BEFORE THE FAST-TRACK EXPERT PANEL

IN THE MATTER of the Fast-track Approvals Act 2024 ("FTAA")

AND

IN THE MATTER of Bendigo-Ophir Gold Project (FTAA-2507-1089)

JOINT STATEMENT OF EXPERT WITNESSES:

GEOCHEMISTRY / WATER QUALITY / HYDROLOGY / WATER MANAGEMENT / FRESHWATER ECOLOGY

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8 & 9 June 2026

INTRODUCTION

1. Expert conferencing on the topic of geochemistry / water quality / hydrology / water management / freshwater ecology took place online via Microsoft Teams from 8.00am-6.00pm on 8 June 2026 and 8.00am-6.30pm on 9 June 2026.

2. The conference was attended by the following experts:

   (a) Dr Paul Weber ("PW") (Applicant). PW had to leave conferencing between 3:30pm and 4:30pm on 9 June;
   (b) Julie Palich ("JP") (Applicant);
   (c) Ryan Burgess ("RB") (Applicant);
   (d) Gary Smith ("GS") (Applicant);
   (e) Dr Ian Boothroyd ("IB") (Applicant). IB had to leave conferencing between 4:40pm and 5:00pm on 9 June;
   (f) Laura Drummond ("LD") (Applicant);
   (g) Eric Torvelainen ("ET") (Applicant). ET only attended conferencing from 1.30pm-2:30pm and 5:15pm-6:30pm on 8 June 2026, and participated in agenda items J, R, U, and W(i) and (ii).
   (h) Dr Leanne Morgan ("LM") (Environmental Defence Society);
   (i) Professor Jennifer Webster-Brown ("JW") (Environmental Defence Society);
   (j) Alexandra Badenhop ("AB") (Otago Regional Council);
   (k) Dr Michael Greer ("MG") (Otago Regional Council). MG had to leave conferencing at 6:00pm on 8 June;
   (l) Kate McArthur ("KM") (Fish and Game);
   (m) Matthew Dale ("MD") (Kā Rūnaka); and
   (n) Mark Pizey ("MP") (Kā Rūnaka).

3. Steve Mutch (ChanceryGreen) acted as independent facilitator.

4. Caitlin Todd (ChanceryGreen) assisted the experts to draft the Joint Witness Statement ("JWS").

CODE OF CONDUCT

5. The experts confirm that they have read the Code of Conduct for Expert Witnesses contained in the Environment Court Practice Note 2023 and referred to in the Fast-track Approvals Act 2024: Panel Conveners' Practice and Procedure Guidance 22 July 2025, and agree to comply with it. The experts

confirm that the issues they have commented on in this JWS are within their area of expertise, unless stated otherwise.

SCOPE OF JWS

6. In Expert Panel Minute 8 (4 May 2026), the Panel directed experts in the topic of geochemistry / water quality / hydrology / water management / freshwater ecology to conference on identified focus areas. The Panel also provided a supporting paper, "Expert conferencing questions – water", which outlines additional topic-specific detail. Annexure 1 of Minute 8, together with that paper, has formed the basis of the conferencing agenda.

7. In this JWS, we report the outcome of our discussions in relation to each item (below), including by reference to points of agreement, disagreement, and unresolved matters or uncertainties. Where we are not agreed in relation to any issue, we have set out the nature and basis of that disagreement.

AGENDA ITEMS

8. In relation to agenda items below related to compliance and performance monitoring, all experts agree that best practice suggests that any compliance or performance monitoring should, among other things, be objective based, define what the monitoring is, its frequency, the trigger for response (or a mechanism and timeframe for defining that trigger), and what the possible response actions could be. However, KM considers that without more detail now of how this is addressed across the management plans it is difficult to be certain about whether compliance and performance monitoring adequately address risk, both construction and long-term.

9. IB considers that the response to a trigger should include an assessment of that effect in the environment for which that trigger is managing the risk.

<u>Water Quality / Geochemistry</u>

A. Oxygen ingress of the ELFs: Performance standards and monitoring in regards to oxygen ingress of the ELFs. Does this adequately address construction and long term risk?

10. AB, MP, JW and PW agree that the following should be included in the ELF Management Plan – section 8 (performance monitoring):

(a) Photographic records and geochemical testing of the surfaces to confirm oxidation processes.

(b) Surface run off and seepage water quality and triggers for sulphate and leading and lagging performance indicators. KM and MG agree with this point as surface water experts.

(c) Timeframes – doing the above (a)-(b) on a monthly basis on active/open areas would be appropriate.

(d) Section 8.3.3 (oxygen ingress) should include definition of oxygen probe monitoring requirements (temporal and spatial placement).

11. PW, AB, MD and MP agree that an initial/indicative SOP including addressing items (a)-(d) above should be prepared and, within 12 months, the SOP should be finalised addressing the above and in accordance with the findings of performance monitoring.

12. PW, MP, MD and AB consider the development of a certified SOP explained above, and the revised ELF Management Plan, would contribute to managing long term risk of oxygen ingress into the ELFs.

13. PW, MP, MG, MD, AB, LD, JW and KM consider that, in the event that oxygen ingress is not controlled and poor water quality eventuates, then water management (including treatment) is required as a mitigating factor. In the event this is required there must be sufficient provision of funding to ensure the scale, performance and duration of treatment. They note that this is not a solution to source control of contaminants but rather a mitigation where the idealised management is not achieved.

