Before the Expert Panel appointed under the Fast-track Approvals Act 2024

Under	the Fast-track Approvals Act 2024 (**Act**)
And	
In the Matter of	an application for approvals by Matakanui Gold Limited to establish, operate, rehabilitate and ultimately close an open pit and underground gold mining operation known as the Bendigo-Ophir Gold Project

Statement of Evidence of **Jens Haaye Rekker** on behalf of **Matakanui Gold Limited** in response to Section 53 Feedback

Water

Dated: 17 April 2026

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INTRODUCTION

1. My name is Jens Haaye Rekker.

2. My qualifications include a Bachelor of Science in Geology and postgraduate Diploma in Science with Credit in Geology both completed in 1990 and 1991, respectively, at Otago University.

3. Since graduation I have had more than 33 years of professional experience variously as modelling geohydrologist, groundwater consultant, resource scientist – groundwater, catchment modelling scientist, and hydrogeologist.

4. In the context of the Bendigo – Ophir Gold Project in Central Otago, much of my post-graduation work experience in the roles listed above have been within Otago, including substantial mineral project environmental geoscience practice.

5. I am currently employed as the Principal Hydrogeologist for Kōmanawa Solutions Ltd, a position I have held since January 2022.

6. I have contributed to the areas of hydrogeology, surface water hydrology and non-derogation of water resources to the Bendigo – Ophir Gold Project since January 2024. This includes oversight of groundwater modelling undertaken by my colleague Matt Dumont of Kōmanawa Solutions Ltd in relation to the Project from inception to April 2025.

7. This statement is given as part of Matakanui Gold Limited's (MGL) response to comments on the BOGP made under Section 53 of FTA. This statement responds to specific comments raised by:

   (a) Otago Regional Council;

   (b) Bendigo Terrace Farming Limited Partnership;

   (c) Ross Hanan, for the owner of 2059 Cromwell Tarras Road (**SH8**);

   (d) Chinamans Terrace Services Company Limited (**CTSC**L);

   (e) Central Otago Winegrowers Association; and

   (f) Environmental Defence Society (**EDS**).

8. My original findings are provided in full in the reports listed below. The four reports labelled B.02 to B.05 were provided within the Substantive Application, and the fifth report identified as K.01 was provided at the request of Otago Regional Council in February 2026 and uploaded to the EPA Fast Track website on 10 March 2026:

(a) B.02 Kōmanawa Solutions Limited Bendigo Groundwater Bore Take Effects Assessment (Kōmanawa 2025a).

(b) B.03 Kōmanawa Solutions Limited - Groundwater Existing Environment and Effects Assessment (Kōmanawa 2025b).

(c) B.04 Kōmanawa Solutions Limited Surface Water and Catchment Existing Environment Effects Assessment (Kōmanawa 2025c).

(d) B.05 Kōmanawa Solutions Limited Groundwater Modelling Analysis for Mining Bendigo-Ophir Gold Deposit (Kōmanawa 2025d).

(e) K.01 - Kōmanawa Solutions Limited - Post Closure Impacts on the Ardgour Aquifer dated February 2025 (Kōmanawa 2025e, 10 March 2026).

9. The above reports address hydrogeology, groundwater supply, baseline surface water hydrology, groundwater modelling (fractured schist-rock, and outwash gravels) are aligned to the assessments made within Mine Waste Management (**MWM**) and HydroGeoChem Group (**HGG**) reports, particularly those parts of the MWM-HGG reporting that cover the Water and Load Balance Model Report (B.06C, Appendix N):

(a) B.06C Mine Waste Management Limited Mine Impacted Water Overview Report - Appendix I to O.

(b) B.43 Hydro Geochem Group BOGP Flow Augmentation Strategy (HGG 2025b).

10. I have prepared this statement in the limited time available for MGL to respond to comments under the Act. If the Panel requires elaboration on any of the matters raised in this statement, I am available to provide further information on request.

11. Although this is not an Environment Court proceeding my confirmation of compliance with the Code of Conduct for Expert Witnesses in the Environment Court Practice Note 2023 is included in Substantive Application Document A0.2B.

SPECIFIC RESPONSE TO COMMENTS

Local and Administering Authorities

Otago Regional Council

12. Otago Regional Council (**ORC**) is a regional authority in terms of the Local Government Act and Resource Management Act. If consent is granted by the Expert Panel, ORC is the body responsible under the Resource Management Act (**RMA**) for administering and ensuring long-term compliance with the regional consents and conditions of consent associated with the Bendigo-Ophir Gold Project (**BOGP**). Furthermore, as the regional authority, ORC has a number of roles within the FTAA to respond and inform the adjudicating Panel.

13. In the context of water-related effects and water management, ORC has provided comments on the substantive application and subsequent interactions with MGL and others. The relevant subject areas to this statement of evidence, includes the following, effects relevant to my evidence is highlighted in bold:

    (a) Geochemistry effects (effects highly relevant to my evidence highlighted in **bold**).

        (i) Seepage containment

    (b) **Hydrogeological and hydrological effects** (effects highly relevant to my evidence highlighted in **bold**).

        (i) General description of hydrogeological and hydrological effects.

        (ii) Stream depletion effects.

        (iii) Flow augmentation.

        (iv) Justification for proposed flow augmentation procedure.

        (v) Site water balance – deficit and surplus conditions.

        (vi) Consequences of water surplus.

        (vii) Management of water surplus.

        (viii) Groundwater abstraction from Bendigo Aquifer.

    (c) Groundwater quality effects.

Seepage Containment

14. The sole primary collection element type seepage containment that I cover is that of instituting an alluvium – weathered rock depth borehole fence at SC-01 monitoring site. I have interacted with the ORC reviewer in relation to an outer seepage control mechanism, as summarised below.

15. The installation of at least five drill holes across the gap between schist bluffs at the SC-01 surface water monitoring site. The first role of the 'fence' of boreholes would be to characterise the subsurface hydrogeology, alluvium / weathered schist permeability, saturation levels and pressures, and hydraulic conductivity to assess whether under-seepage was feasible and if so, quantify the rate of seepage.

16. If under-seepage was found to be feasible, the second role of at least one of the 'fence' of boreholes would be for long-term groundwater quality level monitoring and sampling groundwater quality.

17. The above characterisation efforts would be directed towards assessing the potential for underpass of the SC-01 compliance monitoring site (surface water flow and water quality).

18. Should detectible underflow be determined then cutoff drains keyed into competent rock can be installed to the existing ground level and combined with interception galleries to intercept and remove MIW[1]-affected groundwater to the mine water circuit during operations, or water treatment during active closure.

19. Groundwater monitoring of surface water at SC-01 and RS-03; schist groundwater at bores G-01 to G-08; and alluvial groundwater at MW-101 at the tail of the Shepherds creek alluvium plus bore CB13/0216 at the MGL water supply bore field on the Bendigo Aquifer was proposed and included in the substantive application documents, including the WMP.

20. In my professional opinion, the placement of these groundwater monitoring bores, piezometers and additional drive-points has been well scoped and planned. Each groundwater monitoring point has a rationale and objective embodied in the proposal to include it.

General Description of Hydrogeological and Hydrological Changes

21. Under heading C.6.4.2 of the ORC invited comments, ORC reprises the groundwater and surface water of the Shepherds and Bendigo creek catchments in

[1] Mine Impacted Water (**MIW**).

the context of the mining proposals in the operational, active closure and post-closure phases of mine life.

22. In particular, ORC notes the water balance model predictions that these creek catchments will increase flow rates as a result of the reduction in evapo-transpiration losses to the atmosphere for the same rainfall and snow input, especially at each creek's baseflow. This view of future catchment hydrology is consistent with conceptual or model projections and important to the post-closure hydrology of the affected catchments.

Stream Depletion Effects

23. ORC notes that the principal stream depletion effects of mining activities are related to the disruption imposed by the RAS, CT and SRX pits. The principal stream depletion effect on Shepherds Creek of RAS and CIT pit excavation is reported in the schist-rock groundwater model for those pits as the interception of meteoric water that will be directed into the developing mine pit sump for pumping into the mine water circuit.

24. Stream depletion is closely related to the groundwater inflow through encompassing rock into the base of the mine waters concerned. ORC points out that the RAS underground is projected to make up to 30 L/s of groundwater[2]. Subsequent two-dimensional groundwater modelling using parameters otherwise consistent with the main RAS model predicted that the stream depletion effect of the underground workings would be in the order of 1 L/s. These results of modelling undertaken in January 2026 were provided to ORC in late January 2026[3].

25. Item 245 within the ORC Section 53 Comment discusses the inconsistency between the value for groundwater inflow of the Kōmanawa Solutions' (**KSL**) estimate[2] and MWM's value used in the Water and Load Mass Balance (**WLMB**) report[4]. The discrepancy is given as 30 L/s for KSL and 10 L/s for MWM.

26. For background, the proposed RAS underground workings will be a complex arrangement of access/ventilation drifts, decline tunnels, and panel drives, collectively described in this context as tunnels.

27. The stope panels will be open for a brief interval before being filled with returning cemented tailings paste, thus the stope would be individually stabilised and not

[2] B.03 Kōmanawa Solutions Limited - Groundwater Existing Environment and Effects Assessment.
[3] Memorandum; Kōmanawa Solutions, Responses to ORC Technical Review in terms of the Fast-Track Approvals Act and RMA. 28 January 2026.
[4] B.06C Mine Waste Management Limited Mine Impacted Water Overview Report – Appendix N, WLMB report.

attract inward seepage. The tunnels would have a skin of wall support and foot drains to capture and collect any seepage.

28. As air-filled voids within the fractured schist rock, the tunnels would attract inward seepage until the workings are allowed to flood with the shutdown of ventilation and dewatering pumps.

29. During the operations phase of mine life, the network of tunnels is projected to grow from mine onset to year 13, after which time the underground workings would be closed and flooded.

30. During the growth phase of the underground workings, the collected rate of groundwater inflow will increase in a proportionate manner. The estimated inflow ranged from 4 L/s in year 6 and 29 L/s in year 9, after which the tunnel development length plateaus. The reported 30 L/s peak inflow is predicted for the ultimate year 13 groundwater inflow rate with the maximum number and combined length of tunnels.

31. Kōmanawa Solutions used the Goodman et al 1965[5] method for the calculated inflow in the clause above.

32. MWM considered the calculated inflows and undertook a revision to 9 L/s as peak groundwater inflow rate.

33. In Table 7 titled water balance input basis[4], MWM states the following for the underground dewatering:

(a) *KSL (2025b)[6] estimated in inflow of 30 L/s that represented the full underground development using the Goodman et al. (1965) equation. However, many examples have shown that the Goodman equation tends to overestimate inflows to tunnels. For example, work by Moon and Fernandez (2009) suggest at depths of 150 m below the phreatic surface, inflows could be only 30% of that calculated by the Goodman equation once drawdown and effective stress around a tunnel is taken into account. Therefore, a groundwater inflow rate for the RAS underground workings 200 m below the phreatic surface would be in the region 9 L/s. Once ventilation losses (5 L/s adopted) are taken into account, the net water source equates to 4 L/s for the water balance assessment.*

[5] Goodman, R.E., D.G. Moye, A. van Schalkwyk, and I. Javandel, 1965, Ground water inflows during tunnel driving. Engineering Geology, volume 2, pages 39-56
[6] B.03 Kōmanawa Solutions Limited - Groundwater Existing Environment and Effects Assessment.

34. This is the source of the discrepancy and provides an explanation for the different disclosed values contained in the KSL and MWM reports dealing with different aspects of the underground workings' water balance.

Flow Augmentation

35. Under heading c.6.4.4 of ORC's invited comments, ORC commented on the need for flow augmentation of Shepherds and Bendigo creeks where their tributaries pass through the proposed mining area arises from the assessment that creek flows would be reduced. The statutory and regulatory context to the reduced flow rates imposed imperatives for augmentation to avoid the BOGP mining proposals being caught up in the following matters:

    (a) Non-derogation of existing water rights (Section 30 FTAA), and

    (b) Full allocation under the RMA and Otago Regional Plan: Water.

