Bendigo-Ophir Gold Project

Water Resources Impact Assessment Summary

Prepared for Matakanui Gold Ltd (Santana Minerals Ltd)

August 2026

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E260840 RP1

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Version	Date	Prepared by	Reviewed by	Comments
1	13 August 2026	C West, M Forbes, J Radford	D Weatherill	Draft for client review
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Approved by

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17 August 2026

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Executive Summary

Matakanui Gold Limited (Matakanui) is seeking approval for the Bendigo-Ophir Gold Project (BOGP), Otago, New Zealand under the *Fast-track Approvals Act 2024*. The BOGP Expert Panel has directed the Environmental Protection Act (EPA) to request further information relating to the BOGP application.

To support the request for information and the application process, Matakanui Gold Limited engaged EMM Consulting Pty Ltd (EMM Consulting) to provide a supporting overarching document that summarises all water-related aspects of the Project.

An extensive body of works have been submitted as part of the *Fast-track Approvals Act 2024* application. These works include but are not limited to:

- baseline reports which characterise the existing environment and environmental values of the Project area
- environmental effects assessment reports which consider the effects of the proposed Project on the environment and recommend measures to appropriately manage any adverse effects
- technical/factual reports which have informed the design of the Project.

Informed by the outcomes of these reports, the overarching objective of this report is to present a consolidated overview of the:

- water-related environment in which the proposed Project would operate
- risks and potential impacts of the Project on water resources
- monitoring, management and mitigation measures to be implemented during construction, operation and post-closure.

The report summarises this information by presenting several key sections:

- surface water, groundwater and geochemical setting of the Project area
- risks and potential impacts of the Project on water resources
- monitoring, management and mitigation measures to be implemented during the construction, operational, closure and post-closure phases of the Project.

In summarising the extensive body of works, uncertainties related to Project water management and associated potential constituents of concern (PCoC) have been identified. Such uncertainties are common prior to Project commencement, with on-going data collection, analysis and predictive modelling required to reduce uncertainty as Project development progresses.

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1 Introduction

1.1 Background

Matakanui Gold Limited is proposing to establish a gold mining operation referred to as the Bendigo-Ophir Gold Project (BOGP, the Project) in the Dunstan Mountains of Central Otago, New Zealand, located approximately 20 kilometres (km) north of Cromwell. An application made by Matakanui Gold Limited under the Fast-track Approvals Act 2024 seeks to authorise the integrated development of four identified gold deposits – Rise and Shine (RAS), Come in Time (CIT), Srex (SRX) and Srex East (SRE). The BOGP would involve establishment of staged open pits, an underground mine, a modern gold processing plant and associated infrastructure and ancillary activities.

The BOGP would encompass 610 hectares (ha) of privately owned pastoral lands of the Bendigo Station and Ardgour Station, within the semi-arid high-country area of the Dunstan Mountains. Over the past 100 years, the land has been extensively grazed with sheep and cattle although was historically subject to alluvial, eluvial and hard-rock gold mining.

The application made by Matakanui Gold Limited under the *Fast-track Approvals Act 2024* comprised an extensive body of works including, but not limited to, the Substantive Application report, technical reports, environmental assessment of effects, and proposed conditions and management plans. Subsequent to the application submission, expert conferencing and hearings have been held and further information, including additional technical reports and revised management plans, has been provided to relevant government agencies and the Expert Panel.

1.2 Project overview

The Project would comprise the following key water-affecting activities:

- staged establishment of the RAS Open Pit and Underground Mine, and SRX Open Pit, which will remain as open voids forming pit lakes post-closure
- establishment of the CIT Open Pit, which will be progressively backfilled with waste rock from the RAS Open Pit and rehabilitated
- establishment of the SRE Open Pit, which will transition to the SRX engineered landform (SRX ELF) and be progressively backfilled with waste rock from the adjoining SRX Open Pit
- establishment of an engineered Tailings Storage Facility (TSF) in the upper reach of Shepherds Valley (including a seepage collection sump), which will utilise overburden waste rock from the development of the RAS Open Pit and be buttressed by the Shepherds Engineered Landform (ELF)
- establishment of three ELFs to permanently store overburden waste rock, being the Shepherds ELF, SRX ELF and Western ELF
- a conventional hard-rock gold processing plant in the lower reach of Shepherds Valley, along with associated infrastructure and ancillary activities
- realignment of Shepherds Creek to form the Shepherds Stream Diversion (as part of wider stream diversion activities)

- establishment of temporary topsoil, vegetation and brown rock[1] stockpiles around the Project site
- establishment of the Shepherds Silt Pond at the base of the Shepherds ELF and water storage tank(s) for use at the processing plant and for dust suppression
- abstraction of groundwater from the Bendigo Aquifer via a lawfully established bore and a proposed new bore for use in mining-related activities (and to augment flows in Shepherds Creek, Rise and Shine Creek and wetlands).

1.3 Report objectives and scope

An extensive body of works have been submitted as part of the *Fast-track Approvals Act 2024* application. These works include but are not limited to:

- baseline reports which characterise the existing environment and environmental values of the Project area
- environmental effects assessment reports which consider the effects of the proposed Project on the environment and recommend measures to appropriately manage any adverse effects
- technical/factual reports which have informed the design of the Project.

Informed by the outcomes of these reports, the overarching objective of this report is to present a consolidated overview of the:

- water-related environment in which the proposed Project would be developed
- risks and potential impacts of the Project on water resources
- monitoring, management and mitigation measures to be implemented during construction, operation and post-closure.

1.4 Documents reviewed

Table 1.1 lists the reports, expert witness statements, management plans and notes relating to technical expert panel meetings that were reviewed and used to inform the contents of this report.