14. KM would like to see trigger levels defined at least within the management plans for what constitutes ‘poor water quality’ in the ELF surface runoff and seepage which triggers management responses in relation to both surface runoff and seepage from the ELF. Long-term (post active treatment) does not have performance monitoring defined in the water management plan, so long term risk from contaminants emanating from the ELF cannot be evaluated.

B. Sufficiency of baseline water quality data:

(i) Is the existing dataset sufficient to characterise baseline conditions?

15. AB and MG consider the baseline SC01 and RS03 surface water quality data is adequate/reliable for baseline condition assessment in the substantive application.

16. KM considers that the data provided with the application, alongside understanding the catchment context, was sufficient to determine the level of protection under the ANZG 2018 framework.

17. KM, JW, AB and MG note the data used in the baseline assessment that was used for the water load balance model was not collected for all of the sites or over more than a one-year period (beyond 2024).

18. JW and KM consider that at least two years of good data would be the recommended minimum for a baseline condition assessment.

19. PW notes that data has now been collected since September 2022 through until March 2026 and is ongoing at RS03 and SC01. In March 2026, SC01 had 56 samples and RS03 had 53 samples. PW, AB, JW, KM and IB consider that this data should be reviewed to confirm any variance between the initial assessment data and the updated data, and if/how this may affect predictions for compliance monitoring of water quality.

20. MG, PW, AB, JW, KM and IB acknowledge that confidence in the baseline data would be strengthened by the additional data noted above.

21. MG and KM note that the initial effects assessment did not include the Lindis or the Bendigo Creek prior to it dropping into the Bendigo Aquifer.

22. AB, JW, KM and LM do not consider the existing data set sufficient to characterise baseline groundwater conditions because no data was collected in the valley alluvium, veneer aquifer, and Ardgour Aquifer.

23. AB, JW and LM also note that there was minimal data collection on site within the deeper bedrock in a relatively small location (it was only collected within the pit footprint). This gap was discussed in the Groundwater JWS dated 14 & 15 May 2026 at paragraphs [94]-[97], and it was agreed in that JWS that further data collection was needed.

(ii) Is the characterisation of the current baseline conditions suitable for its use in modelling and assessment of state and effects?

24. JW, KM and AB consider that, with the amendments and caveats indicated under (i) above, the surface water baseline data are suitable for their use in the water load balance model.

25. MG, KM, MD, LD, IB and JW consider there is inadequate assessment of surface water quality in the downstream receiving environment outside the project footprint.

26. PW notes that the water quality at SC01 and RS03 was modelled in the closure phase.

27. Regardless of whether the data are suitable or not, MG, KM, MD, LD and IB note that there is no ecological effects assessment that considers current and predicted water quality for either the mine site or beyond the mine site.

28. As noted in paragraph 23 above, AB, JW, KM and LM consider there was inadequate groundwater baseline data collected and therefore it could not be considered suitable to assess the effects.

C. Adequacy of metallurgical data and understanding of ore and tailings geochemistry, including provision for ongoing data collection during operations to ensure operational and long-term risks are appropriately understood.

29. JW, MP and AB consider that the data collected to characterise the ore metallurgy and geochemistry is adequate to both predict likely tailings composition and to identify potential geohazards on the site. Leach tests and acid-base accounting procedures have been used to inform source term derivation for the Water Load Balance Model, but they acknowledge there are inherent uncertainties in the source terms that will be reduced by ongoing performance monitoring.

30. PW considers the assessment of the geoenvironmental hazards to be appropriate to understand the risks for acid and metalliferous drainage for project including the risks associated with nitrogenous compounds.

31. JW, MP, KM and AB note that it was recommended in MGL's joint response to RFI 4 dated 3 June 2026 (see paragraph [83]), that ongoing tailings data collection be undertaken during TSF operation (initially weekly, for ABA testing

and arsenic content). They support the TSF Management Plan being updated to include this recommendation. Together with TSF seepage performance monitoring data, this will improve understanding of the risks associated with TSF operation and legacy (post mine closure). They therefore consider that a sampling point from the tailings under drainage system (before it is mixed with the Shepherds ELF in the collection sump) needs to be added to the performance monitoring in Table 7 of the Water Management Plan, to undertake quality and continuous monitoring. PW also agrees with the last sentence.

D. Derived seepage water quality for the ELFs and TSF: Is the derived seepage water quality for the ELFs and TSF (utilised in the Water Balance Load Modelling) sufficiently reliable and conservative to assess treatment requirements and/or effects during operations and in the long term?

TSF

32. MP, AB, PW and JW consider that the derived seepage water quality from the TSF is robust and sufficiently conservative to enable the assessment of operational and long-term treatment requirements. They consider that adaptive management principles, based on performance monitoring data that informs the water balance load model, must be integrated into the Tailings and/or Water Management Plan(s) to reflect the operational reality. They also consider that the water balance load model should be updated if the annual review of water quality monitoring data indicates that conditions are significantly different from initial model predictions/assumptions and/or there are material changes to the mine plan (this could be as a modification to condition D.04 Schedule 2 NEW6(a)).

ELFs

33. MP, JW, AB and PW consider the predictions to be reasonable. They note that the characterisation of the ELF discharge is based on a mix of Bendigo leaching data and analogous empirical data. They consider that the water balance model needs to be updated when performance monitoring data for the seepage is available and indicates that seepage water quality is materially different to that predicted.

E. Mass load changes to the receiving groundwater

34. RB notes that analysis of sulphate mass load changes to receiving groundwater to Ardgour aquifer is provided in Jens Rekker's evidence dated 17 April 2026 (see paragraphs [16]-[70]).