        (i) The Lindis River and Bendigo Creek catchment are already fully allocated following the granting of water take consents to members of the Lindis Catchment Group and Bendigo Station, respectively.

        (ii) The granting of water take consents without that take being non-consumptive would be a prohibited activity within the Otago Regional Plan: Water.

36. Paragraph 260 of ORC's invited comments, ORC states that it is comfortable with the augmentation methodology proposed. Augmentation is anticipated to be required to meet residual flow requirements and allow Tarras Farm Pastoral Limited (**TFPL**), Bendigo Station Limited (**BSL**) and other downstream water users to be assured of physical availability to Lindis and Bendigo catchment water resources. The duration of augmentation is from six months following the commencement of mining to the point in time that the compliance monitoring of creek flow rates returns to baseline or exceed them, likely the full length of operations and into active closure.

37. The creek augmentation also has appreciable beneficial effects in terms of reducing in-creek potential contaminant concentrations, which has relevance to surface water compliance, while maintaining existing levels of catchment water yield.

38. The use of Bendigo Aquifer as the supply source of augmentation with its very low sulphate concentrations would add little to the creeks' sulphate mass load but much to the creek waters available to dilute the mass of sulphate in surface water. Sulphate would therefore have lower concentrations in irrigation water taken from

either creek than would have otherwise been the case had augmentation not been included in proposed water management.

Groundwater Abstraction from Bendigo Aquifer

39. Under heading C.6.4.9 of ORC's invited comments, ORC provides comments on the groundwater abstraction for the proposed Bendig- Ophir mining complex. In considering MGL's choices for water supply source, I observed that obtaining access to new water resources of over 100 L/s in Central Otago and securing approvals to utilise those resources has been a challenging proposition for any entity and for some time.

40. To this extent, MGL has been very fortunate to have their gold deposit located as close as it is to the Bendigo Aquifer. In my professional opinion, the Bendigo Aquifer is one of the few remaining water resources of this scale in inland Otago that may still be developed with very few environmental effects or competing interests attached to taking the resource.

41. ORC correctly points out that the aquifer testing of the test production bore did not conform with ORC's recommended aquifer testing guidelines. The principal grounds for nonconformity was the test pumping rate of the constant rate test completed by MGL did not match the maximum rate of 110 L/s sought in the groundwater take consent application.

42. To have done so would have exceeded the conditionality of the permitted activity for aquifer testing in the Otago Regional Plan: Water (Rule 12.2.2.3).

43. MGL approached ORC during the planning phase of aquifer testing and requested a special approval to allow constant rate testing at the full rate of 110 L/s for three days (72 hours).

44. This request was declined and MGL was informed that a groundwater take resource consent would first be required to authorise the aquifer test designed to provide assessment information to support a groundwater take application.

45. Given this seeming 'chicken before the egg' paradox, MGL opted to undertake the constant rate test for 72 hours at immediately less than the 23.15 L/s maximum specified in the permitted activity for aquifer testing. The full rate of 100 L/s was included in the final 2 hours of the subsequent step rate test designed to comply with the 2,000 cubic metres per day restriction set as a maximum in one of the conditions to the permitted activity for 'down-hole' testing.

46. I have proposed and MGL has agreed that a commissioning aquifer test should be undertaken once the second production bore and additional observation bores are

installed. With the agreement and permission of surrounding bore owners, instrumentation would also be installed in selected existing bores prior to the aquifer test being undertaken at the full proposed pumping rate of 110 L/s.

47. The aquifer test would be designed and data analysed to allow the examination of ORC's technical reviewer of barrier boundary reverberation in groundwater levels and such impacts that may occur in surrounding bores.

48. Should surrounding bores be shown in groundwater assessment to be affected, further investigation and possible remedial actions determined. With the agreement and permission of surrounding bore owners at each step, MGL would fund remedial actions as may be agreed with affected parties.

49. Remedial actions of surrounding and affected bores may include:

(a) Lowering of the pump unit within the original bore (where feasible),

(b) Re-drilling of the bore and setting a deeper, larger diameter screen so as to allow lower setting of the pump unit and higher screen loss efficiency,

(c) Provision of a replacement, high reliability water supply of equal or better water quality in the case of elevated risk of bore water supply interruption that cannot be remedied by any other means.

50. The objective set in all parts of the commissioning aquifer test, further investigations, and any remedial actions would be to avoid inconvenience and respond to the wishes of surrounding bore owners, while resolving the potential for conflicts between MGL's water taking and surrounding interest to groundwater.

Groundwater Quality Effects

51. In paragraph 305, ORC outlines the MGL proposals for groundwater monitoring compliance limits, including MW-101 at the junction of Shepherds Creek alluvium and Ardgour Aquifer, and Bendigo Aquifer at the 'Base Bore' (CB13/0216). In paragraph 306, ORC considers these limits and locations to be appropriate. I agree with ORC's conclusion and add the following perspectives on groundwater compliance monitoring.

52. Compliance monitoring bore MW-101 is to be placed at the outlet of the Shepherds Creek alluvium, immediately upgradient of the Ardgour Aquifer before the alluvial materials fan out. This is an optimal location to provide compliance with groundwater

compliance concentrations[7], especially sulphate, nitrate and ammonia solutes and also including dissolved metals and cyanide.

53. The 'Base Bore' (CB13/0216) within the bore field providing the BOGP primary water supply is to be located immediately (1.4 km) downstream of the Bendigo Creek outlet into the Bendigo Aquifer and in a position where the bore would intercept the infiltrating creek waters as Bendigo Creek emerges from its bedrock gorge. Therefore, the BOGP water supply bore field is located that it is to some extent downstream of the Rise and Shine Creek mine discharges.

54. Monitoring groundwater quality of both the water supply and the groundwater expression of proposed activities in the upstream catchment is the dual objective in this instance.

OWNERS AND OCCUPIERS

Bendigo Terrace Farming Limited Partnership

55. Bendigo Terrace Farming Limited Partnership (**BTFLP**) own and manage an irrigated dairy support farm on Ardgour Road, which utilises two large capacity bores located in the middle part of the Bendigo Aquifer. These two bores are located 624 metres and 1,158 metres from the proposed centre of the MGL water supply bore.

56. BTFLP consider that the assessed drawdowns and evaluation of effect on bores are sound.

57. However, BTFLP noted that detailed assessments were only undertaken of two particular bores; G41/0206 and G41/0230. BTFLP considers that assessments should be undertaken for all potentially affected bores. In responses I would point out that these detailed assessments include a series of dimensions and parameters being available to make them. Self-induced drawdown at the consented rate of take is a particular piece of data that is seldom recorded in the ORC wells database for the Bendigo Aquifer bores, however this parameter is essential to completing the calculation remaining freeboard over the submersible pump intake depth.

58. Such freeboard assessments were only feasible where the publicly held bore and consent data was available, which it was for only two surrounding bores.

59. BTFLP bores are well-documented within the ORC wells database, however crucially there were no self-induced drawdown test results on file with which to provide a complete bore freeboard assessment on the BTFLP groundwater sources.

[7] G.01, Table 6, page 52.

Ross Hanan, for The Owner of 2059 Cromwell Tarras Road (SH8)

60. Ross Hanan provided a set of comments for the owners of a property described as 2059 Cromwell Tarras Rd, OTA2/827 -Section 31 Block III Tarras Survey District with its registered owner as James Clarke Hanan. The property is located along State Highway 8 at the locality of Lindis Crossing.

61. The property has and utilises a water well registered as G41/2059 with a diameter of 1 metre and unknown depth according to ORC records. The ORC records mention the well was inspected by an ORC contractor (Graeme Stewart) on 14/08/2021 without the owner or occupant being present. The well is thought to be of an age that pre-dates ORC bore permitting or ORC groundwater surveys, hence the well was unregistered until 2021.

62. The Hanan comments are wide-ranging but several of the comments relate to gravel-based aquifers of Bendigo – Lindis area, including The Lindis Alluvial Ribbon Aquifer (**LARA**), Ardgour Aquifer and Bendigo Aquifer. Water well G41/2059 is located between the LARA and Bendigo aquifers.

63. I respond to these points further below.

Omission of Critical Aquifers in Water Management Plan

64. The Hanan comments begin by asserting that the LARA is omitted from the proposal's Water Management Plan (**WMP**)[8].

65. The WMP is a pinnacle environmental management document relating to water. The WMP rests upon a large body of existing environment descriptions and effects assessment that included hydrogeological reporting. The list of reports that included such evaluations of the LARA, include the following;

    (a) B.02 Kōmanawa Solutions Limited Bendigo Groundwater Bore Take Effects Assessment (Kōmanawa 2025a).

    (b) B.03 Kōmanawa Solutions Limited - Groundwater Existing Environment and Effects Assessment (Kōmanawa 2025b).

    (c) B.04 Kōmanawa Solutions Limited Surface Water and Catchment Existing Environment Effects Assessment (Kōmanawa 2025c).

    (d) K.01 - Kōmanawa Solutions Limited - Post Closure Impacts on the Ardgour Aquifer dated February 2025 (Kōmanawa 2025e, 10 March 2026).

[8] G.02 BOGP Water Management Plan

66. I consider the authors of the above reports hold as complete a knowledge of the LARA as is currently the state of knowledge for the LARA. Four groundwater scientists have undertaken significant investigations of the LARA:

(a) Clare Houlbrooke, former ORC resource scientist groundwater, former Golder Associates senior hydrogeologist;

(b) Scott Wilson, former ORC resource scientist groundwater;

(c) Matt Dumont – Hanson, current Kōmanawa Solutions senior computational hydrologist and modeller; and

(d) Myself.

67. Clare Houlbrooke directed 2009 – 2010 investigations of the Bendigo – Taras district in terms of its groundwater resources that included steady state modelling of the LARA and wider groundwater systems to support water allocation positions for the Lindis River and hence LARA, with contributions from myself.

68. Clare Houlbrooke and I provided technical support for the groundwater – surface water policy, rule and schedules of Plan Change 1C, embodying the elevation of the LARA as an aquifer hydrologically linked to the Lindis River, the water allocation of the Ardgour and Bendigo aquifers.

69. Scott Wilson developed three groundwater flow and nitrate transport models of the LARA and adjoining groundwater systems within the Lindis River catchment, with contributions from myself.

70. I participated as an expert witness for Otago Fish and Game in the Plan Change 5AA independent commissioner hearings, mediation, expert caucusing and Environment Court hearings over the allocation and water take controls for the Lindis River and LARA.

71. Matt Dumont and I authored the MGL hydrological assessments B.03 and K.01, while Jens Rekker authored B.02 and B.04. All existing environment and effects assessment within those reports made extensive reference to the LARA.

72. In my professional opinion, the LARA has not received sufficient scientific investigation or monitoring from ORC or other scientific body (e.g., Earth Sciences NZ) consistent with the Lindis River and LARA's importance in regional water management. Currently there are only partial formal studies, informal studies, desktop hydrological assessments to support hearing evidence, and little continuing monitoring aside from surface water at Ardgour Road and Lindis Peak.

73. However, I do not agree with the comments that the MGL application assessments and proposed water management is uninformed and that informed decision making is impossible.

Inadequate Understanding of Ground-Surface Water Interactions

74. Mr Hanan assets that there is an inadequate understanding of Lindis River Valley and LARA groundwater surface water interactions.

75. To my knowledge, there have been a number of fundamental field based hydrological investigations to assist in understanding such interactions in the lower Lindis Valley:

    (a) Same-day, multiple site flow gaugings of the Lindis River at perceived critical nodes in the lower Lindis Valley by ORC resource science personnel.

    (b) Installation of flow measurement installations on Waiwera Creek, Wainui Creek, Dry Creek, and the Lindis River in at least five locations using TruTrack flow monitors by ORC resource science personnel.

    (c) Same-day, multiple site flow gaugings of the Lindis River by Ryder Consulting Ltd personnel.