Table 1.1 List of documents reviewed

Number	Title	Author and date
Technical Reports		
B.02	Bendigo Groundwater Bore Take Effects Assessment	Komanawa Solutions Ltd 2025d
B.03	Groundwater Existing Environment and Effects Assessment	Komanawa Solutions Ltd 2025b
B.04	Surface Water and Catchment Existing Environment and Effects Assessment	Komanawa Solutions Ltd 2025a
B.05	Groundwater Modelling Analysis for Mining Bendigo-Ophir Gold Deposit	Komanawa Solutions Ltd 2025c
B.06	Mine Impacted Water Overview Report	Mine Waste Management 2025a
B.06A	Mine Impacted Water Overview Report – Appendix B to G	Mine Waste Management 2023, 2025b-c

[1] Weathered rock immediately underlying topsoil, likely comprising weathered schist and alluvium

Number	Title	Author and date
B.06C	Mine Impacted Water Overview Report – Appendix I to O	Mine Waste Management 2025d-h
B.07	Recommended Water Quality Compliance Limits for the Bendigo Ophir Gold Project	Greg Ryder Consulting 2025
B.12	Bendigo-Ophir Gold Project Wetland Values Assessment	RMA Ecology Ltd 2025
B.17	Bendigo Ophir Gold Project: Assessment of Effects on Aquatic Habitat	Water Ways Consulting 2025
B.20	Site-Specific Seismic Hazard Study Report	Engineering Geology Limited 2025b
B.21	Shepherds Tailings Storage Facility Technical Report	Engineering Geology Limited 2025c
B.22	Site Geotechnical Factual Report (3 Parts) (4 Documents)	Engineering Geology Limited 2025a
B.23	Shepherds Silt Pond Technical Report	Engineering Geology Limited 2025d
B24	Rise and Shine Pit – Creek Diversion Technical Report	Engineering Geology Limited 2025e
B25	Process Plant, Infrastructure and Admin Areas Geotechnical Report	Engineering Geology Limited 2025f
B26	Erosion and Sediment Control Report	Engineering Geology Limited 2025g
B27	Shepherds, Western and Srex ELFs and Come in Time Pit Backfill Technical Report	Engineering Geology Limited 2025h
B28	Geotechnical Assessment Open Pit and Underground Mining – Rise and Shine Deposit	Peter O'Bryan & Associates 2025
B41	BOGP Post Closure Active Water Treatment Plant Order of Magnitude Study	Process Flow 2025
B42	BOGP Wetland Drawdown Assessment	Hydro Geochem Group 2025a
B43	BOGP Flow Augmentation Strategy	Hydro Geochem Group 2025b
K.01	Post Closure Impacts of Bendigo Ophir Gold Deposit on the Ardgour Aquifer	Komanawa Solutions Ltd 2026a
K.05	BOGP MWSF Seepage Risk Assessment	Hydro Geochem Group 2026
Expert Witness Statements		
11	Ecotoxicology – Greg Ryder	Greg Ryder Consulting 2026
12	Environmental Chemistry and Water – Paul Weber	Mine Waste Management 2026
13	Hydrogeology – Ryan Burgesss	Hydro Geochem Group 2026
14	Surface and Groundwater – Jens Rekker	Komanawa Solutions Ltd 2026
15	Water Treatment – Gary Smith	Process Flow 2026
16	Mine Closure – Chantelle Dodge	Mine Closure Management 2026
17	Environmental Geoscience – Julie Palich	Geocontam Risk Management 2026
25	Geotechnical – Peter O'Bryan	Peter O'Bryan & Associates 2026
26	Geotechnical – Eric Torvelainen	Engineering Geology Limited 2026
27	Geotechnical and Tailings Storage – Trevor Matuschka	Engineering Geology Limited 2026
Management Plans		
G.01	Water Management Plan	Matakanui Gold Limited 2026a
G.15	Engineered Landform Management Plan	Matakanui Gold Limited 2026b

Number	Title	Author and date
G.16	Tailings Management Plan	Matakanui Gold Limited 2026c
G.17	Pond and Reservoir Management Plan	Matakanui Gold Limited 2026d
G.20	Soil Management Plan	Matakanui Gold Limited 2026e

2 Surface water, groundwater and geochemical setting

2.1 Site setting

The Project area is located in the Bendigo area of Central Otago, on the north-western flank of the Dunstan Mountains (refer Figure 2.1). The Bendigo area, situated in the Upper Clutha Valley, lies between the urban areas of Wanaka and Cromwell, with the Project site located approximately 20 km north-east of Cromwell. Pastoral farming and viticulture are prominent in the Bendigo area, in addition to scenic and historical reserves and associated public conservation areas.

The Project area is predominantly located in incised valleys of the Dunstan Mountains. The topography of the Project area rises from the Ardgour Terrace at 370 metres above sea level (mRL) to the head of the Rise and Shine Valley at 970 mRL, known as Thomsons Saddle (refer Figure 2.2).

