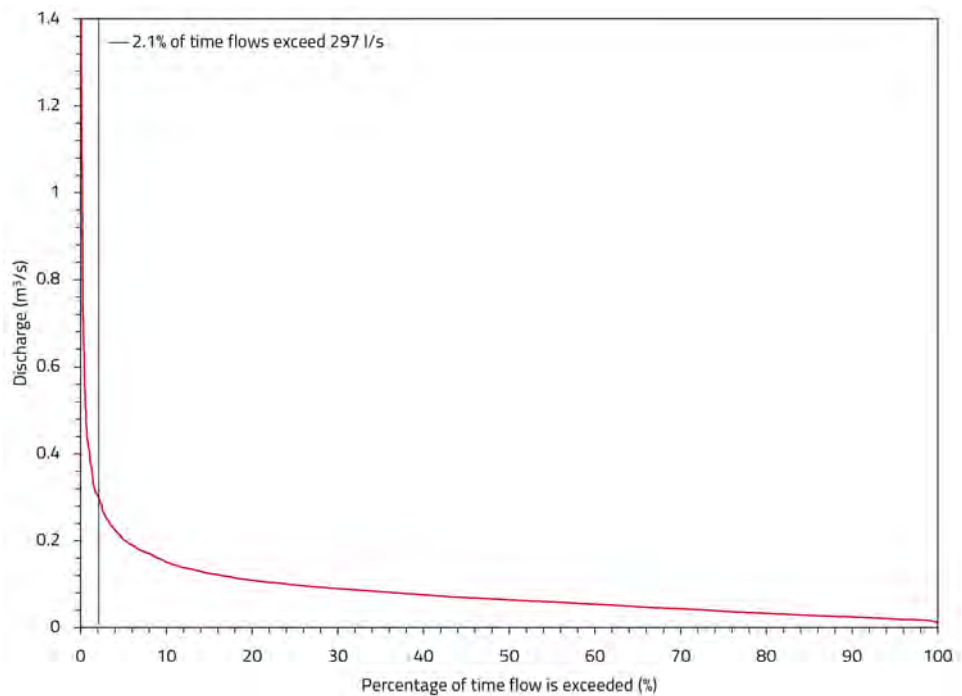


Figure 6: Bendigo Creek flow duration curve for extended flow record, 23-Sep-2008 to 13-Feb-2020, from 13-Feb-2020 record is actual Bendigo Creek flow from Figure 4.

- 3.34 Aukaha seek relief that a minimum flow equivalent to 90% of 7day-MALF be provided for. In my opinion, based on a peak flow of at least 297 l/s required to provide for a connection to the Clutha/Mata-au, and a 17.9 l/s minimum flow being 90% of 19.9 l/s, 17.9 l/s would not provide connectivity to the Clutha/Mata-au.
- 3.35 Anecdotal evidence suggests that flows do not extend to the Clutha/Mata-au.
- 3.36 In my opinion, while a connection to the Clutha/Mata-au is possible to have occurred historically, based on historical imagery it is very unlikely that sufficient flows are provided for long enough to maintain this connection.
- 3.37 It is important to note that while historically flows are likely to have exceeded the threshold required to make a connection with the Clutha/Mata-au, to maintain a connection over a sufficient period, flows much greater than the estimated 297 l/s threshold would be required. In my opinion and based on factual anecdotal evidence these

flows do not occur frequently enough and for long enough in such a way that the applicant's abstraction activities affect this behaviour or could alter this behaviour.

Flows between the point of take and the flow monitoring station.

- 3.38 In response to Commissioner van Voorthuysen's Minute 2 dated 28 April 2020, the below provides commentary in relation to Question 3, 4, and 5.
- 3.39 The distance between the point of take and the flow monitoring station is approx. 750m. I was not involved directly with the installation of the monitoring site but have visited since installation. Access to the creek at the point of take where a reliable flow site could be established is minimal, given the lack of a reliable control that could be used in the development of a stage-flow rating, and therefore, the downstream site was the most suitable.
- 3.40 Due to the creek bed morphology, it would not be possible to install a site closer to, or immediately downstream of the point of take.
- 3.41 The creek upstream of the flow monitoring site is expected to be flow neutral, i.e., no flow losses are expected to occur. There are minimal contributions expected from runoff and/or gullies in this reach.
- 3.42 The New Zealand River Environment Classification¹⁷ (REC) identifies catchment areas and the stream network as derived from a Digital Elevation Model. In the REC a catchment is a polygon that is defined by the upstream catchment area of a river segment at its relevant position in the stream network. A river segment is defined by its connection with a connecting segment, i.e., a river/creek confluence. The flow monitoring site and the point of take are located within the same river segment as defined in the REC version 2.5¹⁸, and therefore, it is not expected that there is any significant change in hydrology along this

¹⁷ Snelder, T.H., and Biggs, B.J.F. (2002). Multiscale river environment classification for water resources management. *Journal of the American Water Resources Association*, 38(5).

¹⁸ New Zealand River Environment Classification version 2.5 (June 2019). Source: <https://data-niwa.opendata.arcgis.com/datasets/river-environment-classification-web-map-rec2-v5>

reach, nor is there any significant hydrological contribution expected from any other additional river segments, i.e., a tributary.

- 3.43 In my opinion, the flow at the point of take will be the same, or very similar, to the flow measured at the downstream flow monitoring site, less any abstraction that is measured by the applicant's water meter.