35. KM, LM and JW consider that mass load changes to the receiving environment have not been specifically addressed for the Bendigo Aquifer or in the Ardgour Aquifer, with the exception of sulphate. However, they acknowledge that surface water loads have been calculated now, and these will have relevance to the load to the groundwater due to the connectivity.

36. KM notes that surface water loads include assumptions about the net percolation and treatment scenarios and are based on average conditions. KM also notes that uncaptured and untreated seepage is not included in the loading calculations.

37. LM and KM consider that Jens Rekker's calculations are built on a chain of models with unquantified uncertainty. They also consider that post closure estimates relied on assumed passive treatment performance (30% sulphate reduction) and does not account for uncaptured and untreated seepage.

38. JW, AB, LM, and KM note that the nature of the mass load to groundwater is predicated on the assumption that all (or nearly all) surface water reports to groundwater.

F. Implications for harvest of game birds from Bendigo Wildlife Management Reserve - potential for bioaccumulation

39. The experts intend to address this agenda item at reconvened conferencing (Day 3).

G. Contaminants bound to suspended sediments

40. MG, KM, IB, MD, LD and JP consider that metals bound to suspended sediment can contribute to the load to downstream receiving environments and can cause toxicity effects when deposited directly into receiving environments. They consider that this contribution has not been captured well by the compliance monitoring. These metals would not be picked up in the compliance monitoring currently proposed because the compliance monitoring is only for dissolved metals.

41. JW, KM, IB, MG, MD, LD, PW and JP consider that, during operation, sediment quality in Shepherds creek, and Rise and Shine / Bendigo creek is also of concern, as metals bound to deposited sediment can be remobilised during flood events, can have toxic effects, and form a reservoir for further metals release (including to groundwater), including load discharged from the WTP in dissolved form. They consider the currently proposed monitoring programme (in condition NEW 8 in D.04) needs further refinement to address this risk and sediment monitoring should be defined, including baseline conditions.

42. KM considers that the risks are higher for the Bendigo Creek catchment downstream of the project area and within the downstream environment when Bendigo Creek is connected to downstream water bodies by high flow events.

43. KM considers that the regularity of the connection of Bendigo Creek to the wider receiving environment has been understated in the application. The recent connection between Bendigo Creek and downstream surface waters is indicated by the presence of migratory and juvenile fish within the Bendigo catchment.

H. Underprediction of arsenic mobility and toxicity

44. This has been addressed under agenda item D.

I. Tailings chemical stability

45. This has been addressed under agenda item D.

J. Cyanide management

46. MP considers that a minimum performance standard for the use of cyanide in mining is represented by the International Cyanide Management Code (“ICMC”) and it is his view that this standard should be a requirement of this operation as an example of best practice in the industry.

47. ET considers there are some practical considerations around tailings management within the facility that need to be kept in perspective in terms of managing seepage. ICMC potentially requires full water cover of tailings which may have other effects that are less favourable. Each TSF requires specific consideration for the best outcomes for water quality.

48. PW notes that cyanide in tailings process water will be managed by conventional cyanide detoxification processes. Test work provided by MGL indicates that the detoxification process reduced cyanide from 66 - 85 mg/L to 0.21 – 1.25

mg/L. This complies with the ICMC guidelines that WAD cyanide in tailings be reduced to < 50 mg/L for the protection of wildlife and meets MGL's water quality targets of < 20 mg/L WAD cyanide in the tailings discharged to the TSF.

49. PW considers that the Water Management Plan should be updated with this cyanide detox process commitment and that the design objective meets the 50 mg/L that is the industry standard for the protection of wildlife.

50. GS and PW consider that TSF water treatment studies should consider cyanide destruct processes (D.02 condition NEW 6), should it be required.

K. Benchmarking against best available techniques and international guidelines

51. PW, MP, AB and JW consider that, in general, in preparation of the application/information, the best available techniques and international guidelines with respect to geochemistry data collection and interpretation have been followed.

52. MG, AB, KM, JW and JP consider that, in general, in preparation of the application/information, the best available techniques and international guidelines with respect to water quality data collection and interpretation have been followed, subject to the below.

(a) JW and KM recommend that National Environmental Monitoring Standards (NEMS) procedures be used for physico-chemical water sample collection, and this should be added to the Water Management Plan and/or conditions.

(b) As outlined in the discussion regarding baseline water quality data, AB, LM and KM consider that there has been insufficient collection of baseline groundwater quality data (both within the mine site and receiving environment) and that this is not in line with best practice. KM considers surface water data in the wider receiving environment was absent from the application.

(c) AB, KM and JW would have expected water quality be compared to irrigation guidelines. The application of irrigation limits is further discussed elsewhere in this JWS.

(d) MG and KM consider that the ANZG water management framework has not been correctly applied. This is also noted elsewhere in this JWS.

(e) MG and KM consider that the surface water effects assessment approach is not consistent with best practice. This is also noted elsewhere in this JWS.

L. Recovery of by-products

53. PW interprets this focus area has potential meaning for critical minerals by-products from mineral processing and potentially recovery of these from water treatment sludge (or other by-products such as brine). Water treatment sludge (or other by-products such as brine) is intended to be addressed at reconvened conferencing at agenda item P(iv). The experts' expertise does not extend to assessment of critical minerals, and this has not been addressed in the substantive application.