2.1.1 Land use

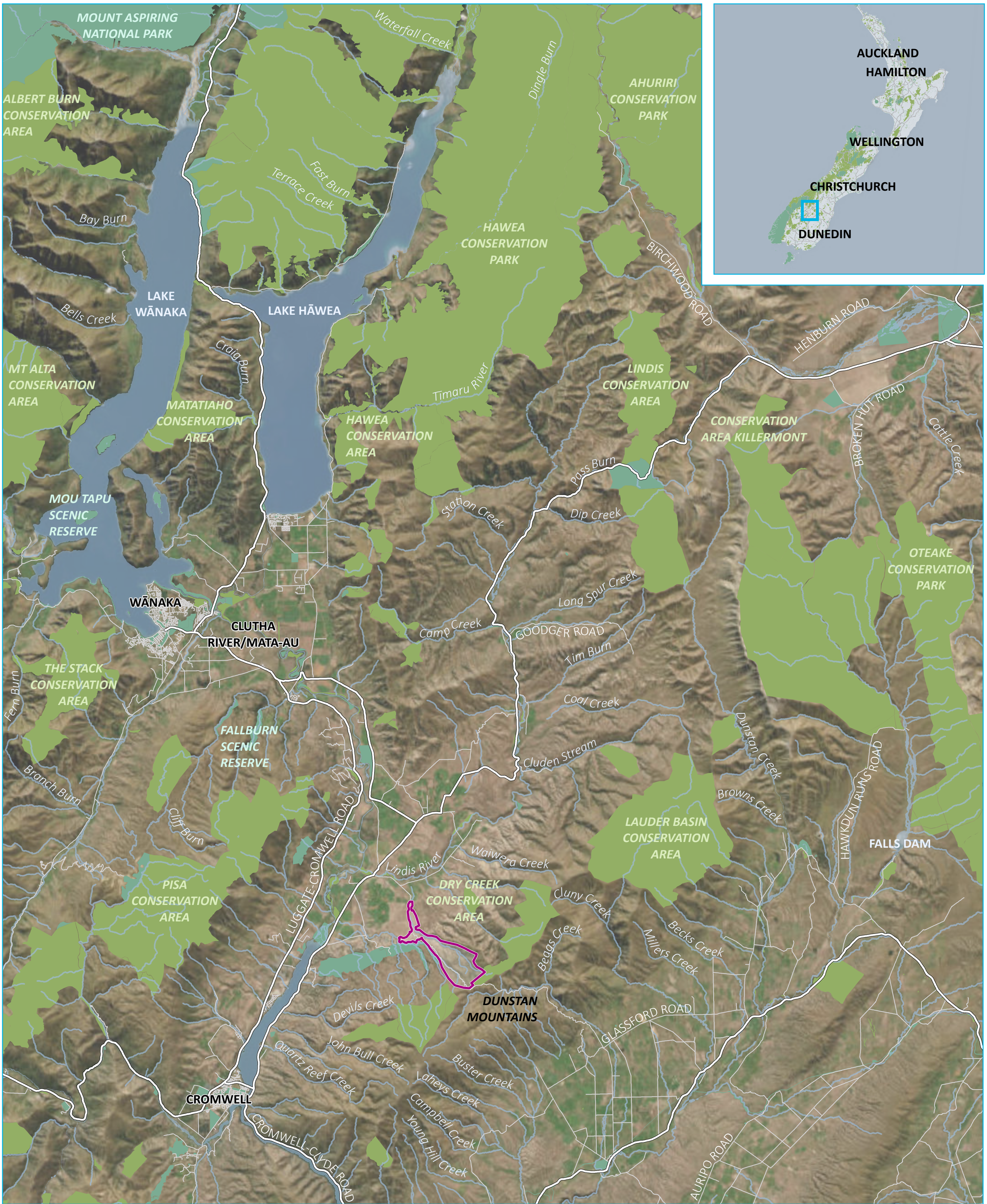
The Project would encompass 610 ha of privately owned pastoral lands of the Bendigo Station and Ardgour Station. Over the past 100 years, the land has been extensively grazed by sheep and cattle. With the exception of minor infrastructure associated with pastoral activity and historic mining activities, the Project area is largely undeveloped.

The Project area would also include supporting infrastructure and facilities on the Ardgour Terrace which is located at the base of the Dunstan Mountains and bounded by the Clutha River/Mata-Au to the west and the Lindis River to the north (refer Figure 2.2). The terraces support agricultural and horticultural activities including improved pasture, vineyards, orchards and residences.

2.1.2 Historic mine workings

Gold mining activities commenced within and adjacent to the Project site in the mid-1860s and continued intermittently until the mid-1960s. An archaeological survey conducted by Lawrence et al. (2019) identified 59 historic mine archaeological sites within and directly adjacent the Project area, including stamping batteries and processing areas, underground mine adits, mullock piles, tailings mounds and sluicing areas. The mine sites and associated workings are considered hazardous activities and industries under the *Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011*.

Within the Project area, remnant impacts of historic mining activities are evident including the accumulation of sluicing debris and migration of tailings along creek beds, adits, mullock piles, and the former battery sites (Geocontam Risk Management 2025).



Source: EMM (2026); LINZ (2026); ESRI (2026)