Operation of the Bendigo Dam Overflow

- 3.44 At the Bendigo dam there is a spillway that moderates the level of pond. The applicant intends to continue operating this spillway.
- 3.45 I agree with the s42A reporting officer that water would be better left at the point of take if it is not needed¹⁹, but my understanding based on the principles of storing water is that it is necessary from a dam safety perspective to provide an outlet when water levels in the pond are too high, and the spillway channel allows for this. Inputs to the pond are primarily water abstracted and delivered via pipe, but could also occur due to rainfall and limited runoff, and an outlet is required to maintain a safe water level, even when water is not being taken from the water source.
- 3.46 The presence of the spillway is likely providing small hydrological inputs to the Bendigo Creek and likely maintains some wet bed downstream within the vicinity of where the overflow occurs. Therefore, it is unfair to assume that this is an inefficient use of water with no hydrological or ecological benefit. The benefits are likely minimal but have been provided historically.
- 3.47 In my opinion, no consent condition should be imposed in relation to the decommissioning of this overflow.

Residual Flow

¹⁹ Page 37 of s42A report, para. 7.

- 3.48 I agree with the position reached in the S42A report that no residual flow is required below the point of take with the current infrastructure. A numerical residual flow is not needed, and a visual residual flow would add unnecessary monitoring and compliance.²⁰
- 3.49 I have reviewed the available Bendigo Creek flow record, and the applicant’s abstraction record. The Bendigo Creek flow recorder is downstream of the applicants point of take and therefore measures the flow left in Bendigo Creek after abstraction.
- 3.50 Table 2 summarises the abstraction activities occurring during 3 different low-flow events (23 March 2020, 31 December 2020, and 8 April 2021), these low flow events represent the lowest flows recorded in Bendigo Creek. Across these three low flow events, the applicant was taking 3.9 to 5.3 l/s and the meter in the creek was reading 2.0 to 3.0 l/s respectively, meaning that this was being provided as a residual assuming no inputs or outputs from the creek in the intervening reach between the abstraction point and the Bendigo Creek flow meter. Based on the timeseries plotted in Figure 7 a residual flow to the monitoring point appears to virtually always be provided based on the record since Feb 2020.

Table 2: Low flow events in Bendigo Creek and associated abstraction for period since February 2020.

	Bendigo Creek Flow (l/s)	Flow at Bendigo Creek flow site (l/s)	Abstraction at WM1515 (l/s)
23 March 2020	6.89 l/s	3.0 l/s	3.89 l/s
31 December 2020	7.28 l/s	2.0 l/s	5.28 l/s
8 April 2021	6.17 l/s	2.0 l/s	4.17 l/s

- 3.51 In my opinion, when assessing the system entirely and considering the wider contributing factors of the overall hydrology, there is no need for a numerical or visual connected residual flow below the point of take under the current infrastructure which because of the current configuration always provides for flow below the point of take (Figure 7). If this infrastructure changes in future, the use of a continuous connected residual flow will only

²⁰ Page 28 – 29 of s42A report.

provide for the maintenance of the hydrological regime in the upper reaches where flow losses do not occur.

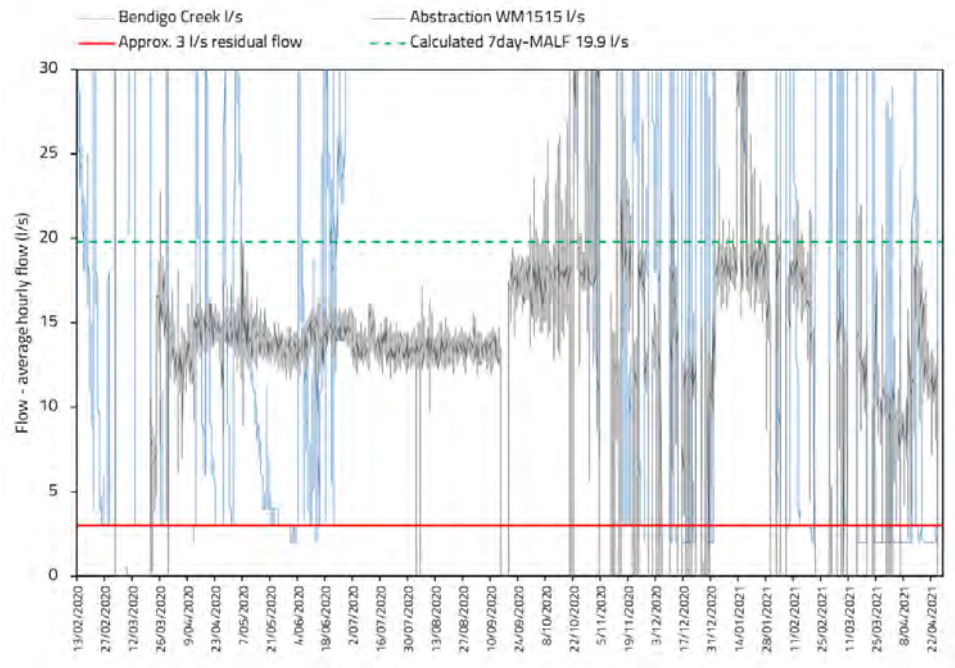


Figure 7: Bendigo Creek flow recorded (raw, no abstracted added back in) plotted with abstraction via WM 1515, y-axis capped at 30 l/s to show low flow conditions. Approx. 3l/s residual flow that is always maintained shown with 19.9 l/s 7day-MALF of Bendigo Creek plotted for context.

Minimum Flow on Supplementary Allocation

- 3.52 I agree with the position reached in the S42A report that no residual flow is required below the point of take with the current infrastructure. A numerical residual flow is not needed, and a visual residual flow would add unnecessary monitoring and compliance.²¹
- 3.53 In response to Commissioner van Voorthuysen’s Minute 2 dated 28 April 2020, the below provides commentary in relation to Question 1 and 2.