M. Consideration of sediment bound metals in water

54. This has been addressed in item G above.

N. Identification of the contaminants / environmental stressors of concern

55. The contaminants / environmental stressors of concern identified in the Water Management Plan are:

(a) Nitrogenous compounds (N) that include nitrate (NO3) and ammoniacal-N (AmmN).

(b) Sulfate (SO4).

(c) Metals and metalloids that may include aluminium (Al), arsenic (As), cadmium (Cd), cobalt (Co), copper (Cu), chromium (Cr), iron (Fe), manganese (Mn), molybdenum (Mo), nickel (Ni), lead (Pb), antimony (Sb), selenium (Se), strontium (Sr), uranium (U), and zinc (Zn).

(d) Cyanide (CN) within the tailings water.

(e) pH.

(f) NTU (as a proxy for suspended sediment).

56. MP, KM, IB, AB and JW consider that the following contaminants / environmental stressors are also of concern:

(a) Boron.

(b) Sulphide.

(c) Chemical oxygen demand (COD).

(d) Total Petroleum Hydrocarbons (TPH).

(e) Dissolved oxygen (DO).

57. JP, PW, MG, AB, MP, JW, KM and IB note that the identification of items in paragraphs 55 and 56 above do not necessarily indicate that a compliance or performance standard will be required in every case. This will be addressed later in the JWS.

58. JP, PW, MG, AB, MP, JW, KM and IB consider that any subsequent changes to the compliance limits (including as outlined in this JWS) may result in additional contaminants of concern being identified through the approach in the MWM reports and a review may be required.

59. AB and KM consider that sodium and chloride can be elevated as a result of mining and that these could pose a risk to irrigation water quality. This risk should be assessed in conjunction with the review of other potential contaminants of concern.

Water Management / Treatment

O. Net percolation assumptions / performance standards: Net percolation assumptions / performance standards adopted. Are these appropriate and sufficiently conservative to assess operation and long term risk?

60. The experts intend to address this agenda item at reconvened conferencing (Day 3).

P. Water Treatment

(i) Triggers for commissioning of the water treatment plant: Are they well defined, appropriate?

61. The experts intend to address this agenda item at reconvened conferencing (Day 3).

(ii) Post closure maintenance / operation of the water treatment plant (both active and/or passive): Is this adequately addressed / provisioned for? Duration of active treatment

62. The experts intend to address this agenda item at reconvened conferencing (Day 3).

(iii) Passive treatment viability: considering potential water quality and volumes. Is this adequately addressed / provisioned for? Duration of passive treatment

63. The experts intend to address this agenda item at reconvened conferencing (Day 3).

(iv) Sludge Disposal: Is this appropriately addressed?

64. The experts intend to address this agenda item at reconvened conferencing (Day 3).

Q. Site Wide transient WLBM: scope, definition, results, uncertainty and how this will feed into detailed design etc.

65. The experts intend to address this agenda item at reconvened conferencing (Day 3).

R. Consideration of climate change:

(i) Is it appropriately represented in the modelling / design

66. ET considers that the design of the TSF, diversion channels, and ponds, shall allow for the effect of climate change for the period of their operation. It is recommended that this is conditioned to provide confidence that this is actioned. This can be done by taking an appropriate Representative Concentration Pathway (RCP) climate scenario. Rainfall depths for these scenarios are provided by NIWA on the High Intensity Rainfall Database (HIRDs) for New Zealand for events up to a 1 in 250 year event. For design situations above 1 in 250 year the change in rainfall depth and intensity is taken as the value at 1 in 250 year level for lack of better information, or more detailed studies are undertaken to justify the design value. It is recommended that RCP 8.5 be taken due to the uncertainty that exists around climate change, unless further studies provide clear justification why a lesser RCP is appropriate.

67. RB considers that the water load balance model appropriately represents potential climate change effects on potential long-term effects on rainfall and potential evapotranspiration. Publicly available climate change projections were used to adjust rainfall and potential evapotranspiration for the SSP2-4.5 scenario for 2080-2099. MP and KM consider that the adoption of anything other than a worst-case scenario (RCP 8.5) is inappropriate.

68. ET considers that the use of climate change scenario 8.5 is potentially very conservative for the sizing of civil infrastructure items. Other climate change scenarios are potentially appropriate for other purposes; however, these are for specific consideration by those experts.

(ii) Are collection / sediment ponds appropriately designed to account for potential greater intensity of rainfall events.

69. ET considers that collection and sediment ponds are appropriately designed to account for potential greater intensity rainfall events where appropriate. Sediment ponds that are required for construction and are only present for a short period of time will be designed for historic rainfall depths. Sediment ponds that are required for operation will be designed for climate change scenario RCP 8.5 for the period 2031-2050. To be clear, diversion channels that are permanent for the closure of the site, will be designed for climate change scenario RCP 8.5 for the period 2081-2100. These design rainfall depths are based on the NIWA HIRDs. It is recommended that RCP 8.5 be taken due to the uncertainty that exists around climate change, unless further studies provide clear justification why a lesser RCP is appropriate.

S. Uncaptured seepage: Is this appropriately considered / addressed in the WLBM and ultimately groundwater assessments

70. The experts intend to address this agenda item at reconvened conferencing (Day 3).

T. Dust suppression water source and volumes required throughout project. Is the source of dust suppression appropriate and are stated volumes sufficient for dust suppression requirements?

71. The experts intend to address this agenda item at reconvened conferencing (Day 3).

U. Appropriateness of collection / storage ponds to minimise discharge to the environment.

72. ET considers that the sediment retention ponds apply appropriate design levels to minimise sediment discharge to the environment. Storm events that are larger than the design levels may pass higher sediment loads to the receiving waters; however, these volumes will still be a small amount. This is because the sediment retention ponds continue to function (less efficiently) in higher storm events.