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KEY

Project area

Existing environment

Major road

Minor road

Named watercourse

Named waterbody

National Park/Reserve

Conservation Area

INSET KEY

Major road

National Park/Reserve

Conservation Area

Regional setting

Bendigo-Ophir Gold Project
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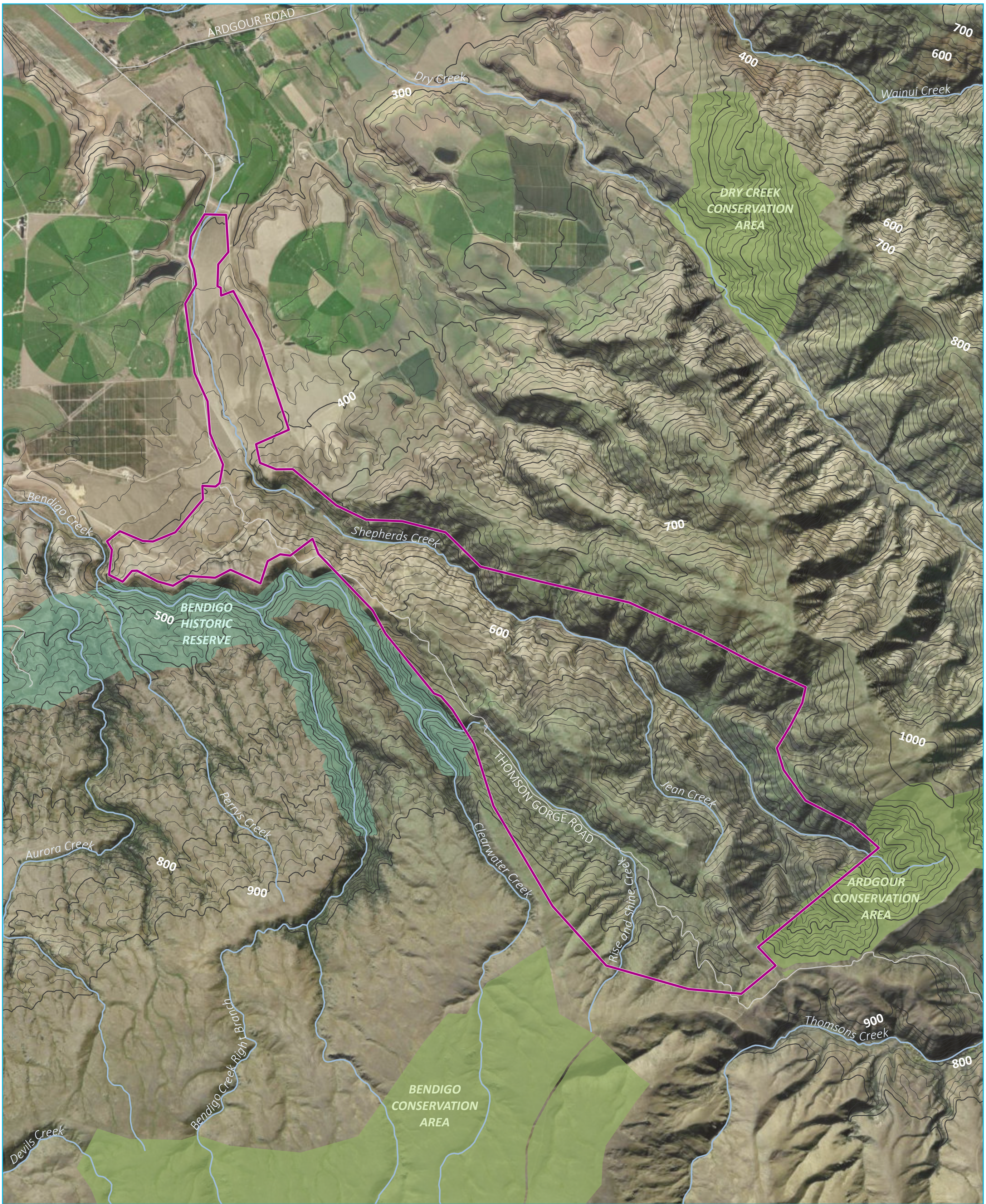

Source: EMM (2026); LINZ (2026); ESRI (2026)

0 1 2 km
NZGD 2000 UTM Zone 59S
N

KEY

Project area

Existing environment

Minor road

Contour (100 m interval)

Contour (20 m interval)

Named watercourse

National Park/Reserve

Conservation Area

Project area topography

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2.1.3 Climate

Based on the Koppen-Geiger classification, the climate is classified as temperate, with no distinct dry season and a warm summer (Cfb). Frosts and snowfalls occur frequently in autumn, winter and spring, while in summer and early autumn temperatures often exceed 30 degrees Celsius (°C) (Matakanui Gold Limited 2026).

Central Otago is the driest region in New Zealand, with the valley floors of the Bendigo-Tarras district among the driest in Otago (Matakanui Gold Limited 2026). Mean annual rainfall of 437 millimetres (mm) was recorded at Cromwell over the period 1981 to 2020 (Mine Waste Management 2023). Mean annual rainfall, recorded over the period November 2022 to January 2025 at three locations within the Project area, ranged from 466 mm to 507 mm (Komanawa Solutions Ltd 2025a). As illustrated in Figure 2.3, synthetically derived potential evapotranspiration (PET) rates for the Project area (approximately 930 mm/yr) are close to twice that of rainfall (approximately 500 mm/yr), with potential evapotranspiration rates likely to exceed rainfall in all months with the exception of May to July.

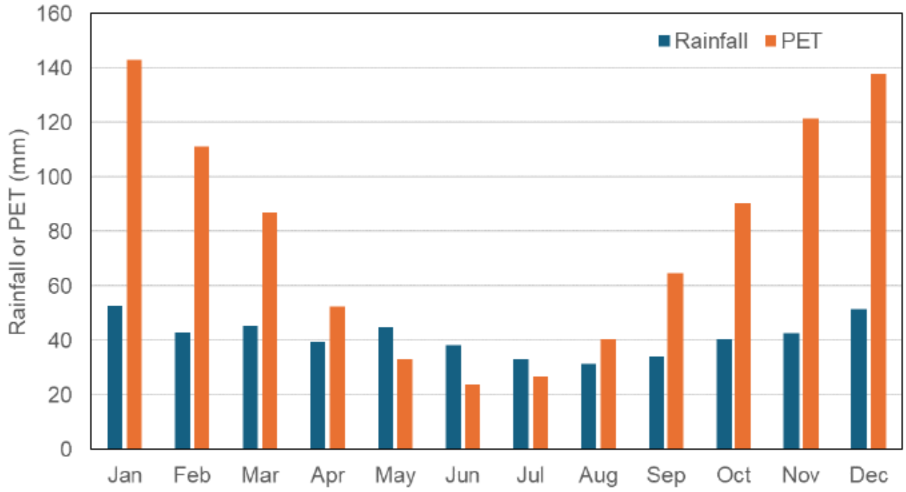


Figure 2.3 Average monthly synthetic climate data summary (Mine Waste Management 2025a)