76. The above field information was interpreted to provide a workable conceptual model of the hydrological interactions between the Lindis River and underlying hyporheic zone and groundwater. These interpretations were presented in proceedings over the allocation and water take controls from 2025 to 2017.

77. In 2016, I developed a flow-based water resource model of the lower Lindis River for the length of the lower Lindis River. This longitudinal model was calibrated to replicate the exchanges between Lindis River and connected groundwater. The longitudinal model of surface water – groundwater water exchanges for a range of upper catchment inflows, as measured at the long-term Earth Sciences NZ flow monitoring site at the ‘Lindis Peak’ locality.

78. Within Environment Court expert witness caucusing, the longitudinal model was adopted as the tool for assessing Lindis River main stem hydrology at the full range of river reaches.

79. The Hanan comments employ a string of quotes from various parts of a number of MGL applicant technical assessments. The summary of these can be provided as follows;

(a) "…detailed information on groundwater-surface water interactions is currently not available…" from B.43 Hydro Geochem Group – Flow Augmentation Strategy.

(b) "Bendigo and Shepherds creeks alluvium have higher permeability and porosity. … information on groundwater-surface water interactions is not currently available …" From G.01 MGL Water Management Plan.

(c) "As part of the unique intermontane physiography of the Bendigo area, Shepherds Creek does not extend as a perennial water courses …" From B.03 Kōmanawa Solutions Groundwater Existing Environment and Effects..“Each model (RAS, CIT, and SRX) was conducted independently and therefore do no provide a holistic view of the system …" From B.05 Kōmanawa Solutions, Groundwater Modelling Analysis for Mining Bendigo Ophir Gold Deposit.

80. Addressing each of these quotations and the inferences that the inferences doubt, incompleteness or causes for concern expressed in the Hanan comments, I perceived that the quotations are out of context to the inferences drawn by Hanan.

81. The quote in item (a) is taken from the introductory background relating to the schist rock parts of the Shepherds and Rise and Shine catchments. The schist-rock groundwater system is acknowledged by all informed hydrogeologists as being complex and incapable of detailed geohydrological characterisation.

82. The reason is the tendency of weak, slow and occult water transmission through rock joints, fractures, shears, foliation[9], and micro-faulting is chaotic at a fine or even medium scale of examination. The schist is sufficiently consolidated, lithified[10] and metamorphosed that all original porosity or ability to transmit water has been lost, therefore what little groundwater transmission is only feasible by the rock defects mentioned above. Such fractured rock systems are characterizable only at a coarse scale or resolution of examination.

83. The quote in item (b) relates to ribbons of alluvium bearing groundwater that are encapsulated at the base and lateral sides by low permeability that tends to channelise groundwater flow within these paleo-channels. The quote is for general information but does not indicate a lack of confidence that the important information on groundwater – surface water interactions well understood. In simple terms, if the

[9] Foliation in geology refers to repetitive layering in metamorphic rocks. Each layer can be as thin as a sheet of paper, or over a meter in thickness. The word comes from the Latin word folium, meaning "leaf", and refers to its sheet-like planar structure.

[10] Lithification (from the Ancient Greek word lithos meaning 'rock' and the Latin-derived suffix -ific) is the process in which sediments compact under pressure, expel connate fluids, and gradually become solid rock.

flow and water quality of the generally creek water that enters such porous channels is well known then the flow and water quality exiting the channel is also well known.

84. The quote in item (c) relates to general background leading up to more detailed characterisation of the existing environment.

85. The quote in item (d) relates to groundwater flow modelling of the schist rock groundwater systems around each proposed pit. Quantitative hydrogeology and the allied discipline of groundwater computer modelling has a reporting style that responds the purpose and information requirements of each analysis or simulation.

86. When reporting, the quantitative hydrogeology and groundwater computer modelling disciplines tend to very carefully couch the information derived against this purpose-driven requirement and then clearly state the limitations of extending the information further. This tendency may mislead lay persons that the information produced is somehow highly uncertain or inadequate.

No Effective Modelling of Groundwater Plume Extent Prediction

87. The Hanan comments refer to the Pope and Craw study of the solute plume emanating from the Macraes Flat Mine, Mixed Tailings Impoundment (**MTI**) and state that "there is no effective modelling of groundwater plume extent prediction".

88. The Pope and Craw study relates primarily to geochemical evolution of schist tailings in tailings impoundments but also includes an account of observed tailings derived solutes leaking through the base of the original Macraes Flat impoundment, the MTI, into schist groundwaters and seeping along the Maori Tommy's Gully drainage toward Deepdell Creek earlier reported in a paper by Craw and Nelson[11].

89. The tailings solute that was used as an indicator of tailings solute seepage was sulphate.

90. The MTI was the original tailings impoundment built on a broad ridge behind the Macraes Flat village as something of a 'turkey nest'[12] dam; large area and low walls in an area of relatively low relief around the impoundment. Tailings impoundments of such geometry present difficulties capturing tailing fluids in underdrains and other containment systems.

91. The Hanan comments conflate the construction and operation of the MTI at Macraes with the construction and operation the Shepherds TSF. Such parallels and

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[11] Craw, Dave; Pope, James . (2017). Time-series monitoring of water–rock interactions in mine wastes, Macraes gold mine, New Zealand. New Zealand Journal of Geology and Geophysics, (), 1–17. doi:10.1080/00288306.2017.1307231

[12] A turkey nest dam is a squat dam structure commonly used in Australian agriculture and mining. Built on flat land with a high surrounding earth embankment.

comparisons are unfounded and as outlined in the EGL design and assessment document[13].

Lindis Aquifer Needs to be Treated as Both Surface Water and Groundwater

92. The Hanan comments suggest that in the case that the LARA is compromised by mining related contaminants then the LARA should be characterised, assessed, and managed as a dual groundwater - surface water body, in consistency with the Regional Plan: water Schedule 2C adoption of the LARA as having strong hydrological connection with the Lindis River.

93. It could be pointed out that the ORC adoption as part Plan Change 1C to include the LARA as a Schedule 2C water body was within the context of managing the Lindis catchment's river water resources and alluvial ribbon groundwater resources conjunctively.

94. One reason, among many, for the Schedule 2C declaration of the Lindis alluvium as a conjunctive water resource was to avoid wells or galleries drawing water that would otherwise remain within or report to the Lindis River unless those water takes were manged in common with the surface water resource. Water takes on the LARA groundwater are managed from a common water allocation pool and subject to the same minimum flow and flow sharing controls.

95. However, the Schedule 2C declaration of the LARA was not for water quality reasons. The groundwater quality protection tool within the Regional Plan: Water is the Groundwater Protection Zone (A and B) and no such declaration of a Groundwater Protection Zone was made in the Plan 1C or Plan Change 5A processes.

96. Of relevance to the Hanan situation, the original Schedule 2C declaration of the LARA extended to the State Highway 8 Lindis Bridge and no further. The extension of the LARA to the Clutha River to encompass small parts of the Bendigo Aquifer was made in a subsequent Plan Change to be in line with the groundwater modelling outputs of Scott Wilson in March 2011. Without the extension by plan change, the Hanan well was considered to rest within the Bendigo Aquifer.

97. Characterisation and assessment of potential effects in terms of water quantity or water quality within the MGL application has acknowledged the dual groundwater – surface water nature of the LARA and the associated Lindis River.

[13] B.21-Engineering-Geology-Limited-Shepherds-Tailings-Storage-Facility-Technical-Report-EGL 2025b

98. The LARA and Lindis River are heavily used and allocated water resources. The consent order arising from the appeal by Lindis Catchment Group against a higher minimum flow and more restrictive allocation regime arguably included a presumption that high rates of water allocation were best extracted using the replacement LARA galleries than the direct surface water intakes that are being retired.

99. In August 2025, ORC informally requested MGL commission characterisation of the lower Lindis Valley downstream of Dry Creek in the context of Section 30 of the FTAA for non-derogation of existing rights. I was among those that compiled the data and prepared the report.

100. Accordingly, MGL and its technical advisors have a comprehensive understanding of the dual groundwater – surface water context and the water resource spectrum within which the LARA and river are managed.

No Dedicated Groundwater Monitoring Plan for the Aquifers

101. The Hanan comments point to inadequacies in the proposed MGL surface water monitoring systems, primarily the monthly frequencies at Shepherds Creek (SC-01), Rise and Shine and Clearwater Creek for the Bendigo catchment (RS-03).

102. The Hanan comments consider that monthly sampling frequency is too long due to the environmental damage that could eventuate and become entrenched in the intervening period. The comments also ask for monitoring along points along the Lindis River for the protection of aquatic ecology, recreation and drinking water consumption.

103. The Hanan comments point to perceived lack of a groundwater monitoring plan for the aquifers (LARA and Ardgour Aquifer in the Shepherds Creek catchment).

104. Comments of this nature arose in the workshop between MGL geochemistry - water consultants and ORC technical reviewers in 24-25 February 2026. I prepared a memorandum dated 11 March 2026 in response. The memorandum, appended to this statement of evidence as Appendix 2, included proposals for extending surface water monitoring to Lindis River and lower Bendigo Creek monitoring sites to be established at existing sites for flow measurement managed by Bendigo Station and ORC, respectively.

105. The intention of the proposed surface water monitoring that the receiving environments could be monitored and a baseline obtained for trend line analysis. At Lindis River the sampling would dovetail into existing ORC State of Environment Monitoring and extend the list of analytes. The fitting of a pH, electrical conductivity

and an optical, continuous nitrate sensor was also proposed to provide temporally-rich data on indicator parameters.

106. The monitoring at the Lindis River and Bendigo Creek would have a monthly frequency and water would be analysed for the analytes set out in Table 3 of the WMP[14].

107. Comments about the need to ensure groundwater seepage could not pass under the SC-01 monitoring site arose in the workshop between MGL geochemistry - water consultants and ORC technical reviewers in February 24-25, 2026. I prepared a memorandum on potential solutions with proposals dated 11 March 2026 in response. The memorandum is appended to this statement of evidence as Appendix 1.

108. In summary, the ORC reviewer noted the risk that the 75 metre wide pass between schist valley sides that Shepherds Creek flows through at SC-01 could contain saturated alluvium and/or weathered schist with a capability to convey creek-derived seepage beneath the surface water quality monitoring site, thus being unaccounted for in terms of concentrations and calculated mass loads.

109. The memorandum to ORC in response outlined the installation of at least five drill holes across the gap. The first roles of installed water bores would be to characterise the subsurface hydrogeology, alluvium / weathered schist permeability, saturation levels and pressures, and hydraulic conductivity to assess whether under-seepage was feasible and if so at what rate of seepage.

110. If under-seepage was found to be feasible, the second role of at least one of the 'fence' of bores would be for long-term groundwater quality level monitoring and sampling groundwater quality.

111. Groundwater monitoring of surface water at SC-01 and RS-03; schist groundwater at bores G-01 to G-08; and alluvial groundwater at MW-101 at the tail of the Shepherds creek alluvium plus bore CB13/0216 at the MGL water supply bore field on the Bendigo Aquifer was proposed and included in the substantive application documents, including the WMP.

112. In my professional opinion, the placement of these groundwater monitoring bores, piezometers and additional drive-points has been well scoped and planned. Each groundwater monitoring point has a rationale and objective embodied in the proposal to include it.

[14] G.01 MGL, Water Management Plan.

Lindis River Water Allocation

113. The Hanan comments note that the Lindis River catchment is already fully allocated with an exacting set of water take controls et in the RM17.301 series resource consents. These consents concern almost all current water take consents in the Lindis catchment that were included in the appeal to Plan Change 5A and the replacement consent applications sent directly to the Environment Court.

114. The resulting consent order included minimum flow and residual flow restrictions, plus flow sharing and explicit requirements to retire the old water race intakes and convert to galleries drawing LARA groundwater by the latter part of 2026.

115. In this context, the Hanan concern in relation to the Lindis catchment water management relates to the possible eventuality of, say, a release of contaminated surface water or groundwater into the lower Lindis Valley that would require a remediation such damming, diversion or groundwater pumping.