²¹ Page 28 – 29 of s42A report.

- 3.54 Policy 6.4.9 applies to supplementary allocations for the taking of water in blocks of allocation where this is appropriate. In my opinion, as Bendigo Station Limited is the only supplementary allocation user on Bendigo Creek, there is no hydrological benefit to applying Policy 6.4.9, and Policy 6.4.10 may be more appropriate.
- 3.55 Policy 6.4.10 provides for further supplementary allocation than that which is provided for by Policy 6.4.9, when flows are above the natural mean flow. According to Policy 6.4.10, where a supplementary take has a minimum flow equal to the natural mean flow, limited allocation is unnecessary.
- 3.56 If Policy 6.4.9 is to be applied, under Policy 6.4.9, abstraction as supplementary allocation from the first block (100 l/s) may begin when flows measured at the Bendigo Creek flow site are above 50 l/s (actual take), plus any supplementary allocation. There is currently no supplementary allocation, and therefore given the absence of other water users, supplementary allocation from the first block (100 l/s) may commence when flow in the Bendigo Creek flow record is 50 l/s.
- 3.57 Under Policy 6.4.10, abstraction as supplementary allocation may begin when flows measured at the Bendigo Creek flow site are above 86.3 l/s (the natural mean flow, refer to paragraph [3.12]).
- 3.58 On this basis, I recommended that the ORC review draft Condition 3 of RM20.079.02 as the recommended draft condition does not currently provide for 50% of the flow to be maintained when applying the methodology under Policy 6.4.9.

Historic Water Use – Allocation Rate and Volumes

- 3.59 I have reviewed the historical water use data. Historical water use data is summarised below in Table 3.

Table 3: Historic water use for Bendigo Station Limited – Primary Allocation

Historical Maximum	Rate l/s	Daily m ³	Monthly m ³	Seasonal m ³
Bendigo Station Limited calculated	83.3	6,571	132,470	1,048,170
ORC calculated	50	6,570	132,000	1,046,200

Proposed – Bendigo Station Limited	50	NA	235,948	1,080,598
Recommended - ORC	50	NA	132,000	857,778

- 3.60 The applied for rate is consistent with the pattern of taking that occurs 95% of time, i.e., 50 l/s is the 95%ile, and given the abstraction record had only one instance where the consent maximum of 83.3 l/s had been meet, this approach is suitable in this case.
- 3.61 The volumes sought by the applicant include both the primary and the supplementary allocation. The monthly and annual historical volumes calculated are consistent with ORC’s water use analysis, and only minor discrepancies exist (Table 3).
- 3.62 Given the approach taken by ORC’s processing offer regarding primary and supplementary allocation, I agree that the primary allocation monthly limit reflects the historical pattern of use (132,470 m³/month). The supplementary allocation monthly limit recommended by ORC’s processing officer is what the applicant applied for applied for in Table 3, and I agree with this.
- 3.63 As the applicant’s current pattern of taking reflects winter water taking, and higher flow taking for storage, the annual volumes abstracted historically are higher than what is required for irrigation of 100ha of pasture, stock drinking water, and domestic water requirements. Therefore, ORC’s processing officer has recommended that the primary allocation annual volume limit be determined as the sum of these above water requirements, i.e., Aqualinc annual water demand for 100ha of pasture, plus stock water and domestic water (total: 857,778 m³/year). ORC recommend the supplementary allocation annual limit be the difference between the primary allocation annual limit and the historical maximum abstraction (i.e., the water need for existing uses), and provide the difference between water needs for existing uses and the additional water required for proposed irrigation areas. In principle I agree with this and see no issues with the recommendation of ORC.

Conclusion

- 3.64 The natural 7day-MALF for Bendigo Creek has been recalculated as part of the process in preparing this brief of evidence and estimated as 19.9 l/s. Given the updated rating produced for the Bendigo Creek flow monitoring site since Rain Effects completed their

assessment, and suitability of this rating now for determining low flows, in my opinion the 7day-MALF for Bendigo Creek likely approximates 20 l/s and is lower than the estimate made by Rain Effects which used the old rating, and less data.

- 3.65 The Bendigo Creek experiences substantial periods of dryness in the lowest reaches. Significant flows are required to overcome this natural drying behaviour and likely to not occur frequently enough or for long enough to sufficiently provide for connectivity to the Clutha/Mata-au.
- 3.66 Bendigo Creek flows at the point of take will be the same, or very similar, to the flow measured at the downstream flow monitoring site, and therefore is no need to shift the current monitoring site or provide a flow monitoring site closer to the point of take.
- 3.67 The operation of the Bendigo dam spillway may provide benefits to the extent of the wet bed where the overflow occurs, and although this benefit is likely minimal, these benefits have been provided historically.
- 3.68 I have made recommendations regarding residual flows that considers the hydrology of the system and the practicalities of compliance monitoring. Under the current infrastructure set-up, no residual flow condition is required below the point of take.
- 3.69 I have recommended that the ORC review draft Condition 3 of RM20.079.02. I have suggested that because there is no need for allocation blocks to manage the use of supplementary allocation among water users, Policy 6.4.10 may be more appropriate.
- 3.70 I consider the recommended primary allocation, and supplementary allocation rate of take, and monthly and annual volume limits appropriate. I agree with the recommended volumes as these are based on historical water use and represent efficient use of water for the intended purpose.