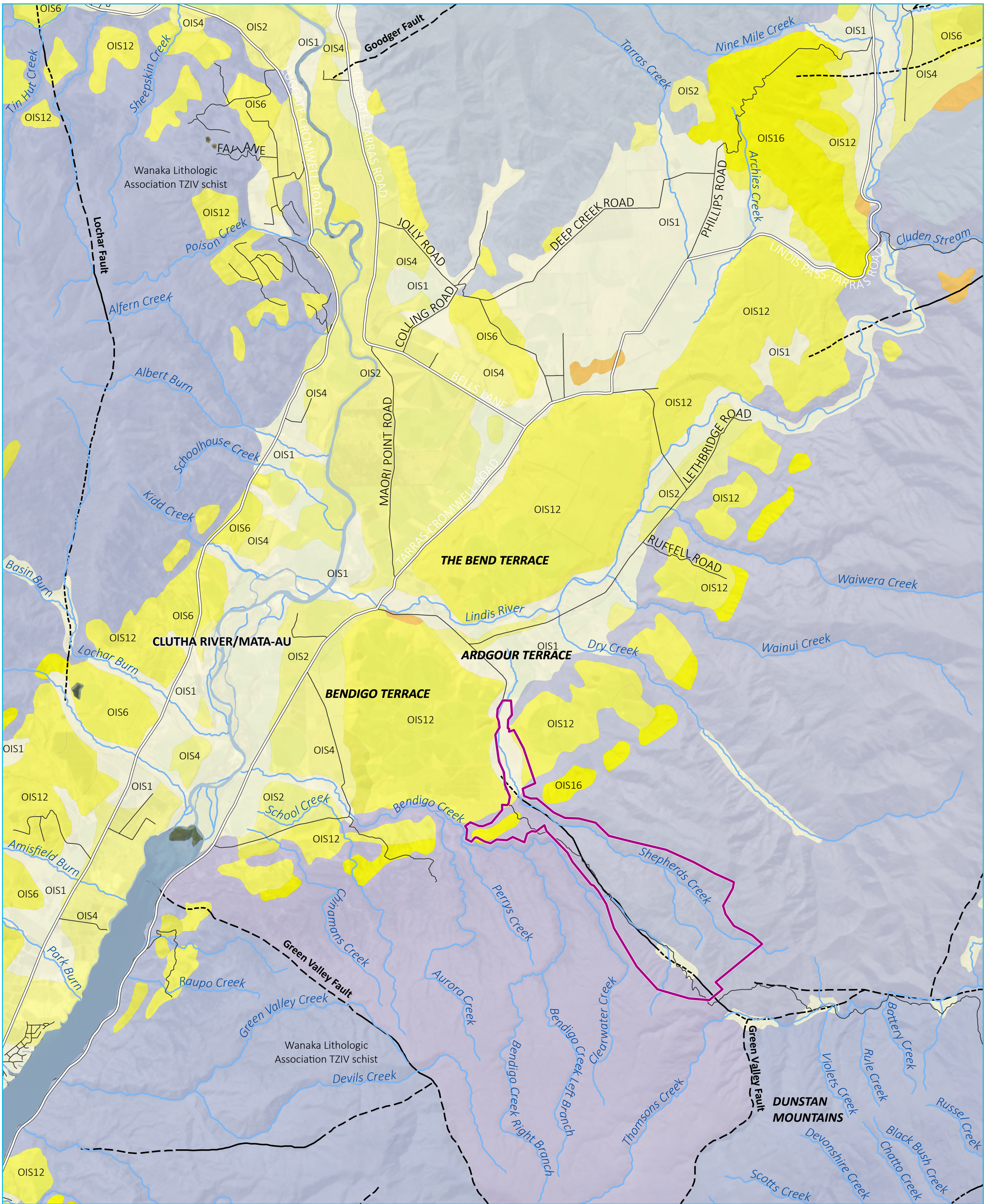
2.1.4 Geology

i Overview

The Project area is located in the Bendigo-Tarras basin which is underlain by Haast Schist of the Rakaia Terrane. The basement rock of the Dunstan Mountains is formed in the Haast Schist, an up to 18 km thick layer of grey quartz-feldspathic metagreywacke interlayered with micaceous meta-argillite and shallow dipping greenschist (Peter O'Bryan and Associates 2025; Komanawa Solutions Ltd 2025b). The greenschists are derived from Permian-Triassic (330-300 million years ago) sedimentary mudstones and sandstones. Metamorphism of these sedimentary units occurred in the Cretaceous (140-75 million years ago).

As illustrated in Figure 2.5, the core zone of the Dunstan Mountains area is strongly foliated and segregated garnet-biotite-albite zone schists (Torlesse Terrane Textural Zone IV (TZ4)). These schists are bounded to the north by the Thomsons Gorge Fault, a gently north north-easterly dipping normal-slip (refer Figure 2.5). Separated from the TZ4 by the Thomsons Gorge Fault is a chlorite schist zone (Torlesse Terrane Textural Zone III (TZ3)).

Orogenic gold mineralisation occurred in the zone of the Thomsons Gorge Fault in the axis of a fold creating the Rise and Shine Shear Zone (RSSZ), which is a length of approximately 20 km. Mineralogically the RSSZ consists of ankerite and siderite alongside arsenopyrite, galena and sphalerite. Consequently, the unit is enriched in arsenic.