116. I understand the concern is that such remedial responses to contain and remediate contaminated water would for instance interfere with lawfully established water use and river water resource management of the Lindis River.

117. Indeed, such an eventuality that entailed damming, diversion or groundwater pumping is not included in the suite of authorisations applied for in the current applications. So an application would be required to be made to authorise remedial works, unless works were authorised by some other approval including emergency powers of the central government or local authorities.

118. I consider that such an eventuality has very low probability, however were MGL in the position of planning to undertake such remedial works, it would need to apply in the normal manner to the appropriate authorities. In such an application process I would anticipate that the interests and values of Lindis Catchment water users and stakeholders would have primacy in the normal balancing of current or future legislation and regulations.

A Detailed Hydrological Report, with a Proven Scientific Model, Examining the Groundwater Connections Between Shepherds Creek and the AA and LRA Aquifers

119. In conclusion and as a set of requests, the Hanan comments requests that the applicant provide further information so that the long-term consequences of the proposal can be understood.

120. A request is made that the applicant provide a proven, scientific (groundwater flow and transport) model covering the groundwater systems of the Shepherds Creek alluvium, Ardgour Aquifer and the LARA.

121. The request refers to the Ardgour Aquifer post-closure solute transport report and the recommendations for the acquisition of calibration data and validation data, including primary sources of information:

(a) Water table and base water level survey.

(b) Pumping and aquifer tests using pumping and observation bores (drilling rig supported).

(c) Advective – dispersive property determinations, including;.

(i) Solute injection tests,

(ii) Tracer push-pull tests.

(d) Groundwater sampling and analysis snapshot survey.

122. A reasonable understanding of the type and nature of the above parameters was available from sparce existing data and correlations from other locations in New Zealand. This understanding was sufficient to support the modelling guidance contained in Kōmanawa Solutions report K.01.

A Report on Toxic Plume Predictions Using this Proven Model

123. A further request is made by Hanan that the proven, scientific (groundwater flow and transport) model covering the groundwater systems of the Shepherds Creek alluvium, Ardgour Aquifer and the LARA is utilised to undertake targeted contaminant transport modelling for the affected groundwater systems and the Lindis River.

124. MGL was unable to commission the development of a calibrated and fully optimised groundwater flow and transport model within Shepherds Creek alluvium, Ardgour Aquifer and the LARA during the time of primary effects assessment, due to the deficit in aquifer geometry and calibration data.

A Reassignment of Water Quality Metrics to be Used for Both the LARA and Ardgour Aquifer that Recognises the Dual Nature of the Lindis River Valley

125. The Hanan comments include a request to revise the WMP Table 3 compliance thresholds for water within the Shepherds Creek and lower Lindis Valley. It is

understood that the request includes the compliance thresholds adopting the lowest concentration taken from the ecological and drinking water guidelines.

126. This request is unnecessary since the WMP Table 3 compliance limits apply to surface water thresholds, when the monitoring and compliance limits for the Ardgour groundwater measured at MW-101 are taken from WMP Table 6. Table 6 relates to groundwater compliance limits that will be measured and managed at MW-101 in the Lindis catchment.

Increased Surface and Groundwater Monitoring and a Monitoring Plan for the Lindis River, LRA and AA aquifers

127. The recent proposals for monitoring surface water at the sites Lindis River at Ardgour Road, and Bendigo Creek at the BSL gauging site, plus groundwater characterisation at the SC-01 bedrock gap have been outlined above.

128. The recent proposal may go some way towards meeting the Hanan request for increased surface and groundwater monitoring.

Chinamans Terrace Services Company Limited (CTSCL)

129. Chinamans Terrace Services Company Limited (CTSCL) manages the shared services for landholdings upon Chinamans Terrace and along the southern leg of Bendigo Loop Road. Winegrowing is the main livelihood within the CTSCL service area, plus associated services and attractions.

130. The first concern of CTSCL is given as the effect of the 110 L/s capacity MGL water supply bore field on the CTSCL water supply bore near the junction Bendigo Loop Road and State Highway 8 on the Bendigo Station homestead land.

131. The CTSCL bore and the proposed MGL water supply bore field are separated by 2.4 kilometres with the MGL bore field lying to the northeast and both tapping the Bendigo Aquifer.

132. The existing environment for the Bendigo Aquifer and effects of the proposed groundwater take up to 110 L/s has been the subject of a Kōmanawa Solutions report for MGL[15].

133. The summary of the existing environment for the Bendigo Aquifer includes the following features:

[15] B.02 Bendigo Groundwater Bore Take Effects Assessment.

(a) The aquifer is a continuous gravel sheet defined laterally by the Bendigo Terrace to the east, schist bedrock to the south, and the Clutha River / Mata Au to the west and north,

(b) The aquifer is defined vertically top and base by the water table beneath the land surface, and either sandstone or schist, respectively. The aquifer is highly permeable and unconfined.

(c) The Bendigo Aquifer is replenished regularly by recharge from the Clutha River, Lindis River (in the north only) and Bendigo Creek, plus lesser recharge through land surface from irrigation return and unirrigated rainfall excess.

(d) In terms of groundwater use, the Bendigo Aquifer provides substantial volumes of pumped groundwater using large capacity wells or bores developed for pastoral, viticultural and horticultural irrigation.

(e) The applicable maximum groundwater allocation from the aquifer is 29 million cubic metres per annum, of which 16.22 million cubic metres per annum have been assigned to existing groundwater take consents, meaning the groundwater allocation is under-allocated.

134. The CTSCL water supply holds a consent to take up to 32 L/s for the purpose of irrigation of vineyards and communal domestic supply, which expires on 1 November 2036 in ten years' time.

135. MGL seeks the granting of a groundwater take of up to 110 L/s and 3,153,600 cubic metres per annum. The proposed water take would not cause the aquifer's groundwater allocation to become fully allocated and would take place in the context of approximately 30 large, consented groundwater takes across the aquifer's surface.

136. The CTSCL water supply bore lies within 270 metres laterally of the closest branch of the Clutha River / Mata.

137. The MGL bore field would lie within 1,750 metres of the closest branch of the Clutha River / Mata.

138. Regardless of proximity to the river, Otago Regional Council (**ORC**) groundwater science scientists expressed within ORC reports have developed a consensus that the Bendigo Aquifer water balance and water exchanges are dominated by the Clutha River / Mata Au[16].

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[16] Houlbrooke, Clare. 2010. Bendigo and Tarras Groundwater Allocation Study. Prepared by Resource Science Unit for Otago Regional Council, Dunedin. 59 pages, including appendices.

139. Close proximity of a pumping bore to a major river and a high permeability connected aquifer results in any groundwater level decline being strongly buffered by the presence of the river[17].

140. Effects estimates of the pumping of the proposed MGL bore field bores at the combined maxima pumping rates as proposed in applications were made in commissioned groundwater effects reports[18].

141. Conservatively framed calculation of the potential drawdown effects on the CTSCL bore by the proposed MGL bore field pumping can be presented for medium term and long-term contexts:

    (a) 90 days of pumping at 110 L/s: 0.043 metres; or

    (b) 1 year of pumping at 100 L/s: 0.19 metres.

142. The ORC drawdown effects assessment embodied in the Regional Plan: Water, Schedule 5B specifies the Theis Equation used in the above drawdown calculations and a threshold of significance above which the Plan considers a neighbouring bore ‘potentially affected’. Below this 0.2 metre drawdown threshold, a bore is not considered to be potentially affected and far below the threshold of adversely affected.

143. Thus, the proposed medium term and long-term groundwater level declines (drawdown) projected in highly conservative effect assessments that neglect the dominating presence of the Clutha River / Mata Au, are below accepted thresholds of potential effect.

144. In my professional opinion, I consider that the CTSCL water supply bore will not be affected by the proposed mine water supply activity at the supply bore field.

145. The CTSCL comments note concern that the 35 year term set of resource consents sought by MGL would overlap with the remaining period of CTSCL’s 35 year water take consent term, granted in 2002 and expiring in late 2036.

146. The regulatory practices used within the Resource Management Act 1991 is that expiring water take permits retain the pre-existing water allocation providing application is made more than six months prior to the date of expiry. Site specific effects assessments would be required for a replacement consent, but the ongoing access to the allocated groundwater is generally preserved by the consent authority.

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[17] Davidson, P; and Wilson, S. 2011. Groundwater of Marlborough. Marlborough District Council, printed by Caxton Press, Christchurch, NZ 302 pages. Chapter 15: Groundwater And Surface water Interaction, page 136.

[18] B.02 Bendigo Groundwater Bore Take Effects Assessment, page 42.

147. The CTSCL comments note concern about the potential impact of MIW transiting Rise and Shine Creek into Bendigo Creek and infiltrating into the Bendigo Aquifer near the Bendigo Loop Road ford crossing of said creek.

148. Indeed, the water scientists commissioned by MGL to investigate and assess the potential for release of MIW and constituent substances through the Creek system were alive to the possibility of solutes entering the creek system with concentrations higher than relevant thresholds of acceptability against guidelines protective of aquatic ecology, stock water, or drinking water human health.

149. The SRX ELF[19], SRX pit and pit lake, southwestern highwall of the RAS pit and Western ELF are proposed mining areas of the Bendigo – Ophir Gold Project that would fall within the Bendigo Creek catchment, primarily fronting onto either Rise and Shine Creek or Clearwater Creek (in the case of Western ELF).

150. Specific guidance and assurance that can be provided to CTSCL is my professional opinion that the groundwater flow paths from the infiltration point of Bendigo Creek into the Bendigo Aquifer diverge substantially from the position of the CTSCL bore at the Bendigo Station Woolshed.

151. Furthermore, the CTSCL bore position is flanked by schist bedrock to the south and east. The bore probably is placed to exploit a 24 metre deep pocket of glacial outwash between the schist bedrock and the Clutha River / Mata Au lying to the west.

152. The step test undertaken on 24 September 2001 derived a specific capacity of 180 litres per second per metre of drawdown, indicating high hydraulic conductivity of the loose coarse gravels and schist slabs noted in the drilling log across the well screen interval of 18.7 to 22.7 metres below ground. These observations support the inference that the CTSCL bore is substantially hydraulically connected to the Clutha River / Mata Au rather than the rest of the Bendigo Aquifer.

153. The static water level of 1.2 metres below ground of two measurements made in 2003 and 2021 when corrected for the 196.085 metres Above Mean Sea Level (**AMSL**) elevation measured for the local ground level, indicated static water elevation of 194.885 metre AMSL. This measured level was independently verified by land surveying and water level survey by ORC in December 2009 of 194.54 metres AMSL[20].

[19] The acronym ELF relates to an Engineered Land From mostly comprising placed waste rock that is not subjected to mineral processing.
[20] Houlbrooke, Clare. 2010. Bendigo and Tarras Groundwater Allocation Study. Prepared by Resource Science Unit for Otago Regional Council, Dunedin. 59 pages, including appendices.

154. Both elevation-corrected water levels reveal that the CTSCL bore water level lies approximately 0.2 metres higher than the adjoining Clutha River / Mata Au. Therefore, the inferred hydraulic connection between the river and CTSCL bore is confirmed.

155. On the balance of the information and interpretation provided above, the CTSCL bore is not interpreted to be affected by the subsurface outflow of Bendigo Creek, which collects water from Rise and Shine Creek at the proposed site of MGL mining activities.

156. Regardless of the predominant hydraulic connections interpreted for the CTSCL bore, effects management measures and monitoring are proposed within the Water Management Plan and included in the proposed conditions of consent.

157. Measures to minimise contact of sensitive materials with runoff transiting the upper creek catchment include the following:

(a) SRX pit and pit lake, southwestern highwall of the RAS pit and the Western ELF,

(b) capture of pit and ELF seepage, erosion and sediment controls, and

(c) fluming of Rise and Shine creek around pit walls.

158. Surface and groundwater monitoring with high frequency and the proposed list of analytes targeting potential contaminants would be undertaken at site RS-03 on Clearwater Creek. This RS-03 monitoring location is also a compliance site.