73. JW, KM and MP note that, although it may be a small amount of sediment released relative to sediment on the site, it is a large amount for a small water system to assimilate and will provide a pathway for trace metals to enter this system.

74. KM adds that RS03 baseline monitoring data shows low sediment concentrations and turbidity. While the full range of flows are unlikely to be represented in the current RS03 dataset, these results are indicative of potential for sensitivity to sediment and associated contaminants.

75. ET notes that the Shepherds silt pond is designed to provide sediment retention in the form of a flow-through design basis. However, the pond also includes storage volume for 30,000m^3 of water. The total storage volume is effectively 70,000m^3 if surface water run off from the ELF needs to be contained and managed on site.

76. ET considers Shepherds Silt Pond can be converted from a flow through type sediment retention pond to a collection pond with water pumped back to the TSF. Allowing for freeboard and dead storage (for sediment), the volume available to be converted to water storage for collection is approximately 70,000m^3. The total catchment reporting to the pond is approximately 179 ha. In a 24-hour rain event the total runoff allowing for climate change in a 1 in 20-year event (upped from 1 in 10 year in the updated D.04 Schedule 2, Condition 40, April 2026) is estimated at approximately 90,000m^3. This is greater than the 70,000m^3 available in the presented design. Practically this additional volume is easily accommodated with a 1.5m increase to the crest level. This change is minor due to the Shepherds Service Corridor valley infill and can be accommodated within the current project footprint of the project. In the proposed consent conditions there is no limit on the crest height of this silt pond to provide flexibility for such situations. However, there is a limit in D.04 Condition 41 (Schedule 2), on the total volume of Shepherds Creek Silt Pond. From a practical perspective it is recommended that

the maximum volume at the crest full situation is increased from 90,000m^3 to 112,000m^3 required to manage a collection pond situation. It is noted that dam design and safety is managed under the Building Act (2004) and Building (Dam Safety) Regulations 2022.

77. MG and KM consider that before closing off the flow from the silt pond is considered, further work is needed around the water quality benefits versus the hydro ecological costs of reduced flood flows.

78. MP, PW, AB and ET consider that sediment retention ponds shall be utilised, together with the use of flocculant, if required, for the treatment of suspended solids. MP, KM, AB and PW consider that the use of flocculant should trigger the requirement for a chemical management plan. JW, AB, KM and PW consider that the choice of flocculant and its use must not have an adverse effect on the environment and be dealt with in the Chemical Management Plan as needed.

V. Adaptive Management Approach: Is this sufficiently outlined, provisioned for? Longevity and duration of active management.

79. The experts intend to address this agenda item at reconvened conferencing (Day 3).

W. Water supply for wetland: Construction of a biodiversity wetland on the TSF is proposed as a major part of the ecological mitigation package. To sustain wetland vegetation and provide wetland habitat for wildlife the wetland requires a fresh water supply for most of the year (10 months plus) and wet soils all year. Are the following appropriately addressed:

(i) How will the proposed wetland receive water and from where?

80. ET notes the northern diversion channel above the TSF in operation will be diverted. However, the northern diversion channel above the TSF will be disestablished during closure, and flows onto the TSF cap surface will be established. The springs will provide some base flow to the wetland. Further, the catchment above the TSF reporting to the wetland is approximately 600ha and run off from rainfall events will contribute to water levels in the wetland when they occur. There are practical considerations that are required for this to be successful. This includes the conveyance of flows across the capping to the wetland without notable losses, impoundment of shallow water within the wetland area behind a small perimeter bund and understanding of the seasonality of flows

from the springs. All of this is required to be developed for successful closure achieving the desired ecological outcomes. There will need to be update of the Mine Closure Plan following detailed design as per new consent condition D.03 C115 prior to closure and agreed with key stakeholders.

81. Importantly, ET notes that a cap will be installed to protect the water quality of the wetland and maintain tailings integrity if the water level is low. Practically, this is a capping of weathered brown rockfill and topsoil. This requirement is included in consent conditions D.03 and C41 of Schedule 1.

(ii) What confidence is there that the wetland will receive a constant water supply (surface and/or groundwater)?

82. MP, LM, RB, KM, LD, JW, MD, IB and AB consider that, whilst surface water flows exist above the final surface of the TSF, no evidence has been presented to confirm a constant water supply, year-round, will be available. Further, no mitigation for low or zero flow situations has been proposed.

83. MP, LM, RB, KM, LD, JW, MD, IB and AB recommend that, to address this absence of data, detailed modelling of flows above the TSF surface and an associated water balance calculation, reflecting seepage and evapotranspiration from the wetland area, be undertaken. They would also like to see continuation of flow monitoring of contributing streams to capture dry conditions to support the mine closure planning.

(iii) What are the contingencies for natural on-going supply?

84. The experts intend to address this agenda item at reconvened conferencing (Day 3).

(iv) Expected chemical composition of the water in a wetland positioned on top of tailings: What is the expected chemical composition (including pH) of the water in a wetland positioned on top of tailings? Is there risk of contaminant leakage into the wetland sufficient to cause plant mortality?