Source: EMM (2026); LINZ (2026); ESRI (2026)

0 2.5 5 km

NZGD 2000 UTM Zone 59S

N

KEY

Project area

Existing environment

Rail line

Major road

Minor road

Named watercourse

Named waterbody

Fault (inactive)

Fault exposed, location accurate

Fault, exposed, location approximate

Fault concealed, location approximate

Geological unit (250K)

Bannockburn Formation and Dunstan Formation (Manuherikia Group)

Early Pleistocene river deposits

Maniototo Conglomerate (Hawkdun Group)

OIS1 (Holocene)

OIS10 (Middle Pleistocene)

OIS12 (Middle Pleistocene)

OIS16 (Early Pleistocene)

OIS2 (Late Pleistocene)

OIS4 (Late Pleistocene)

OIS6 (Middle Pleistocene)

Undifferentiated Manuherikia Group quartzite

Undifferentiated Pleistocene to Holocene glacier deposits

Undifferentiated Rakaia Terrane Permian to Triassic TZIIB semischist

Undifferentiated Rakaia Terrane Permian to Triassic TZIII schist

Undifferentiated Rakaia Terrane Permian to Triassic TZIV schist

Wanaka Lithologic Association TZIV

Terrace Labels

DunstanMountains_01pl_MD_2026081

Surface geology

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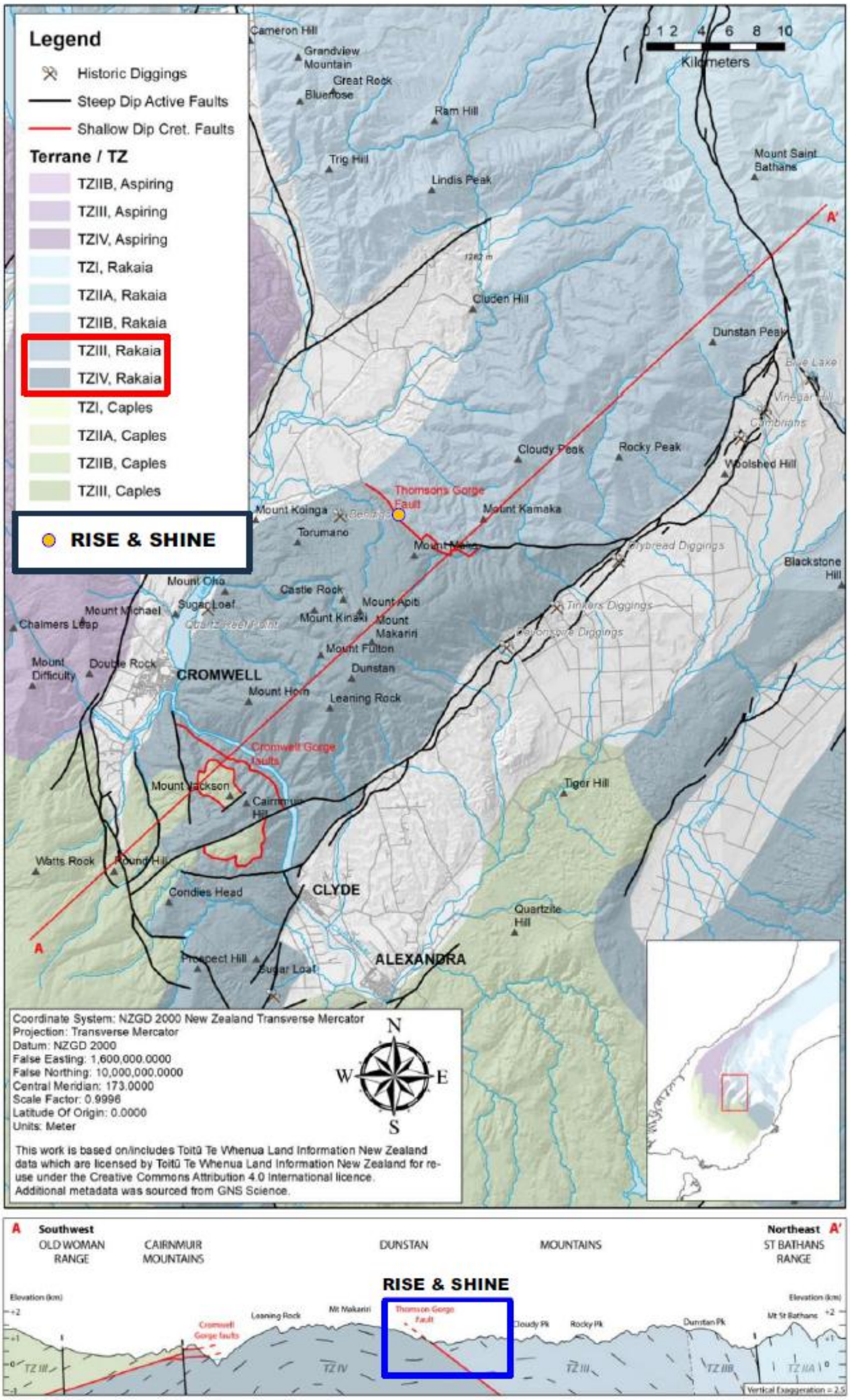


Figure 2.5 **Textural zones of Haast Schist in the Dunstan Mountains region, Otago, New Zealand (Peter O'Bryan and Associates, 2025)**

Tertiary-aged (Miocene and early Pliocene epochs) quartz sand and gravel sediments were deposited on the schist unit and are primarily preserved in localised structural basins of the Upper Clutha Valley. Restricted surface outcrops of these sediments are present in the lower Lindis River valley as Dunstan Formation quartz sand and gravel with lignite seams or Maniototo Conglomerate weathered in a sandy matrix (Komanawa Solutions Ltd 2025b).