159. Further surface water monitoring is proposed in Lower Bendigo Creek immediately upstream of reaches that have been observed over several seasonal cycles to go dry by infiltration to groundwater. This downstream monitoring site coincides with the Bendigo Station creek flow monitoring location, which would facilitate the calculation of solute mass loads for estimation of catchment solute contributions to the Bendigo Aquifer and long-term trend analysis.

160. In conclusion ,CTSCL concerns relating to drawdown from the MGL borefield and the change in groundwater quality arising from ming activities are mitigated by distance from the zones of potential effect, the shielding presence of bedrock to the south and east of the CTSCL bore and the close proximity of the Clutha River / Mata Au.

OTHERS

Environmental Defence Society (EDS)

161. Environmental Defence Society has provided comments by Dr Leanne Morgan[21], including some relevant to my own areas of expertise.

162. I have responded in order and in accordance with the paragraph numbering of those comments.

163. Paragraph 51 questions model domain size. I would respond that none of the three pit-centred models (RAS, CIT, or SRX) used fixed heads or fluxes at the outer margins, therefore regardless of whether the domain size is optimally large, conservative results in terms of drawdown effect would always be maintained.

164. Measured drawdown due to RAS did not approach the margin of the RAS model. The CIT model drawdown approached the outer margin but at the Rise and Shine Creek flow divide, which is consistent with field observations. The RAS drawdown approached the outer margin to the northern side and the transgression of drawdown would only serve to accentuate modelled drawdown and/or depletion, which is fundamentally conservative.

165. Paragraph 52 refers to the Hope Downs open cast mine. It would be helpful for Dr Morgan to have indicated that Hope Downs shares the same degree of mountainous topography of the BOGP proposed mine site. My preliminary reading suggests it is not. In my professional opinion, the comparisons made between the Hope Downs open cast mine and the BOGP pit effects in steep terrain cut by a series of ridge affect the relevance of the points made.

166. Paragraph 54 refers to the need to include Clearwater Creek within the model domain. In fact the middle reaches of Clearwater Creek and most relevant reaches were within the model domain.

167. Paragraph 54 refers to the permeability structure somehow linking Clearwater Creek with RAS pit. In fact, Clearwater Creek is two large ridgelines to the south east of the RAS pit. The RAS pit extends only to the base of the Rise and Shine Shear Zone (RSSZ) while Clearwater Creek is hundreds of metres lower than the stratigraphic 'height' of the RSSZ. In terms of permeability structures such as schistose foliation, Clearwater Creek is much removed from RAS pit.

[21] 40a_Environmental Defence Society - Evidence of L Morgan EiC 10 April 26 Final.pdf

168. Paragraph 57 suggests that no-flow boundaries too closely placed to the pit wall would under-report the pit groundwater inflow. However, in such a case, drawdown and depletion effects would be increased than had the non-flow boundary been placed further distant. The setting is fundamentally conservative in this context.

169. Paragraph 58 asserts that the model boundary condition simulating the presence of creeks, should have been implemented with an intervening layer simulating the veneer alluvium or more weathered zone. I disagree with this criticism as the creek boundary conditions as modelled provided the most direct contact between the unweather schist rock groundwater system and the mine pit concerned. To have employed complicated artifices as suggested would have risked biasing the creek pit model connection.

170. Paragraphs 60 and 61 related to the use of homogeneity and isotropy in the model framework and hydro stratigraphic domains. There is much about a fractured rock groundwater system that is untestable. The precise rock fabric and mesostructures relevant to small scale groundwater flow patterns are an aspect of fractured rock hydrogeology that is generally only justified in exceptional circumstances. My response is that for Dr Morgan to require that heterogeneity and anisotropy is included in the pit groundwater models when there are few realistic means to ascertain the physical nature of these model settings is unhelpful and would risk introducing untested biases into the model results.

171. Paragraph 64 questions the use of steady state model methods when a staggered or transient model method would have been superior. I do not agree, since the surface pits would be long-live especially for RAS pit but less so for CIT and SRX, therefore steady state simulation, which after all provides an ultimate groundwater response pattern, is wholly more conservative than a transient simulation of such pit penetrations to the groundwater system.

172. Paragraph 67 states a preference for using flux targets in constraining the respective models. While I agree generally that flux targets may be of value in constraining model operation through parameter optimisation, in the case of the BOGP schist rock models the measured or modelled creek flows are mediated through the alluvial veneer in the Shepherds and Rise and Shine valleys. Flux targets are also less workable for a steady state model.

173. Paragraph 68 observes that there are sometimes large residuals where resource holes have been used in replicating model pressure surfaces. It is self-evident that discrepancies producing calibration residuals will occur when individual drill hole influences in stratified fractured rock are applicable. The already noted vertical

pressure gradients in the Morgan comments and B.03[22] bear some responsibility for mismatches.

174. Paragraph 68 also notes the overestimation in valley floor and underestimates of groundwater head along ridgelines where recharge would dominate. Such under-fits to field data are almost inevitable in fractured rock groundwater systems in mountainous terrain. However, the under-fits would tend towards higher depletion in model results and is therefore somewhat conservative.

Central Otago Winegrowers Association

175. Central Otago Winegrowers Association (**COWA**) represents vineyard owners and wine producers in the Central Otago region.

176. COWA reports that sampling of five bores attached to the vineyards of Mondillo, Folding Hill, Quartz Reef, Schoolhouse, and China Terrace, all provided arsenic concentrations less than that of the detection limit (i.e., 0.001 mg/L).

177. These results for groundwater arsenic are consistent with the dissolved arsenic result from the same Bendigo Aquifer of a sample taken from the proposed MGL bore water supply bore CB13/0215. This bore sampled after 4.5 hours of pumping on 24 July 2024 returned a laboratory result for arsenic below detection also.

178. I do not agree with the conclusion that COWA is making that the proposed surface water and groundwater compliance limits are inconsistent with the maintenance of the existing low arsenic status, or that there would be a material degradation of the area's environment from a rise in that is still less than the groundwater compliance limit.

179. Compliance monitoring of surface water in the Bendigo catchment is proposed to be undertaken at a site close to the confluence of Rise and Shine Creek and Clearwater Creek but on Clearwater Creek (RS-03).

180. The dissolved arsenic concentration from Apr-2023 to Sep-2024 ranged between 0.005 and 0.014 with a mean of 0.010 mg/L.

181. The arsenic compliance limit concentrations are as follow:

(a) Surface water 0.042 mg/L

(b) Groundwater 0.010 mg/L

[22] B.03, Kōmanawa Solutions, Bendigo – Ophir Gold Mine Project – Groundwater Existing Environment & Effects Assessment , Section 3.2 and Figures 5 and Figure 8.

182. Comparing the baseline concentration with the surface and ground water compliance, the surface water limit requires headroom above the baseline to guard against nuisance triggering by naturally elevated arsenic pulses in the two creeks.

183. The groundwater compliance limit coincides with the relevant arsenic drinking water standard and would be protective of the potability and indeed irrigation waters.

184. The Clutha River / Mata Au is the major source of the Bendigo Aquifer. The water balance prepared by ORC in the resource science study by Clare Houlbrooke broke down the water balance on the basis of a mostly measured and modelled conceptual model. The ORC report estimated that the Clutha River / Mata Au provided 36.5 million cubic metres per annum (74%) of all water flowing through the Bendigo Aquifer. It was estimated the 10.9 million cubic metres per annum (22%) was derived from the Lindis River and rainfall recharge represented only 1.7 million cubic metres per annum (3%) of the annual water balance.

185. The ORC Bendigo Aquifer water balance did not account for the Bendigo Creek infiltration, which based on published estimates of mean creek flow would be estimable as 3.7 million cubic metres per annum (approximately 7%) and greater than rainfall recharge component of aquifer inputs.

186. The point of the discussion of the aquifer's water balance is that the Clutha River dominates the quantum of groundwater moving through the Bendigo Aquifer.

187. It should not come as a surprise that the arsenic concentration in the seven bores drawing Bendigo Aquifer groundwater mentioned above are below detection limit of 0.001 mg/L, since this reflects the composition of the Clutha River / Mata Au.

188. Similarly, any arsenic effects from MGL mining activities to the Lindis River that subsequently recycle into the Bendigo Aquifer confront dispersion in three aquifers then mixing in the flows of the Lindis River, following by dispersion of Clutha and Lindis derived groundwater in the northern third of the Bendigo Aquifer.

PARTIES WITH EXISTING INTERESTS

Bruce and Sandra Calder

189. Bruce and Sandra Calder have expressed concerns about the fate of their water supply to their property fronting Ardgour Road.

190. It is believed that the Ardgour Water Scheme that provides their water is in turn supplied by one of Lindis Irrigation Limited's water races. Lindis Irrigation is in the process of moving away from water races and piping irrigation water within the Lindis Valley.

191. The new intakes for Lindis Irrigation's water supply network is to be transitioned to a number of infiltration galleries and large capacity bores, five of which would be located in the lower Lindis Valley between Dry Creek and Lindis Crossing.

192. In conclusion, the Ardgour Water Scheme is intakes are located distant from and mostly upgradient of the parts of Ardgour Aquifer or LARA potentially affected by Shepherds Creek. Mine-impacted water controls, surface water and groundwater compliance triggers within monitoring regimes and performance monitoring of lower Lindis all provide me with considerable confidence that the Ardgour Water Scheme will remain unaffected throughout BOGP's mine life.

Jens Haaye Rekker
17 April 2026

APPENDICES

Appendix 1: Instituting an Alluvium – Weathered Rock Depth Drillhole Fence at SC-01 Monitoring Site

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Memo

To: Cheryl Low, Environmental Manager, Matakanui Gold Ltd
From: Jens Rekker,
CC: Shay MacDonald, Senior Consent Planner, Otago Regional Council
Date: 11 March 2026
Subject: Instituting an Alluvium – Weathered Rock Depth Drillhole Fence at SC-01 Monitoring Site

INTRODUCTION

At the 25 February 2026 workshop between Matakanui Gold and Otago Regional Council, the question of installing a fence of drill holes across the gap between schist bluffs at the SC-01 surface water monitoring site was discussed. In essence, the drilling would penetrate unconsolidated alluvium and potentially also consolidated weathered schist, which are the two potential materials for allowing subsurface flow of groundwater through the gap and onwards to the lower Shepherds Creek catchment. Groundwater flow through the gap would bypass the SC-01 monitoring site, and a compliance point. The SC-01 monitoring includes continuous flow measurement in high flow and low flow flumes and sampling of surface water. Both sets of monitoring parameters would be bypassed and potentially be unaccounted should there be appreciable underflow through the gap. See Figure 1 for location of proposed profile from southwest to northeast.