85. The experts intend to address this agenda item at reconvened conferencing (Day 3).

(v) Expected chemical composition of pit lake water quality

86. The experts intend to address this agenda item at reconvened conferencing (Day 3).

Compliance

X. Proposed surface water and groundwater compliance locations: Appropriateness of proposed surface water and groundwater compliance locations in terms of:

(i) Capturing effects of potential offsite discharges

87. The experts intend to address this agenda item at reconvened conferencing (Day 3).

(ii) Addressing effects to offsite receptors

88. The experts intend to address this agenda item at reconvened conferencing (Day 3).

Y. Monitoring schedule: Is the monitoring schedule sufficient to capture effects including site water management practices, hydrological variation, seasons etc.

89. The experts intend to address this agenda item at reconvened conferencing (Day 3).

Z. Discharge water quality standards / Compliance limits for water quality: Appropriateness of proposed compliance water quality - both actual limits, contaminants of concern, resultant mass loading (chronic versus acute) with a particular focus on:

(i) Nitrate N + Ammoniacal N

90. JW, JP, MG, MD, IB, AB and KM acknowledge that the nitrate and ammoniacal nitrogen compliance limits are consistent with the national bottom line in the National Objectives Framework (NOF) of the NPS-FM (Band B) for toxicity assessment.

91. However, KM, IB, MD, JW and MG note NPS-FM-based compliance limits proposed for ammoniacal nitrogen and nitrate toxicity are of significantly higher concentration than those consistent with the protection of other components of

ecosystem health (e.g. excessive periphyton growth). Allowing such high nitrogen concentrations under the proposed water quality standards, despite the fact that modelling suggests that such levels are not required following treatment, would, in their opinion, increase the risk of nuisance periphyton growth and associated significant adverse effects on aquatic life.

92. KM, JW, MD and MG consider that the risk of nuisance periphyton growth identified above undermines the ecological benefits anticipated from the applicant's proposed diversion and enhancement works. IB considers the risk *could* undermine these anticipated ecological benefits if persistent excessive periphyton growth occurs.

93. MG, JP, IB and JW agree that, provided that the periphyton management approach proposed in revised proposed condition D.04 NEW 7(f) is retained, the most practical way to set nitrate and ammonia limits that reduce the risk of nitrogen-driven periphyton growth is to:

    (a) align with the modelled outcomes presented in MWM (2025); while

    (b) allowing an appropriate buffer to account for model uncertainty.

94. KM agrees with paragraph 93 above in theory but has a lack of confidence in the modelled concentration outputs for the NP20 treated case that result from uncertainty in the assumptions underpinning the model, and with the ability for both active and passive treatment to achieve the necessary reductions in nitrogenous concentrations given the scale and enduring nature of the discharges.

95. PW and GS state that they intend to provide updated estimates on active water treatment efficiencies for nitrogenous compounds to support the new derivation of nitrate and ammoniacal nitrogen compliance limits by others.

(ii) Appropriateness of 90th versus 95th % ile ANZG standards where appropriate

96. MG notes that examples of slightly to moderately disturbed systems accommodate a wide range of human influences and associated disturbance. The examples provided below assume that the degree of disturbance reflects the attributes described above:

    (a) rural streams receiving runoff from land disturbed to varying degrees by grazing or pastoralism.

(b) waterways downstream of townships or mineral extraction activities.

(c) coastal ecosystems adjacent to urban areas.

97. KM considers that the Project surface water quality monitoring data is not indicative of a highly disturbed system and therefore the 90% species protection level from ANZG is not appropriate to determine the compliance limit. KM considers that the characterisation of the environment is incorrect based on the baseline surface water quality data. KM considers that 95% species protection level is more appropriate because the receiving environment water quality is consistent with a slightly to moderately disturbed system.

98. MG, JW, JP, IB, LD, MD and KM agree that the RAS and Shepherds creeks meet the ANZG definition of slightly to moderately disturbed systems. Thus, the ANZG toxicant DGVs for the protection of 95 percent of species should be applied, except for arsenic at RS03 which should be retained as the 90% species protection threshold. Unless stated otherwise in this JWS, limits not based on the ANZG DGVs should be retained in their current form except for nitrate and ammonia.

99. MG, JW, JP, IB, LD, MD and KM consider that the compliance standards based on the ANZG DGVs should be applied as 95th percentiles in the compliance standards as opposed to the current approach of using hard maximums to be consistent with ANZG water management framework.

100. KM notes for the information of the Panel, the methods for assessment using the DGV under the ANZG framework are included as Appendix 1 of her statement.

(iii) Surface water arsenic compliance standard (proposed 90%ile ANZG of 0.042 mg/L) versus groundwater drinking standard of 0.01 mg/L

101. AB, MD and KM consider that, given the potential for minimal or no dilution of surface water in the Ardgour aquifer, groundwater drinking standards for arsenic need to be applied to surface water at SC01.

102. JW notes that this could be addressed by the changes suggested for the arsenic compliance limits in the Shepherds creek catchment in paragraph 98 above as the 95% ANZG guideline for arsenic (As) is 0.013 mg/L. AB, MD and KM agree this would be adequate to achieve the purpose of protecting the drinking water quality of the groundwater with respect to arsenic.

(iv) Additional limits such as dissolved oxygen, chemical oxygen demand, petroleum hydrocarbons, sulphide, iron, manganese, mercury, sodium, chloride, EC

103. KM considers low dissolved oxygen is a critical stressor for aquatic life. A compliance limit and continuous monitoring should be applied to the discharge from any treatment system discharge.

104. PW supports the need to implement continuous dissolved oxygen monitoring once the water treatment system commences as some waters may have a high oxygen demand (e.g., TSF seepage) and the passive treatment system could use anaerobic processes.