During the Early Pleistocene a combination of de-glaciation and land surface uplift generated the outwash of glacial till, meltwater deposits and riverine gravels. The valley floor river terraces and flats are stepped sequences of three outwash surfaces: Albert Town (71,000 – 59,000 years ago), Hawea (17,000 – 12,000 years ago) and Holocene (14,000 years ago). The three outwash sequences share similar grainsize and textural properties and, therefore, in combination form the Bendigo Aquifer groundwater management zone (Komanawa Solutions Ltd 2025b).

Pleistocene deposits of slender thickness and extent are present on the Dunstan Mountains, including alluvium in the Rise and Shine Creek, outwash remnants, and landslide deposits in steep areas of the Shepherds Creek catchment.

ii Geological units, structural geology and landforms

The main geological units, structures and landforms within the Project area, as shown in Figure 2.4, Figure 2.6 and Figure 2.7, are summarised from Engineering Geology Limited (2025a) and Earth Sciences New Zealand (formerly GNS Science)[2] as follows:

Dredge tailings and sluiced gravels: Washed and redeposited quartz -schist gravels and sand encountered as a veneer overlying pre-existing surfaces downstream of historic gold workings.

Loess: Locally, on the lower flatter slopes the loess may have been deposited as a thin ‘blanket deposit’ with a depth of 1 to 2 m thick while on steeper slopes it has been remobilised and forms a thin loess/colluvium slope wash unit containing material from the underlying rock.

Holocene landslide deposits: Deposits ranging from shattered rock to clay and boulder breccias, typically derived from underlying adjacent rocks. It may be described in some references as colluvium and slope wash deposits.

Undifferentiated Quaternary landslide deposits: These deposits are older than the Holocene deposits but have a similar composition and, in some locations, may have been overlain by more recent Holocene landslide deposits.

Alluvial deposits and fans (Q1): Undifferentiated, typically unconsolidated, variable weathered gravels with interbeds of sands, silts and clays. This unit was generally encountered in the valley floor of the Project area and is comprised of clays, silts, sands and gravels derived from parent materials upslope of the deposition location.

Late Pleistocene outwash deposits (Q2): Bedded, locally derived, unweathered to slightly weathered sandy gravel in low terraces in non-glaciated catchments.

Till (Q12 & Q16): These deposits comprise till and outwash gravels and are generally present as terraces against the western side of the Dunstan Mountains to the east of the Lindis River.

Torlesse TZ3 Schist (Rakaia Terrane, Whakatipu Group) (Yt3): Permian to Triassic era undifferentiated pelitic and psammitic schist and greenschist sequences. This unit may be locally weathered to a silty gravel.

Torlesse TZ4 Schist (Rakaia Terrane, Whakatipu Group) (Yt4): Permian to Triassic era undifferentiated pelitic and psammitic schist and greenschist sequences; may be variably segregated, veined and foliated.

Thomson Gorge Fault Gouge: This deposit typically comprises a band of material 2 to 10 m thick derived from movement on the Thomson Gorge Fault. In general, this material comprises clays with some angular gravel and forms a ‘marker bed’ separating the TZ3 and TZ4 schist within the Project area.