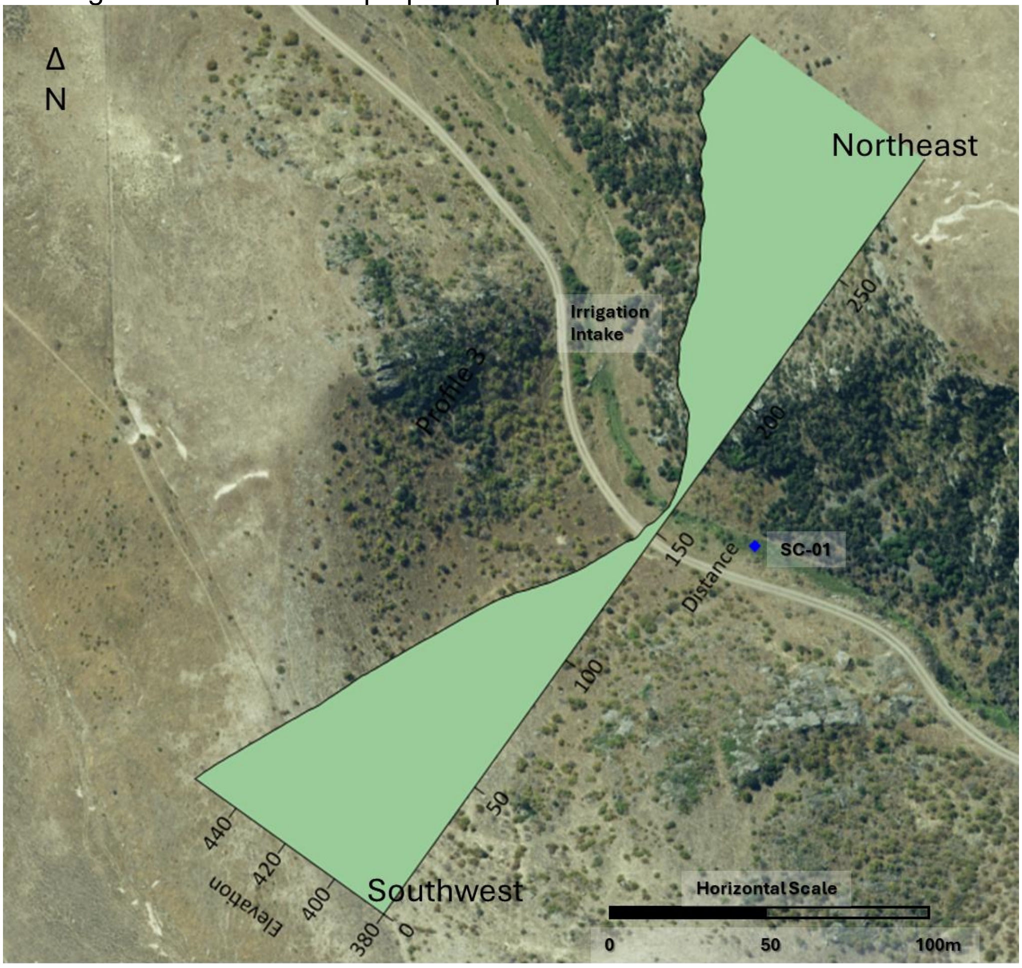

Figure 1: Topographic profile across axis of Shepherds Creek gorge at SC-01 (satellite image and DEM profile)

Figure 2 illustrates the profile line as a topographic cross-section of the land surface taken from the merged DEM surface for the area. The base of the gorge (or gully) lies at an elevation of 382.0

metres AMSL. The access track lies at an elevation of 384.1 metres AMSL. The gorge sides suggest a talus slop on both flanks below schist outcrop bluffs at the steepest part of the slope.

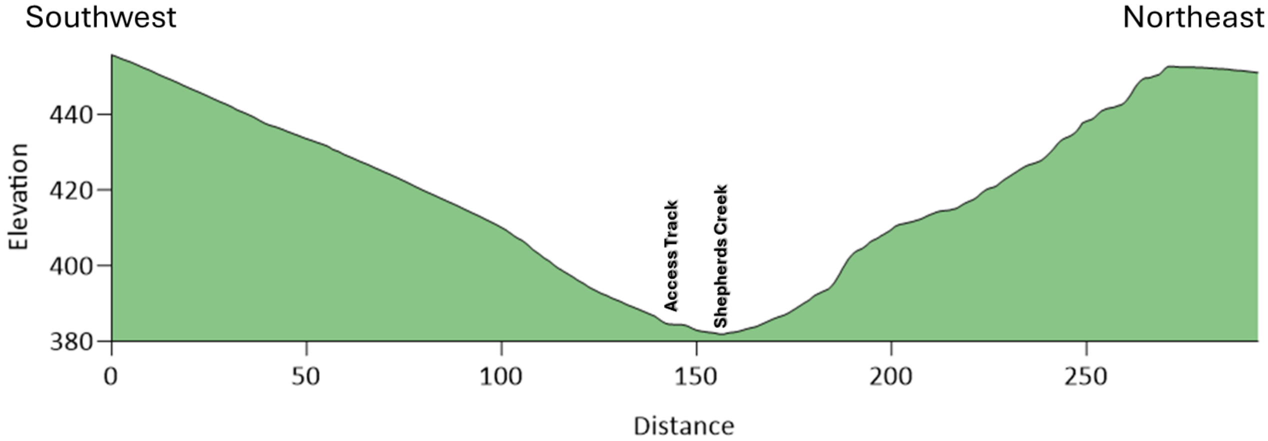

Figure 2: Two-dimensional profile of land surface across axis of Shepherds Creek gorge at SC-01

PROPOSED FENCE OF DRILL HOLES

Approximation of the likely disposition of alluvium and weathered schist is illustrated in Figure 3. The cross-section is based on upstream and downstream test pits of the valley floor, the closest of which lies 310 metres upstream.

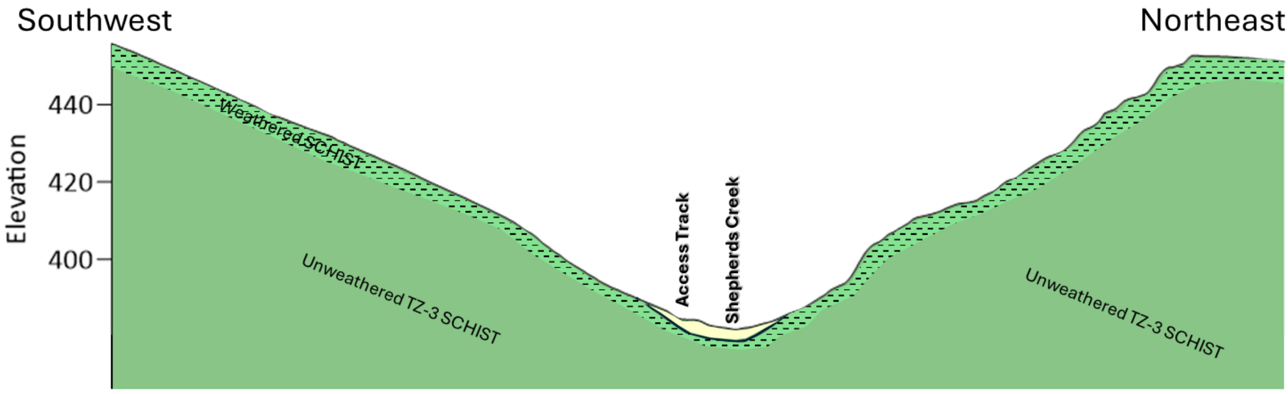

Figure 3: Approximate geological cross-section of Shepherds Creek gorge at SC-01

Figure 4 is a representative cross-section through the gorge floor and alluvium illustrating the probable placement of five drill holes to characterise the subsurface, including the potential for groundwater bypass of SC-01. A geotechnical drilling rig would be employed to characterise subsurface conditions as far as possible. Nested piezometers would be designed and placed on the basis of drilling investigations within alluvium and weathered schist for characterisation of the groundwater level profile and any vertical gradients.

The piezometers would also be available for the undertaking of slug tests and potentially a pumping test to characterise hydraulic conductivity. In the long-term the piezometers would be available for the taking of water samples to delineate the composition of any bypass flow. Ultimately, investigations to characterise subsurface seepage would have the ability to quantify any underflow rates and the mass load of defined potential contaminants.

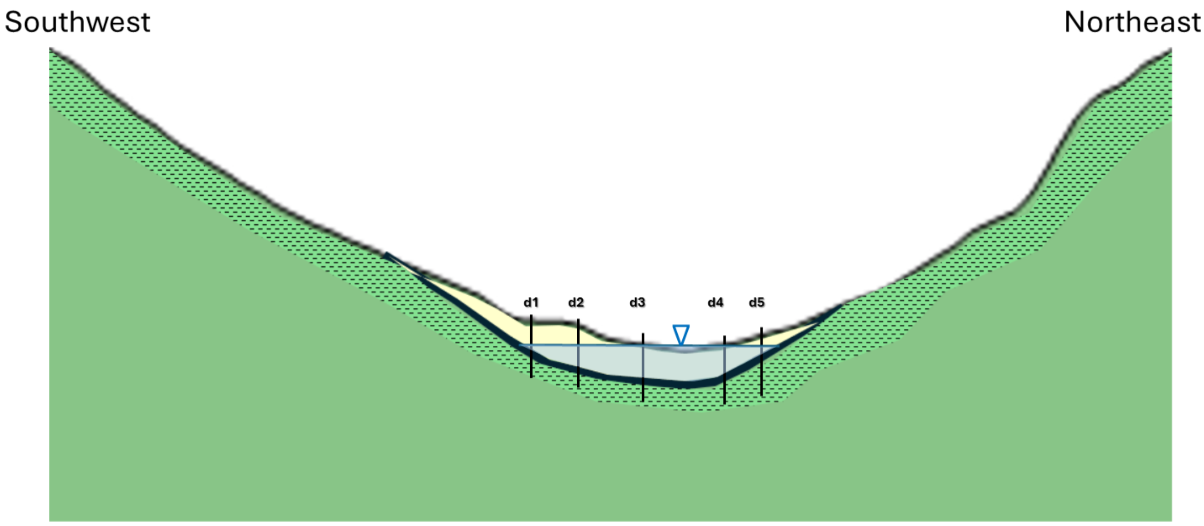

Figure 4: Representative cross-section through Shepherds Creek gorge showing drill holes d1 – d5

ENDS

Appendix 2: Memorandum, Water Quality Monitoring of Lindis River & Bendigo Creek

Memo

To: Cheryl Low, Environmental Manager, Matakanui Gold Ltd
From: Jens Rekker,
CC: Shay MacDonald, Senior Consent Planner, Otago Regional Council
Date: 11 March 2026
Subject: Instituting Water Quality Monitoring of Lindis River and Bendigo Creek

INTRODUCTION

At the 25 February 2026 workshop between Matakanui Gold and Otago Regional Council, the question of delineating the baseline and monitoring long-term surface water quality in the primary catchments downstream of the BOGP mining complex –

- During pioneering (Year 1)
- During operations (Year 2 – 13)
- Following mineral extraction closure (Active Closure)
- In Post-Closure.

Lindis River at Ardgour Road

Otago Regional Council maintains surface water quality monitoring on the Lindis River at the ORC Ardgour Road flow recorder site. This site is notable in being bounded upstream and downstream by dry riverbed during late summer low flow periods, as river water moves primarily by interflow within the hyporheic zone coarse sandy gravels of the Lindis Alluvial Ribbon Aquifer. By whatever mechanism, the subsurface flows persistently surfaces in the small river reach either side of the flow monitoring site, perhaps a low permeability geological feature beneath the perennial river reach.
ORC archives water quality on Ammonia-N, DRP, E. coli, Nitrate-N and pH for the Lindis at this site. Flow data is also available. Monthly monitoring has been instituted since September 2005, with gaps.

Lindis River at Lindis Peak

Earth Science New Zealand (formerly NIWA) maintains a flow monitoring and water quality monitoring at 'Lindis River at Lindis Peak', which is upstream of the lower river and mostly upstream of irrigation intakes that impose a substantial load upon the lower river during the irrigation season. ORC archives water quality on Ammonia-N, DRP, E. coli, Nitrate-N and pH for the Lindis at this site. Flow data is also available. Monthly monitoring that includes the above determinands has been instituted since September 2014.

Bendigo Creek

There is no independent water quality monitoring of the Bendigo Creek main stem. Proposed BOGP monitoring focuses on Clearwater Creek and the Rise & Shine Creek catchment affected by SRX and the RAS pit edge. It is proposed to institute a new main stem surface water quality monitoring site in lower Bendigo Creek upstream of points below which creek water infiltrates to the ground, and thence to the Bendigo Aquifer.

HISTORIC SURFACE WATER MONITORING

A location map of the combined surface water quality monitoring at Lindis Peak and Ardgour Road sampling sites is provided below in Figure 5.