105. MG, MD, AB, JW and KM consider that a good alternative to receiving environment monitoring would be to require continuous dissolved oxygen monitoring in the active and passive treatment system discharges and to set a compliance limit specifying that dissolved oxygen shall not be less than 4 mg/L at the point it enters Shepherds Creek and Rise and Shine Creek as this removes a lot of the difficulties with continuous monitoring devices in dynamic river systems (i.e. less chance of probes being washed away and upstream influences impacting compliance).

106. JW and KM consider that from the surface water quality compliance limits, sulphide, iron, boron, manganese, mercury and selenium are all missing. ANZG guidelines should be used where appropriate, unless otherwise stated below in (a)-(d).

(a) Sulphide: PW, KM, AB and JW agree there should be a compliance limit for sulphide once treatment commences. The compliance limit could be the greater of the lowest available detection limit or the 95% ANZG protection.

(b) Iron and manganese: PW supports a compliance limit for iron and manganese for aesthetic purposes. AB considers that, to support the current value of the stream which can be used for irrigation water, the compliance limits need to be 0.2mg/L for iron and 0.2mg/L for manganese in accordance with the ANZECC Guidelines. JW and KM agree with AB.

(c) Boron: PW notes that TSF seepage waters could be up to 0.825mg/L for boron. AB, JW and KM consider that there should be a compliance limit for boron given there is a surface water take at the bottom of the Shepherds creek catchment. They consider that, to support the current value of the

stream which can be used for irrigation water, the compliance limits need to be 0.5mg/L for boron in accordance with the ANZECC Guidelines.

(d) Mercury and selenium: JW considers that mercury and selenium bioaccumulate in the food chain and should be included in the sediment monitoring and if found to be elevated relative to baseline conditions, that should elicit a management response. JW notes that mercury and selenium bind to sediment and can be elevated in sediment even when not detected in the water. PW notes that this monitoring could be part of consent condition D.04 NEW 8. MG considers that, at a minimum, mercury should be included in NEW 8 and selenium could also be monitored under this condition.

(i) KM and MD consider periodic (e.g. every five years) tissue sampling of fish in the receiving environment (Lindis and Bendigo creek) should be undertaken to assess bioaccumulation risk to humans from consumption. MG and JP disagree that tissue monitoring is needed because there would be no way to attribute this to MGL.

(ii) PW, MD and KM agree that any such fish bioaccumulation monitoring should commence once treated water is being discharged from site.

107. MG and KM note for the information of the Panel, that the suggested compliance standards above for iron, manganese and boron are more stringent than relevant ANZG DGV for the protection of 95% of species (0.28 mg/L, 1.9 mg/L, 0.94 mg/L respectively).

108. Sodium and chloride have been discussed in relation to identification of potential contaminants of concern above at paragraph 58. AB, JP and KM consider that if sodium and chloride exceed irrigation guidelines in receiving waters they would be considered potential contaminants of concern and should be managed accordingly.

109. KM, MG, AB and JP agree that a performance monitoring standard is not needed for COD (chemical oxygen demand), as it is covered by the performance monitoring standards in Table 7 which specifies DO.

110. JP and AB consider that risks associated with TPH can be identified and managed through operational controls and surface water quality monitoring should only be required if a hydrocarbon release was identified as posing a credible risk to waterways.

111. AB, JW, PW and KM note that the Water Management Plan should be updated to clearly outline the performance monitoring parameters such that all potential contaminants of concern are included (current descriptions are general).

112. PW recommends that the frequency of compliance and performance monitoring should be considered in an adaptive manner with time. This may include a change in monitoring frequency and/or monitoring variables if risks change. It is proposed that 2 years of monitoring (monthly testing) is required once stable trends are identified before any reduction is considered as confirmed by a suitably qualified and experienced person (SQEP). This timeframe is in alignment for the ANZG baseline monitoring requirements of 2 years and provides a mechanism to ease unnecessary monitoring requirements.

113. KM disagrees with the above because the changing nature and long timescale of the contaminant discharges means that any stable or reducing concentrations may not be apparent for decades into the future. Stable trends is not a defined term.

114. MG and KM also disagree that flexibility should be provided in compliance monitoring.

(v) Dissolved versus soluble limits

115. The experts discussed this; however, this agenda item will be addressed in reconvened conferencing (Day 3).

(vi) Groundwater versus surface water limits

116. The experts discussed this; however, this agenda item will be addressed in reconvened conferencing (Day 3).

(vii) Receiving environment values

117. The experts intend to address this agenda item at reconvened conferencing (Day 3).

AA. Appropriateness of proposed performance monitoring, adequacy of triggers and actions as outlined in Water Management Plan to address these.

118. The experts intend to address this agenda item at reconvened conferencing (Day 3).

BB. Appropriateness for stock water, irrigation, water quality standards: Appropriateness of proposed compliance limits with regards to the relevant stock water, irrigation, water quality standards.

119. The experts intend to address this agenda item at reconvened conferencing (Day 3).

CC. Monitoring data collection and availability: Appropriateness of availability, transparency, independence.

120. The experts intend to address this agenda item at reconvened conferencing (Day 3).

DD. Bioaccumulation in the receiving environment. Is this addressed in the proposed compliance standards?

121. The experts intend to address this agenda item at reconvened conferencing (Day 3).

EE. Effects of mass discharge to the receiving environment: Are the effects addressed and well understood? Consideration of effects on aquatic life, consumption by farm animals etc (RMA s107).