Christina Bright



Hydrologist – Landpro Limited

3 May 2021

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**BEFORE THE COMMISSIONER APPOINTED BY
THE OTAGO REGIONAL COUNCIL**

RM20.079

Between BENDIGO STATION LIMITED
Applicant
And OTAGO REGIONAL COUNCIL

BRIEF OF EVIDENCE OF RICHARD MARK ALLIBONE

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BRIEF OF EVIDENCE OF RICHARD MARK ALLIBONE

Introduction

1. My full name is Richard Mark Allibone.
2. I am the Director and Principal Ecologist of Water Ways Consulting Limited. I hold the following tertiary qualifications; a BSc (Zoology and Geology), an MSc (Zoology) and PhD (Zoology), all from the University of Otago. I am also a certified resource consent hearing commissioner.
3. I specialise in freshwater ecological research and management of native freshwater fish. I have been a freshwater fisheries specialist for the Department of Conservation, a Post-Doctoral Fellow and fisheries scientist at NIWA, and a Species Protection Officer in the Department of Conservation's Biodiversity Recovery Unit. Since 2004 I have worked as a consultant; firstly, at Kingett Mitchell Limited, then Golder Associates (NZ) Ltd. In November 2014 I formed the company Water Ways Consulting Limited where I am a director and the principal ecologist.
4. I am a recognised expert with regard to the conservation management of New Zealand's freshwater fish. My PhD conducted the first research into the ecology, distribution and conservation threats of four of non-migratory galaxiids in the Taieri River catchment, Taieri flathead (*G. depressiceps*), Central Otago roundhead galaxias (*G. anomalus*), Eldon's galaxias (*G. eldoni*) and Clutha flathead (*G. spD*) found in the Taieri River (Allibone 1997). Since completing my PhD, I have conducted further research on the effects of water abstraction and salmonid impacts on non-migratory galaxiids in Otago (e.g. Allibone 2000a, b). I have also continued to be involved in the Department of Zoology, University of Otago's research as a co-supervisor of PhD, MSC and PostGrd Dip Wildlife Management students working of galaxiid related thesis studies.
5. My experience with irrigations schemes and deemed permit water takes began in 1992 during my PhD studies and has continued to the present day. I have assessed the potential impact of irrigation takes in Otago for the Department of Conservation (Allibone 2000a, b). As a consultant in the last 15 years, I have undertaken freshwater ecological assessments for a range of irrigation schemes, either working for the applicant, reviewing applications on behalf of Regional Councils or as an expert working for submitters including the Department of Conservation and Forest & Bird. These irrigation schemes include large schemes such as Central Plains and Hunter

Downs irrigation schemes down to small individual farm-based irrigation schemes including application for deemed permits replacement resource consents

6. I confirm that I have read and agree to comply with the Environment Court Code of Conduct for Expert Witnesses (Consolidated Practice Note 2014). This evidence is within my area of expertise, except where I state that I am relying on the evidence or information provided by another parties. I have not omitted to consider material facts known to me that might alter or detract from the opinions I express.

SCOPE OF EVIDENCE

7. My evidence addresses:
 - (a) Freshwater fish values of the Bendigo Creek.
 - (b) Assessment of the effects of the proposed Bendigo Station water take.
 - (c) Fish screen requirements
 - (d) Residual flow
8. I have read the application and S92 information provided by the applicant and also the submissions of Aukaha and the ORC Staff Officers report.

FISHERIES VALUES IN BENDIGO CREEK

9. I conducted a fisheries survey of Bendigo Creek in December 2019. We recorded brown trout at a single survey site (Site BEN 5, Figure 1) 1.5 km downstream of the water take location. The five brown trout caught ranged in size from 40 mm to 160 mm. Four of these fish were 40-55 mm long and were young of the year fish. A single older brown trout 160 mm long was also caught. A total of 50 m of stream was fished and this reach was approximately 1.5 to 2m wide. This gives a total area fished of 75 to 100 m² and an observed fish density of between 0.067 and 0.05 fish/m².
10. The habitat at Site BEN5 was predominately shallow run and riffle habitat that is unsuitable to large brown trout as they require deep water (greater than 30 cm deep) in pools and runs. Habitat of this shallow nature extended upstream and downstream from Site 5 indicating limited habitat was available for larger brown trout.
11. In summary I would consider the trout density to be very low, the habitat is of limited value for brown trout and the small size of the majority of the trout caught indicates the stream supports very few adult fish and the population has no sports fishery value.

12. No fish were found at four other sites, one immediately downstream of the water take (Site BEN 4) and three upstream of the water take (sites BEN 1-3). Site 3 immediately upstream of the water intake provided the best fish habitat, with numerous deep pools and run and riffle habitat (Figure 2).
13. The absence of brown trout at the upper four sites is due to the steep stream gradient in Bendigo Creek in a section starting approximately 750 m upstream of Site BEN 5. From this point upstream past the water take the stream has steep cascades amongst boulder dominated stream bed (Figure 3). It is likely the lower part of this reach were the stream flows in what appears to be a gorge section (Figure 4) waterfalls will be present that will also form fish passage barriers preventing brown trout moving upstream.
14. From the finding of the fish survey and site observations I would describe the fish fauna of Bendigo Creek to be limited to stunted population of brown trout that have no sports fishery value. This population is limited to a reach of Bendigo Creek starting 750 m downstream of the water take.