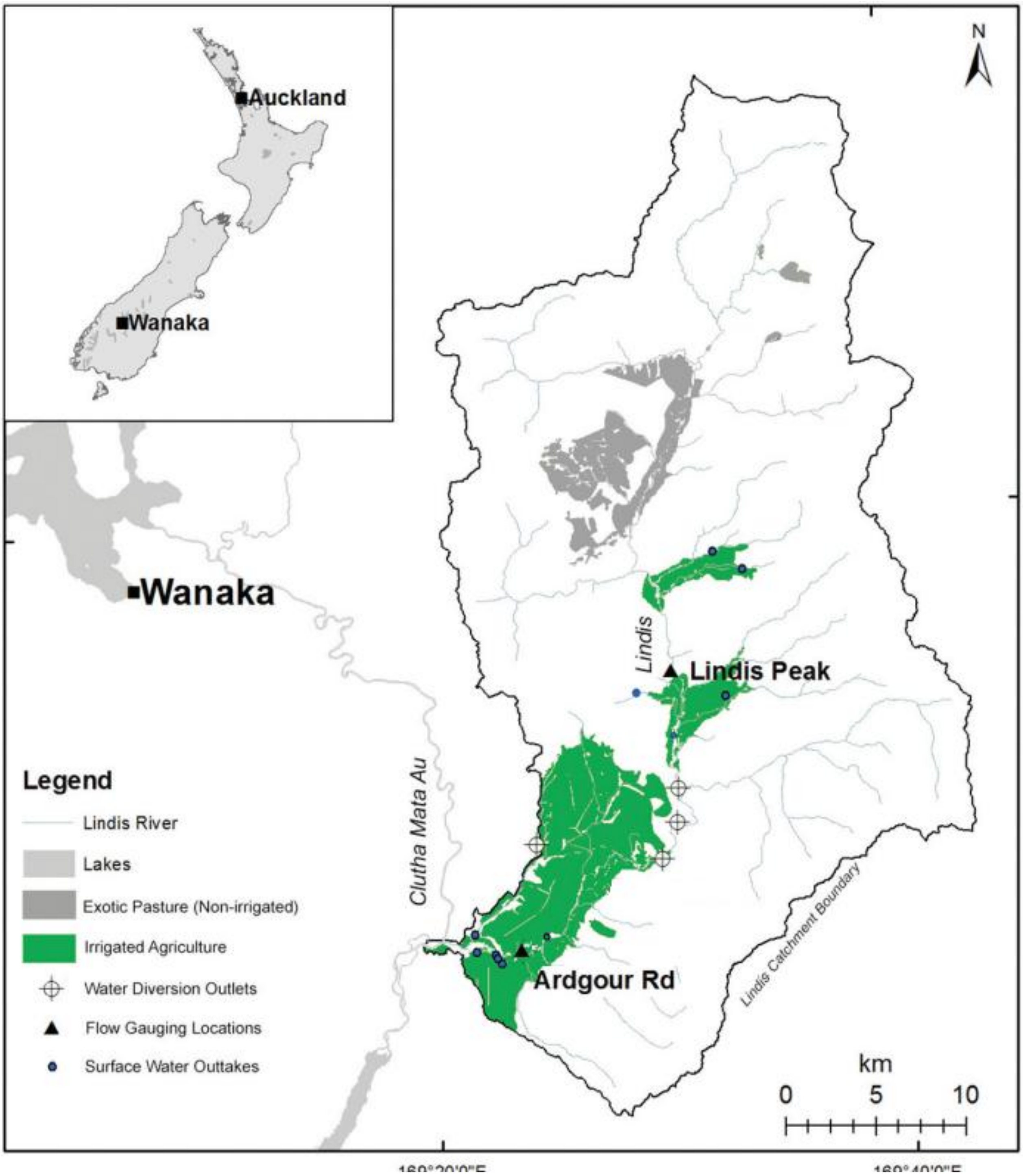

Figure 5: Location of Lindis River @ Lindis Peak, plus the downstream site of Lindis River @ Ardgour Road

Plots of the analytical results as time series are provided for each set of analytes in Figure 6, Figure 7, Figure 8, Figure 9, and Figure 10 for ammonia, DRP, nitrate, pH and E. coli, respectively. The data is presented as time series plots to display variability and any seasonal trends.

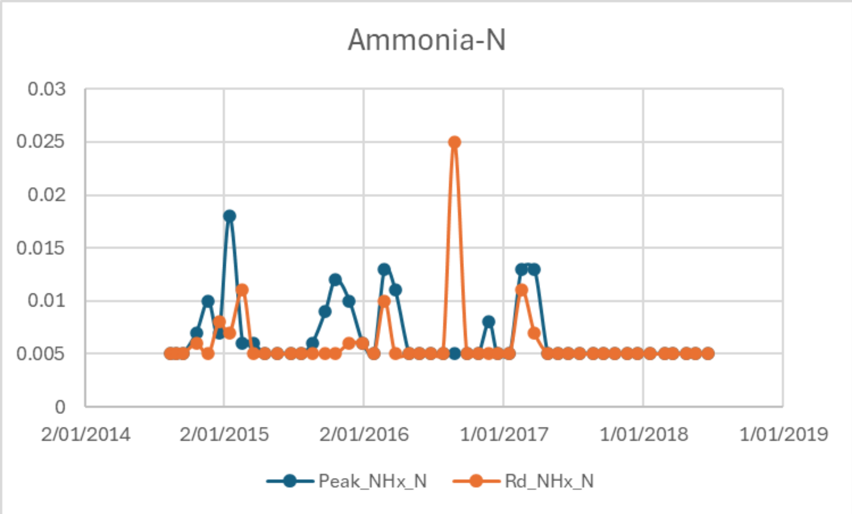

Figure 6: Ammoniacal nitrogen concentrations for Lindis Peak (Peak) and Ardgour Road (Rd)

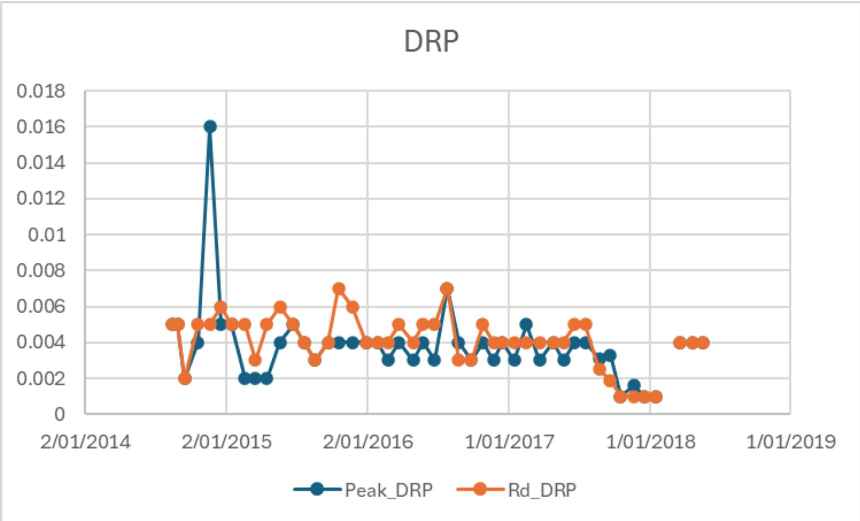

Figure 7: DRP concentrations for Lindis Peak (Peak) and Ardgour Road (Rd)

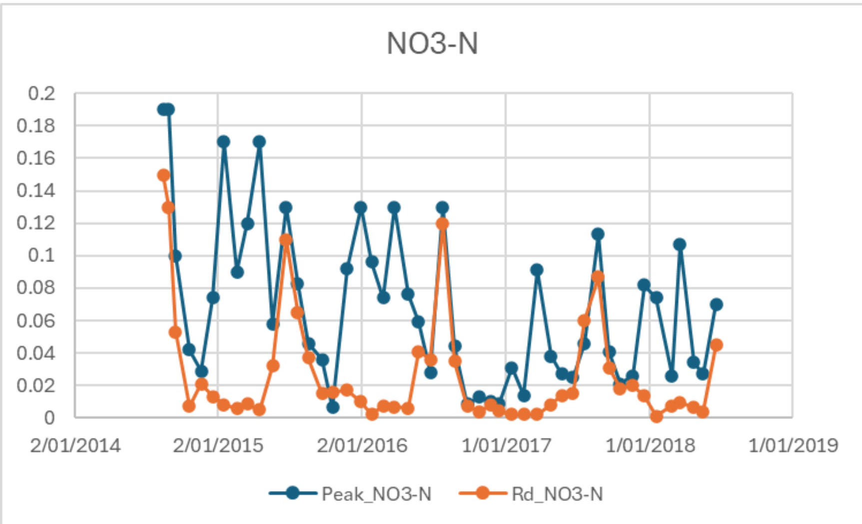

Figure 8: Nitrate nitrogen concentrations for Lindis Peak (Peak) and Ardgour Road (Rd)

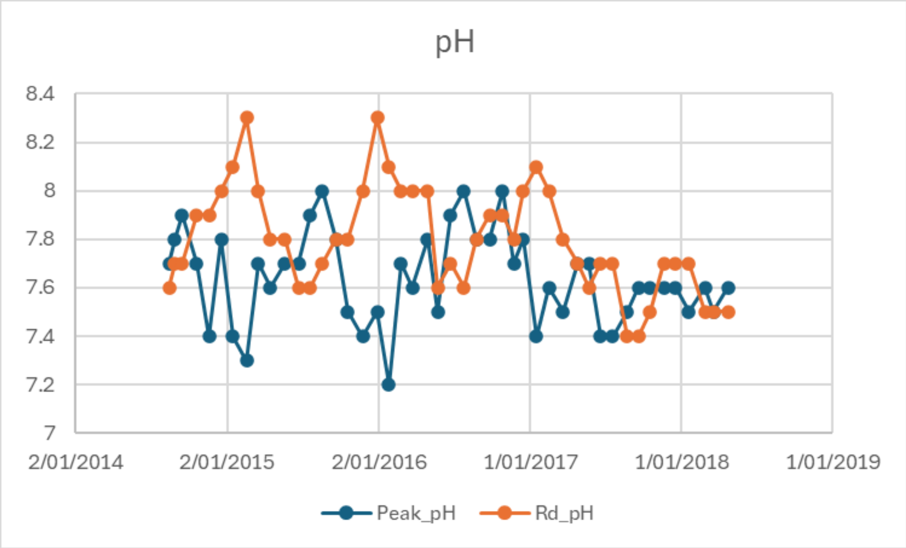

Figure 9: pH levels for Lindis Peak (Peak) and Ardgour Road (Rd)

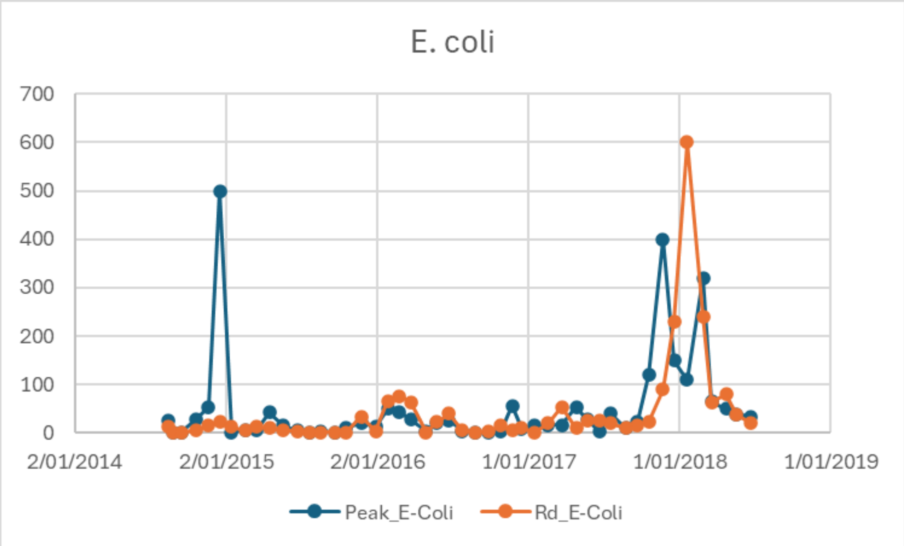

Figure 10: E. coli concentrations for Lindis Peak (Peak) and Ardgour Road (Rd)

The sole determinand that appeared to display consistent seasonal dependencies was nitrate nitrogen. Expanding on nitrate nitrogen plot in Figure 8, two plots were prepared of river nitrate nitrogen concentration alongside measured daily river flow at Ardgour Road monitoring site. Figure 11 plots a time series of nitrate at both Lindis Peak and Ardgour Road sampling site, alongside the measured mean daily flow rate. The distinction between the upstream schist rock dominated catchment of the Lindis Peak site and the downstream alluvium dominated catchment of the Ardgour Road site is probably the larger degree of groundwater-mediated baseflow at Ardgour road. Due to the large porous reservoir of alluvium immediately upstream of the flow and sampling monitoring site at Ardgour Road.