122. The experts intend to address this agenda item at reconvened conferencing (Day 3).

<u>Freshwater ecology (excluding wetlands)</u>

FF. Downstream impact of any contamination on the freshwater environment

123. MD and IB consider that the freshwater ecological values were adequately characterised, and the baseline information was adequate to inform the freshwater ecology assessment.

GG. Stream loss, diversion design and offsetting

124. MD, MG and IB agree that the proposed activities will result in the permanent removal of 7.1km from Shepherds Creek and 1.5km from Rise and Shine Creek. The Applicant proposes to create approximately 9.6km of rehabilitated stream diversions for Shepherds Creek and approximately and 1.6km of rehabilitated stream diversion for Rise and Shine Creek.

125. AB, MG, RB, LD, IB and MD agree that, hydrologically, the Shepherds Creek will function very differently once diverted. Whilst the identified springs in the headwaters of the stream will still provide some baseflow to the stream, the system will no longer be connected to groundwater along the valley floor. Whilst the baseflows at SC01 will increase due to increased seepage through the ELF and TSF, and the flows from the RAS underground portal, the flows will only be returned to the creek below the water treatment plant, as they will be collected for treatment. These flows will not contribute extra baseflow above this discharge location.

126. MD and IB note that, to address time lags in enhancement of stream diversions and restoration of existing stream habitat, the Applicant has proposed to compensate by undertaking willow management and riparian vegetation enhancement activities along approximately 6.7km of the Bendigo and Clearwater Creeks.

127. MD notes that there are approximately 2.5km of stream length with visible willow canopy within the proposed restoration area Bendigo and Clearwater Creeks.

128. MG, MD, LD and IB agree that, once fully established, the proposed stream diversion plan is a suitable method of addressing the effects of reclamation and permanent diversion, while acknowledging that the creeks will have different water quality and flow characteristics from what is there currently. IB notes that ecological communities and functionality will have a similar character. MG and MD disagree because they expect that a change in water quality, habitat and flow characteristics would change ecological communities and functionality.

129. MD considers that there is significant uncertainty around the ecological effects of the combined impacts of stream diversion/restoration, water quality and flow regimes. MD considers that the current proposed compensation measures for freshwater ecology do not adequately address the effects of lags in the proposed restoration and uncertainty created by changes in water quality and hydrology. MD considers that further compensation is required to address this gap.

130. IB considers that the compensation component of the effects management package provides for the temporary effects (time lag). Therefore, further compensation is not required. MG considers further compensation is not required because the values of the stream, the short duration, and the stream loss is of a small scale compared to the wider Lindis catchment.

131. MD is of the view that the translocation of Clutha Flathead Galaxias (Threatened – Nationally Vulnerable) into Shepherds Creek will provide an adequate compensation to address the issues raised above, as well as wider ecological impacts of the proposed activities. IB, LD and MG disagree that translocation of fish forms any part of the effects management given that fish are not present within the Rise and Shine or Shepherds Creek. However, they note that this does not preclude the Applicant from proposing to do so outside of the consent.

132. IB and MD consider that, if translocation were to be undertaken, they are of the view that a translocation plan should be developed and implemented for Clutha Flathead Galaxias that outlines the suitability of current and predicted habitat in Shepherds Creek, source and release sites, programme of works, statutory processes, and prevention of trout invasion.

133. MD notes that the potential translocation of Clutha Flathead Galaxias as part of an effects management package also sits within the wider landscape-scale biodiversity impacts of the proposed activity, not just those relating directly to freshwater. As such, it may form part of a compensation package that addresses wider impacts on native ecosystems and biodiversity.

HH. Aquatic ecology and stream ecological valuation monitoring (SEV)

134. MG, LD, MD and IB consider that the SEV is suitable for how it is used in proposed Condition 22(e), i.e. comparison of baseline condition with final stream diversion design (on paper). They agree that SEV does not need to be conducted for any other purpose in relation to this proposal.

135. MG and IB agree that Condition 22 could be amended as follows (IB considers this better reflects the calculations for the remediation of the creeks):

> *(b) as much as possible, the steam diversion channel must be of a similar length ~~and stream area than~~ to the channel to be reclaimed. This aims to ensure that there is no loss of extent and values of the watercourse.*
>
> *(f) The ~~length and~~ area of the final diversion at seven day mean annual low flow shall be equal to or greater than that measured in the corresponding diverted reaches prior to works beginning.*

II. Management of periphyton

136. MG and IB consider the approach to periphyton management in proposed condition NEW 7(f), with refinement, is reasonable.

137. MG and KM consider that refinement to proposed condition NEW 7(f) should include identification of causes by an SQEP and, if attributable to the discharge, a requirement for design and implementation of additional nitrogen removal within a certain timeframe.

138. IB considers there may be other mechanisms for managing persistent periphyton growth.

139. MG, IB, LD, MD and KM agree that monthly cover monitoring, and summer (November-April) monthly biomass monitoring, is adequate.

From Groundwater Joint Witness Statement

JJ. Have potential impacts to Ardgour / Bendigo Aquifers been appropriately addressed in terms of consideration of sediment bound metals in water leaving the site

140. JW, RB, JP and AB note that sediment-bound metals do not generally travel through groundwater systems, so this is not of significant concern in contrast to surface water systems (see agenda item G above).

SIGNATURES OF EXPERTS

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Ryan Burgess

Gary Smith

Dr Leanne Morgan

Professor Jennifer Webster-Brown

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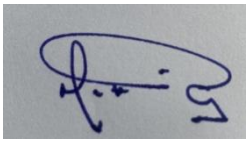

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