ASSESSMENT OF EFFECT OF THE WATER TAKE

15. The water take will reduce habitat downstream of the abstraction point. The impact of this is to reduce habitat for invertebrates and the brown trout in the lower reach of Bendigo Creek. However, habitat will remain for all species and passage for invertebrates is available through the water abstraction area.
16. The steep turbulent nature of Bendigo Creek downstream of the water take means that water aeration will continue to occur, and the water will be well oxygenated. This reach is also well shaded, and this limits the potential for the water abstraction to lead to increases in water temperature.
17. The reach of Bendigo Creek from the water take to the bottom of the steep section (750 m) is well shaded by riparian vegetation. This combined with the steep turbulent stream means algal blooms will be prevented and the reduced flow will not increase the risk of algal proliferation. Therefore, I do not expect the water take to contribute to algal blooms in Bendigo Creek, although didymo blooms may occur these will occur regardless of the water abstraction.
18. Therefore, I would consider effects of the water take are not significant on the aquatic environment in Bendigo Creek and any impact on the brown trout population will have no effect on sports fishing values.

FISH SCREEN REQUIREMENTS

19. No fish were caught by electric fishing in the vicinity of the water take nor at the upstream sites. December is also an ideal time of year for observing young of the year galaxiids as they swim in the water column in pools during the day. None were observed at any site. Therefore, I do not expect trout or galaxiids to be present in the vicinity of the water take.
20. In the absence of fish, I would not recommend fish screens for the water take.

RESIDUAL FLOW REQUIREMENTS

21. The draft National Environmental Standard for Ecological Flows and Water Levels (MfE 2008) has in Section 5 proposed interim limits for minimum (or residual flows) and water allocation. The 90% of 7dMALF is the suggested interim minimum or residual flow for rivers and streams less than 5 m³/s and could apply to Bendigo Creek. These suggested limits were proposed to be used until regional plan processes can set minimum or residual flows for catchments that have no existing minimum flows. The draft NES then notes that local knowledge and expertise can then be used to address the requirements of individual rivers and streams. In my opinion, for Bendigo Creek there is sufficient information to address the residual flow requirements for ecological values from the assessment I have conducted rather than use the default interim flow.
22. For the assessment of residual flow requirements for the Bendigo Creek take there are two important factors to consider. Firstly, the values the residual flow is being set to protect and secondly how the take operates and the flow that will occur through the point of take regardless of the operation of the water take, i.e., leakage or flow around the take structure that occurs at all times.
23. With respect to ecological values Beca (2008) sets out in Section 2 a series of ecological values for fish, invertebrates, and algae to assess. For Bendigo Creek the fish values are limited to the presence of a stunted low density brown trout population that I would consider of little relevance to the residual flow requirement and have not considered further in this assessment.
24. For stream invertebrates Beca (2008) recommends the effects on:
 - (a) water temperature,
 - (b) sediment transport,

- (c) periphyton (algae),
- (d) water quality,
- (e) water depth and velocity: and
- (f) stream bed substrate

be considered in an assessment of residual flow requirements.

25. I have assessed the likely effect on water temperature as minimal due to the shaded nature of the stream for the first 750 m downstream of the water take. Sediment transport and stream bed substrate at the point of take and downstream will not change as the substrate is dominated by large boulders, cobbles and some gravel that is well packed and will be difficult to mobilise even during high flows. There is potential for fine sediment build up in the lower reaches of the stream, but only if this fine sediment is present in the stream and residual flow will not alter this as flushing flows are required to remove accumulation of fine sediment. Water quality will also not be altered by the abstraction and given the limited stock assess the change to dilution of farm related nutrient runoff will be of limited. The water will also continue to be well aerated due to the turbulent flow below the intake. Algal communities will also continue to be restricted due to stream shading and in the lower reach the presence of didymo will override flow condition requirements to prevent algal blooms. There will be, as noted, a reduction in water depth but this will be restricted to riffle and run habitats with little effect on the deep pools.
26. I note Aukaha have submitted that a residual flow of 90% of MALF is appropriate. From an ecological perspective the setting of the residual flow at this level would be done for a stream with high or very high ecological values and a high degree of risk to those values if a lower residual flow was set. As I have noted there is no fishery value that is considered high for this stream and the risk to invertebrates is low. Furthermore, the likelihood of undesirable algal blooms is limited to blooming of didymo, something that cannot be managed by residual flow setting. Therefore, I do not see ecological values that support the setting of a residual flow at 90% of the 7dMALF.
27. For the setting of any residual for the Bendigo Creek take I would consider the present state of the water take and its ability to provide a measured residual flow and the flows that occur past the intake. The intake pipe is placed in a deep pool and the pool has an outflow at or below the level of the intake pipe (Figure 5). This structure means the

water take cannot abstract the full flow at the point of take and flow through the pool outlet and via leakage amongst the streambed substrate means a residual flow will be provided.

28. The nature of the stream bed in this reach also makes the measuring of flow extremely difficult to assess the residual flow being provided (Figure 6) and impractical for consent compliance. The installation of a watertight intake and flow sharing structure that could provide a measurable consistent residual flow is also likely to be difficult in this steep stream terrain.
29. To provide for ecological values I would recommend the setting of a connecting flow through the intake and a requirement that the water intake pipe be set in the water column in the intake pool such that flow is maintained at the pool outflow at all times. A photographic record of this could be kept for consent compliance processes.

SUMMARY

30. The Bendigo Creek water abstraction has been assessed for its effects on the downstream ecosystem and the effects on fish and invertebrates are assessed as a reduction in habitat, but this is not considered significant.
31. The absence of fish in Bendigo Creek at the point of take and upstream means a fish screen is not required for the water take.
32. The requirement of a residual flow from an ecological perspective the existing intake arrangement appears appropriate to provide a residual flow sufficient to maintain freshwater invertebrate community values. I agree with the conditions recommended in the s42A report regarding a residual flow



Richard Allibone

3 May 2021

Reference

Beca. 2008a. Draft Guidelines for the Selection of Methods to Determine Ecological Flows and Water Levels. Report prepared by Beca Infrastructure Ltd for MfE. Wellington: Ministry for the Environment.