Figure 11 reveals nitrate nitrogen concentrations at Ardgour Road following the trend of flow rate, while the nitrate nitrogen concentration at Lindis Peak was markedly more volatile. Figure 12 reveals a strong pattern of dependence between flow rate and nitrate nitrogen concentration at Ardgour Road. It is inferred, based on studies in comparable braided river bed catchments, that nitrate accumulates in upstream alluvium and is flushed into surface water through to the river water column by high flows. Low flows are period of declining nitrate nitrogen concentration and depletion of the upgradient nitrate reservoir.

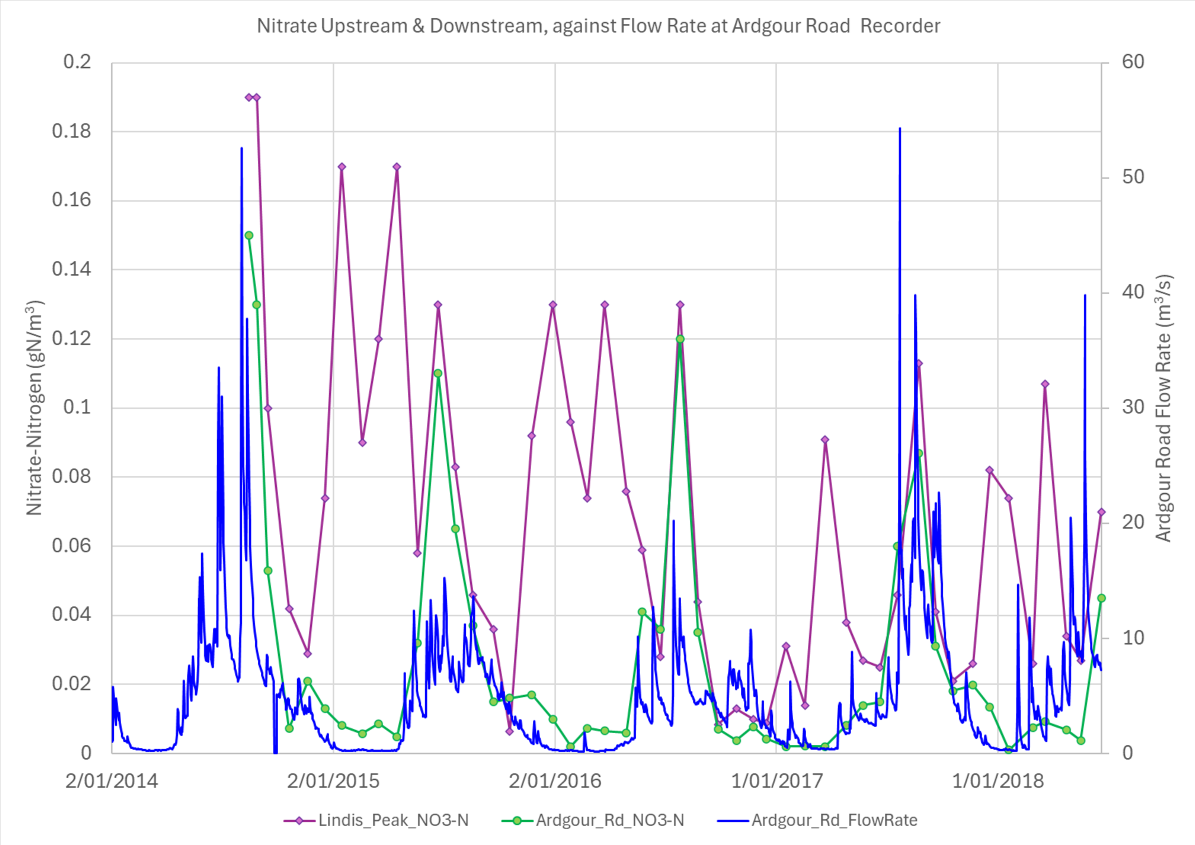

Figure 11: Trends in monthly nitrate-N at Lindis Peak and Ardgour Road daily mean measured flow rate

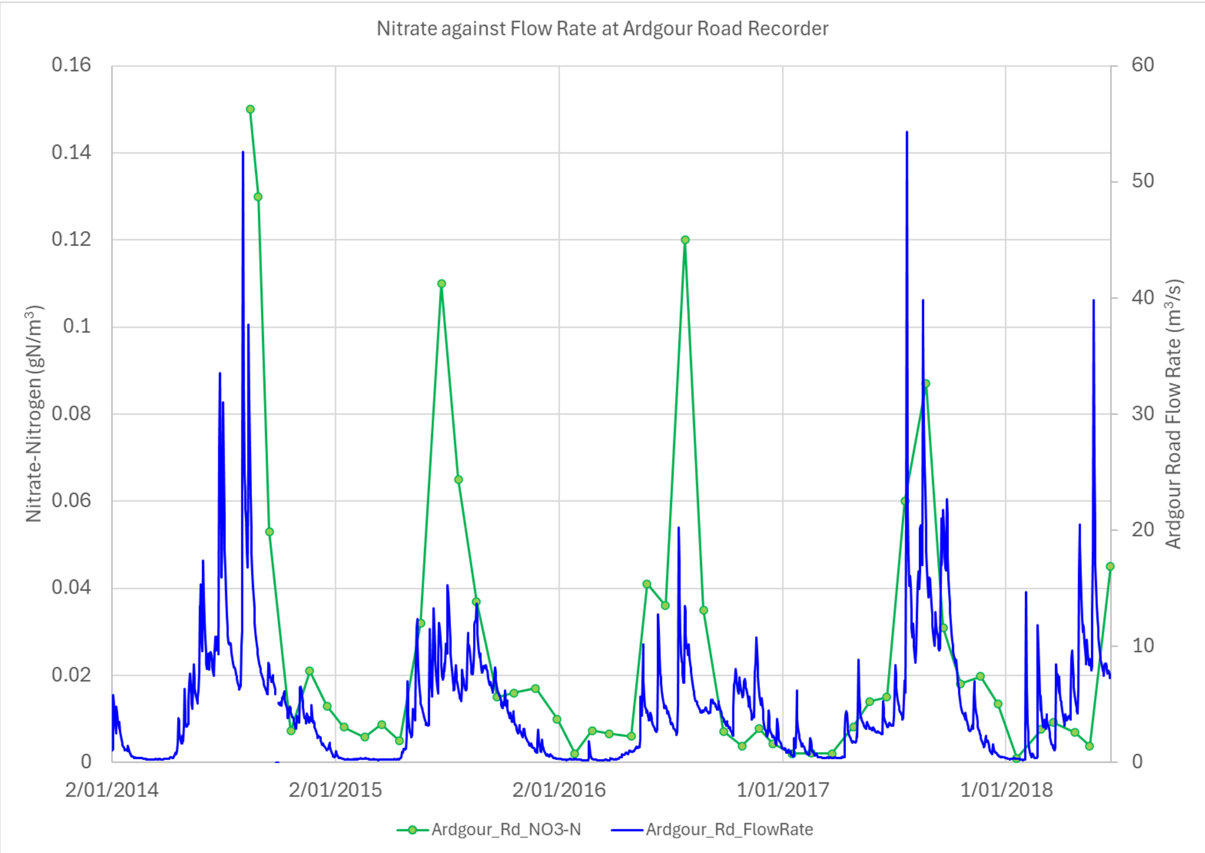

Figure 12: Ardgour Road monitoring site nitrate-N concentration and measured mean daily flow rate

Pastoral land use is the predominant inferred source of nitrate, which nitrifies in the soil profile and moves readily dissolved in soil water and groundwater to the Lindis Alluvial Ribbon Aquifer (LARA). The LARA ultimately discharges into the Lindis River before its confluence with the Clutha River, but particularly into the river bed immediately upgradient of the Ardgour Road monitoring site.

Dissolved inorganic nitrogen moves through the Lindis River primarily as nitrate, with ammonia about an order of magnitude lower in concentration and therefore mass load. This pattern is consistent with the mostly oxic geochemical characteristics of the gravelly alluvium making up the majority of upgradient subsurface vectors of catchment drainage. Nitrate nitrogen is generally associated with high velocity groundwater flow within high effective porosity, high permeability, and elevated dissolved oxygen content through the ground and hyporheic zone. Ammonia in groundwater is more generally associated with low velocity water flow within low effective porosity, moderate to low permeability, and suppressed dissolved oxygen content through the ground or wetlands.

IMPLICATIONS FOR ONGOING MONITORING

In the Shepherds Creek and lower Lindis River catchments, the BOGP operational and post-closure water quality risks include the multiple mode surface – subsurface – surface water vectors for potential contaminants such as arsenic, sulphate, nitrate, and other dissolved metals. The Lindis Valley water quality monitoring does not include sulphate but does include nitrate nitrogen. Other dissolved metals and metalloids have not been defined in existing monitoring.

Monitoring of nitrate has indicated that the baseline is influenced by volatility in the winter and spring season associated with high river flow rates and depletion with relative stability in concentrations associated with low river flows over the irrigation season and elevated evapotranspiration.

PROPOSAL FOR FUTURE MONITORING WITH MATAKANUI GOLD INVOLVEMENT

Monitoring Sites

It is proposed that surface water monitoring with an expanded and focused list of analytes should be undertaken as follows:

1. Continuation of monthly monitoring of the Lindis River at Ardgour Road

a. Consideration could also be given to the installation and maintenance of a continuous optical nitrate sensor for further spatial characterisation of ambient solute concentration trends.

2. Implementation of new monthly monitoring of Bendigo Creek at grid reference1314160 5018620 metres NZTM.

The Lindis River site would coincide with the ORC monitoring site in the lower river. The Bendigo Creek site would coincide with the Bendigo Station flow monitoring site that is a residual flow monitoring site for consent RM20.079.01 issued to Bendigo Station. This location coincides with a track crossing and ford, affording light vehicle access. The creek is considered to have perennial flow character at this proposed sampling site, which avoids the tenancy of lower reaches to lose creek flow during late summer.

Figure 13: Proposed surface water monitoring site at "Bendigo Creek monitoring station" **(Bright, 2020)**

Both proposed monitoring sites are collocated with existing flow measurement equipment. The ability to correlate the results of analysis with flow conditions is helpful in interpreting the concentrations or trends. Mass loads may also be calculated.

Analytes

The list of analytes would conform with the parameters and limits specified in Table 3 of the BOGP Water Management Plan.

Sampling Frequency

Monthly sampling and analysis frequency is proposed. As the basic objective of the surface water quality monitoring at Lindis River and Bendigo Creek is conjunctive assimilated catchment condition rather than trigger compliance limits, sampling frequency needs merely to characterise temporal trends in any seasonal fluctuation pattern. With such seasonal patterns characterised, the effects of upstream mining activities could be estimated in the context of downstream infiltration to groundwater. Both the Lower Lindis River and the lower Bendigo Creek contribute to groundwater sustaining irrigation galleries and bores operated during the 6 – 7 month irrigation season (October to April).

ENDS

Table 1: List of Analytes

Analyte
pH
Turbidity
Ammoniacal Nitrogen
Nitrate Nitrogen
Cyanide
Sulfate
Aluminium
Antimony
Arsenic
Cadmium
Chromium
Cobalt
Copper
Molybdenum
Zinc

Note: Green shading indicates overlap with ORC Lindis River monitoring analytes.

REFERENCE

Bright, C. (2020). *Hydrological assessment for flow losses / gains—Bendigo Creek* (Technical Comment No. S15298). Landpro.