Ministry for the Environment (2008). Proposed National Environmental Standard on Ecological Flows and Water Levels: Discussion Document. Ministry for the Environment Publication number: ME 868. Wellington: Ministry for the Environment.

Figures

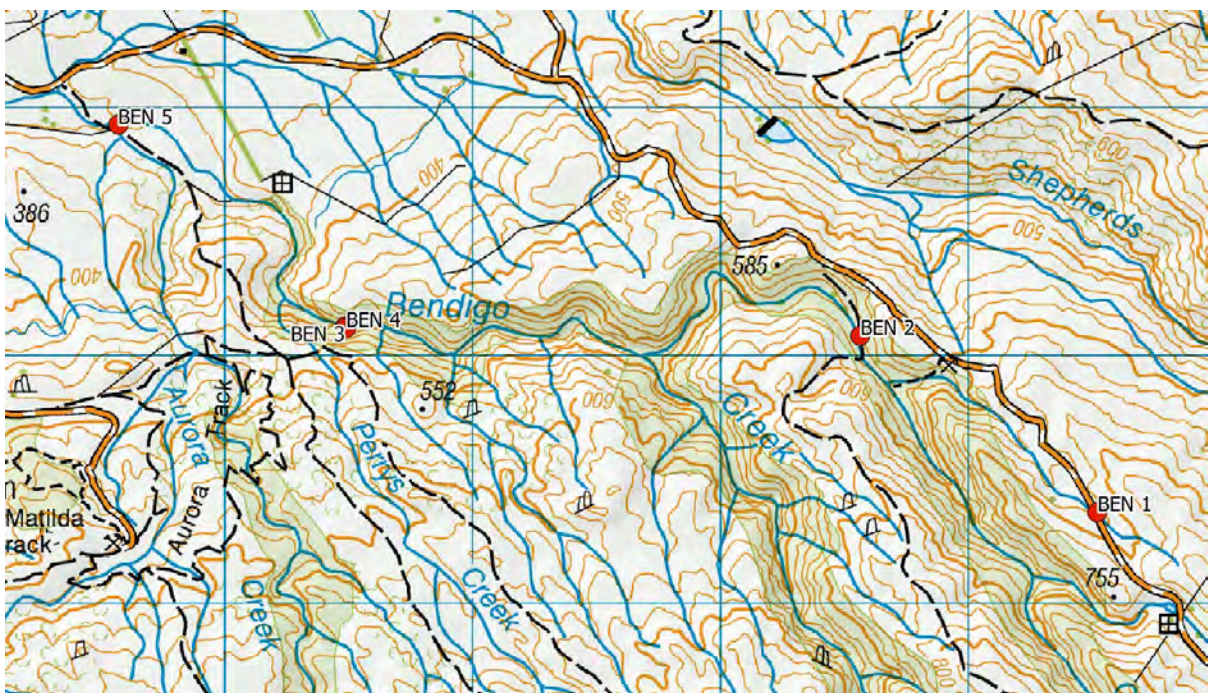


Figure 1: Fish survey locations.



Figure 2: Bendigo Creek at Site BEN 3.



Figure 3: Bendigo Creek downstream of the water take with the also buried amongst boulder substrate.



Figure 4. The Bendigo Creek gorge section downstream of the water intake and area likely to have fish passage waterfalls.



Figure 5: The Bendigo Creek intake and downstream end of the intake pool.



Figure 6: Bendigo Creek approximately 2-4 m downstream of the intake pool.

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Applicant
And OTAGO REGIONAL COUNCIL

BRIEF OF EVIDENCE OF GRANT ALEXANDER PORTER

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1. INTRODUCTION

- 1.1 My full name is Grant Alexander Porter. I am employed by Bendigo Station Limited as the General Manager. I have been working for John Perriam and the Perriam Family for the last 12 years at Bendigo.

Qualifications and experience

- 1.2 I have been working with farmers in an advisory capacity for twenty five years. Originally from a sheep and beef farm in Southland, I gained a Bachelor of Commerce and Management from Lincoln University in 1996. I then trained as a farm accountant, became a member of the Chartered Accountants Australia and New Zealand and Member of New Zealand Institute of Primary Industry Management. I have worked in private agribusiness companies and trading banks over the last twenty five years .
- 1.3 In 2018, I was an expert witness for the Lindis Catchment Group in an Environment Court hearing of appeals concerning the minimum flow regime for the Lindis River proposed by Plan Change 5 to the Otago Regional Plan. My evidence provided an analysis of the financial impacts on irrigators of the proposed minimum flow regimes.
- 1.4 In 2020 I was involved in Plan Change 7 to the Canterbury Land and Water Regional Plan (**PC7**) as an independent expert engaged by Opuha Water Limited (**OWL**) to assess the financial impacts of PC7's proposed minimum flow and partial restriction regimes for the North Opuha, South Opuha, Upper Opihi and Te Ana Wai sub-catchments for OWL shareholders to inform the Opihi Flow and Allocation Working Party's (**FAWP's**) position on PC7.

Code of Conduct

- 1.5 I confirm that I have read the Code of Conduct for expert witnesses contained in the Environment Court's Practice Note as updated in 2014. Although I am an employee of Bendigo Station Limited I have had regard to that document and prepared in compliance with it. Unless I state otherwise, this evidence is within my area of expertise and I have not omitted to consider material facts known to me that might alter or detract from the opinions I express.

1.6 I have read the S42A report prepared for Otago Regional Council (ORC) by Charles Howell and base my evidence on this report and its recommendations.

2. BENDIGO STATION

2.1 Bendigo Station has been owned by John Perriam and his late wife Heather for 42 years. It is an extensive 11,000 hectare property with 7,685ha's freehold and the balance being leased or run under grazing license from Department of Conservation. The farm runs 17,000 stock units being predominantly fine wool merino supported by Angus beef cattle.

2.2 The low stocking rate at under 2 stock units per hectare and low input farm system is good for the stock, the environment and the people that work at Bendigo. The farm uses a Lime / Sulphur mix fertiliser on pasture and the only Nitrogen that is applied goes on a small area of winter crop (up to 25 hectares) and the subsequent regrassing of the cropped area post grazing per annum meaning the farm has a very low environmental impact.

2.3 Bendigo Station and the other Perriam Family assets have been setup to be retained in the Perriam family for future generations and form part of the Perriam Family foundation which has been setup to provide for the family and other charitable organisations.

2.4 Bendigo Station originally had 200 hectares of border dyke irrigation in 1979 and now has 450 hectares of spray irrigation with 350 hectares on the lower Bendigo basin using water from bores and 100 hectares of land at the Shine basin utilising Bendigo Creek water. The irrigated land provides winter feed and support for the hill country stock.

2.5 Over the last 42 years John Perriam has developed and upgraded the irrigation at Bendigo by converting border dyke to more efficient spray pivot irrigation and has surrendered old run of river water rights that could be replaced by bore water that comes from the Bendigo Aquifer that was estimated in a study commissioned by ORC in 2010 to have up to 29mm³ of water available for extraction with only 13% of this water being consented for use in 2010.

2.6 In my experience, Bendigo view's water as a privilege, not a right, in that it is able to support its farming operation. Without the use of additional water, Bendigo's farming

operations would not be economic and could not support its 17,000 stock units, three families and six staff.

- 2.7 In addition to the farm water rights, Bendigo has utilised its water to help create over 400 hectares of vineyards and 60 hectares of cherries (with a further 140 hectares of cherry planting planned) owned by various other parties. These horticulture and viticulture developments are estimated to have been an investment of over \$120 million in the Bendigo area. The vineyards produce 4.4 million bottles of wine per annum and supports directly and indirectly over 300 jobs in the local economy.

3. BENDIGO CREEK

- 3.1 In 1869, John Perriam's ancestor (also named John Perriam) lived at Logan Town (A mining settlement on the edge of Bendigo Creek downstream from the new water meter) and operated a merchant store to service gold miners. In 1871, Mr John Perriam expanded his business and built the fourth hotel along the Bendigo Creek.
- 3.2 The Perriam family has a long association and connection to the Bendigo Creek. John Perriam has worked with Department of Conservation and Historic Places to try and preserve this water source by fencing off historic ruins and mining sites and providing access to the public along Bendigo Creek and in the Bendigo Hills.
- 3.3 The Bendigo creek does not run to the Clutha and acts more like a drain in times of heavy rain. The last time I saw it run out to the Clutha was in December 2019 as a result of the runoff from the farm and hills all flowing out the creek. Even during this event the creek was flowing only in certain areas – not its full length.
- 3.4 We believe that the main reason the Bendigo Creek does not flow to the Clutha is that there are numerous fractures in the sub surface structure causing water to be lost through losing reaches in the creek bed. We know this from drilling reports from Santana Minerals Ltd who have been utilising diamond drill rigs to core sample the old gold fields.
- 3.5 Santana Minerals Ltd is listed on the ASX and have published many reports on the Bendigo Ophir gold exploration project and their geologists state that the earthquake that occurred in the area over 4 million years ago is the reason why gold deposits were formed in the Bendigo area. Bendigo was the richest quartz gold strike from 1860 to the early 1900's with over 150,000 ounces taken out.

3.6 Over the years core samples looking for the gold deposits that were abandoned provide an understanding of why the Bendigo Creek has losing reaches and the water goes underground. The core samples taken by the mining drill rigs show fractures in the profiles at various depths right up to 325 metres which is a reason why water flowing down Bendigo Creek is unable to continuously flow to the Clutha.

4. Infrastructure

4.1 Over the last 12 years Bendigo has spent over \$4.4 million upgrading and extending irrigation. This has included replacing the last 100 hectares of inefficient border dyke irrigation with pivots, surrendering 160l/s of run of the river water takes and bores connected to the Lindis River and replacing them with bores from the Clutha and Bendigo Aquifer.

4.2 We are seeking to replace the last of the old water rights on Bendigo. The Bendigo Creek water right is unable to be replaced with a bore due to its location. It would be uneconomic for Bendigo to pump water 7.1 kilometres uphill to where the Bendigo Creek water is used to supply stock water and irrigation water on the 100 hectares for sheep and beef farming.

4.3 In 2019, Bendigo upgraded the Bendigo Creek system in anticipation of renewing the water right as the old irrigation pipeline was put in in the early 1900's and was a mixture of concrete and riveted iron that was leaking and inefficient. The pipeline upgrade cost \$230,000 and the installation of meters cost a further \$44,000. The intake valve system is manually operated due to the location of the intake and the inability to get automation and remote connection to the intake – however this could be done at a cost of between \$50,000 to \$70,000. Bendigo is not willing to do any further upgrades or work on the system if the consent is only a short term consent (i.e. less than the 15 years agreed with Fish and Game).

4.4 Bendigo has agreed to a reduction to a 15 year term (down from 25 years) for the primary allocation as a bottom line to make our system economic to utilise while enabling possible enhancement to the system. Enhancements would be in the form of automation of the control valves and linking the system via cellular network and apps so that we can modify the intake at times of high and low flows to maximise the use of the storage pond but also we would be increasing the irrigated area.

4.5 Despite the current consent allowing for up to 83.3l/s we estimated that due to the inefficient pipeline we were probably only getting around 30l/s. The new pipeline has

the ability to take up to 160l/s where it is transported to what was the old duck pond which has been upgraded to the storage pond outlined in the Application at a cost of \$583,000. The storage pond stores water from Bendigo creek and provides 17 days of irrigation in periods where there is no water available from the creek. With the primary and supplementary allocation sought, we will be able to fully utilise this new water infrastructure.

- 4.6 From my experience with Bendigo Creek there is a drying reach which runs dry regardless of the extent of water taken. For that reason, I see no benefit in applying minimum flows.
- 4.7 In terms of water take requirements, Bendigo requires a minimum of 50l/s to run through our pivot and support the farm land at the Shine Basin.

5. BENDIGO STORAGE POND

- 5.1 The pond is an important part of the Bendigo Creek system given the Bendigo Creek has such a variable flow. The pond has been enhanced with native plantings and has its own bird life and habitat forming since it was completed. The pond used to be a duck pond which was much larger but full of willows before being cleaned out. The duck pond is on a solid clay base and collects runoff water and surplus water from the stock water race that flowed out of the Bendigo creek.
- 5.2 The storage pond essentially builds on and enhances the existing duck pond. This has made the storage pond a very effective system but at considerable cost to Bendigo. The spillway is the remains of the old water race that returned surplus water and runoff water to Bendigo creek. The spillway continues to be utilised to supply stock water to three paddocks and the Bendigo Creek river bed block which is grazed under grazing license from DOC. Attached to this evidence as **Appendix 1** is a map identifying the area that is used for stock water.
- 5.3 We believe that by taking the water through a pipe from the creek intake, storing it and returning any surplus water to the creek is an efficient use of water which would otherwise be going underground. Outlined below are photos of the pond identifying the enhancements undertaken by Bendigo to date which will continue to develop its own ecosystem over time. We have also looked into introducing fish to the pond in future.





- 5.4 The spillway is a necessary part of the pond which directs any surplus water captured by the pond. The pond catches runoff water from the farm in times of high rainfall which is a continuation of the existing duck pond system. The spillway operates as a safety valve to direct drainage of the lake (during high rainfall events) in a controlled manner. Most importantly, without the spillway we cannot provide drinking water to stock that occasionally graze three paddocks nor can we graze the Department of Conservation block which includes Bendigo Creek as there would no stock water running down the lower reaches of the creek.
- 5.5 We don't accept the recommendation to cease using the spillway because it is a necessity for Bendigo's farming operations. The alternatives to using the spillway to provide stock water are uneconomic and would not provide any benefit to the environment than the current system. That is because Bendigo only relies on the spillway for stock water for approximately 6-8 weeks of the year, but perhaps only once per week on average between October and December during irrigation season where there is more feed in the paddocks adjoining the overflow path shown on Appendix 1. During January to April where there is less feed we may only use the spillway for stock water once per month.

- 5.6 In any event, it is necessary to control any overflow path in times of high rainfall so ensuring that this goes back to the water source is a pragmatic way of addressing this issue. We observe that providing excess water from the storage pond, collected via rain events or otherwise, provides an enhancement to the downstream flow of Bendigo Creek. Other sources of water that runoff into the pond and down the spillway also return to Bendigo Creek. The spillway provides a controlled mechanism for securing a positive outcome that would otherwise be lost.
- 5.7 By way of example, on 19 April 2021 we ran stock water through the spillway system as we would if we needed water to graze the dryland paddocks and DOC creek block. We ran 12 l/s through the intake into the pond and over the spillway – filling a 10 litre bucket out of both drain pipes into the creek took 3.7 second meaning 5.4l/s was returning to creek whilst running through paddocks for stock water. This was sufficient water to supply all three paddocks and the DOC creek block. Attached to this evidence as **Appendix 2** are photos showing stock water released from the spillway draining back into the creek. Notably, at Images 2 and 3 the creek is dry above the culvert that returns the stock water back to the creek. Before we opened the valve, the creek bed was dry above and below the drain outlet into the creek.

6. Conclusion

- 6.1 Bendigo are largely in agreement with the recommendations of the S 42A Report Author with respect to term and allocation volume. However, Bendigo does not agree to the condition that would require the spillway to cease operations on the basis that the take of water is inefficient. The spillway performs a necessary function of directing flows from the storage pond in periods of high rainfall which may inundate the pond and need to go somewhere. The spillway operates to direct the water back to Bendigo Creek as well as providing stock water intermittently during the Spring/Autumn as outlined in this evidence.

Appendix 2 – Photos of water draining from spillway



Image 1: 19 April 2021, looking north showing Stock water from spillway travelling south to Bendigo Creek



Image 2: Looking west showing the culvert (midway point of image) that runs through the formed road providing water back into Bendigo Creek.



*Image 3: Looking south-east identifying Bendigo Creek running dry with culvert
Supplying stock water back to Bendigo Creek.*

Bendigo Station irrigation pond



Legend

- Bendigo Creek
- Bendigo pipeline
- Bendigo Pond overflow



200 m