2 GNS Science, NZL GNS 1:250k Geology, accessed at: https://data.gns.cri.nz/geology/

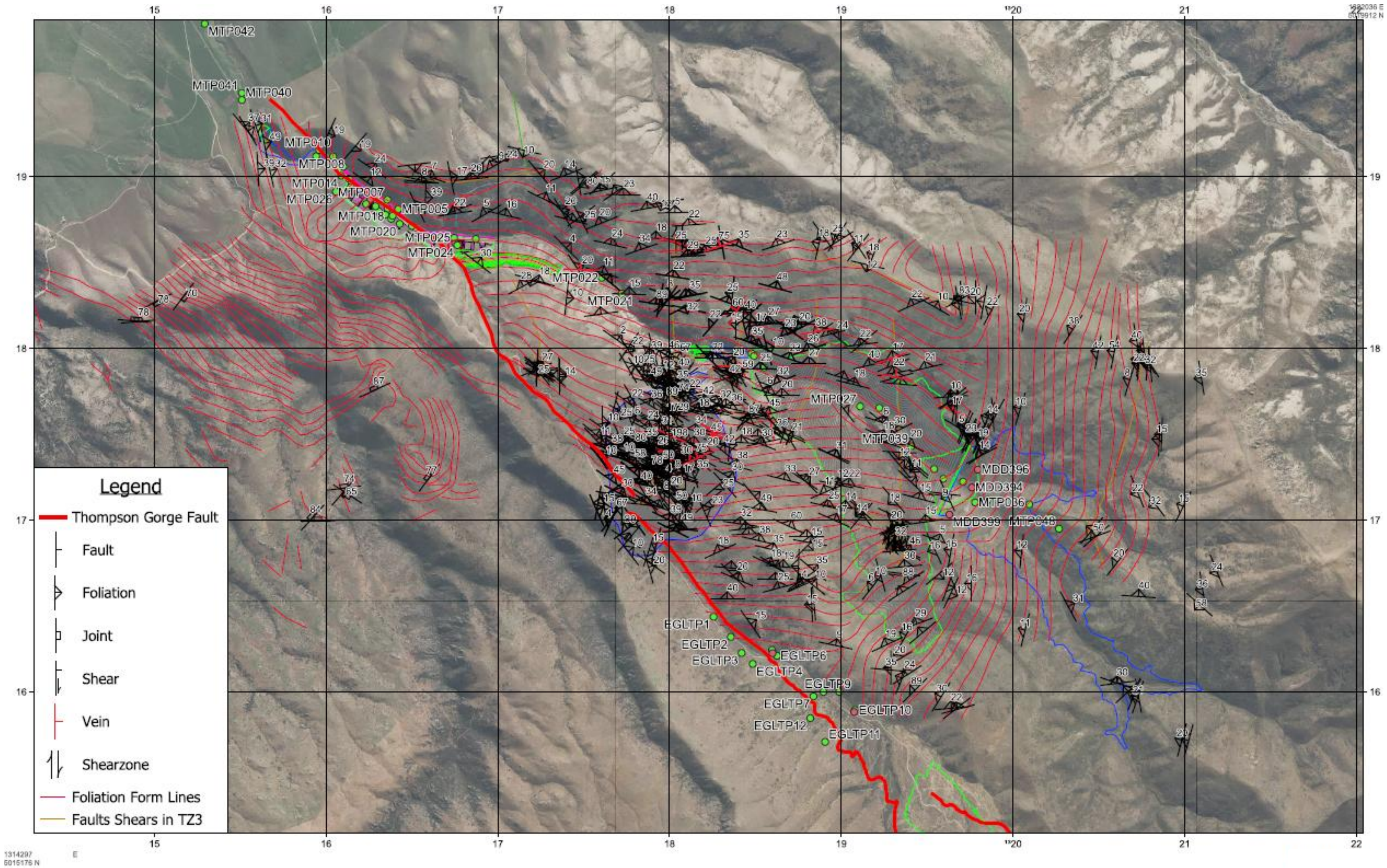


Figure 2.6 Joints, foliation and shear zones on schist outcrop in the Project area (Engineering Geology Limited 2025a)

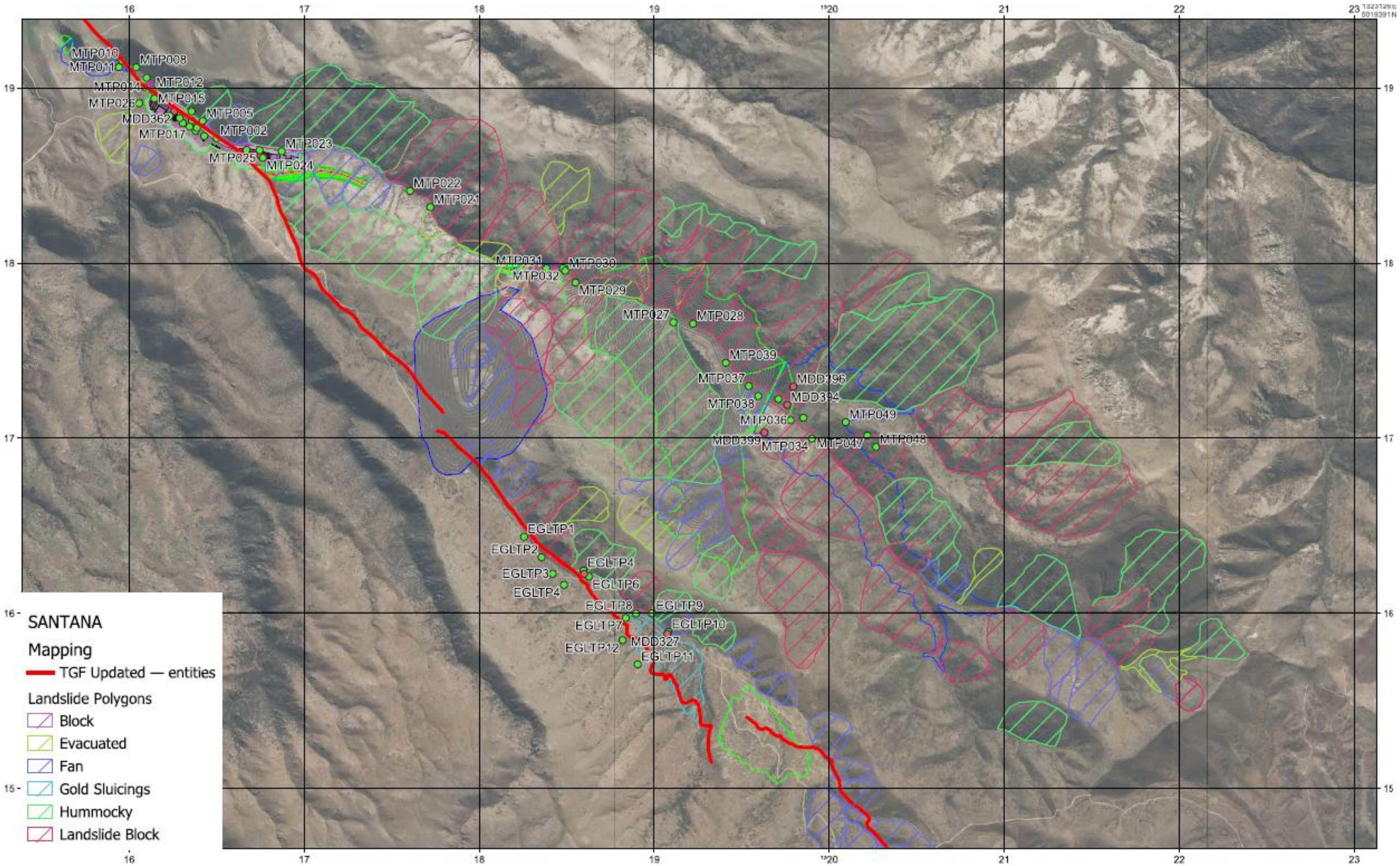


Figure 2.7 Natural and manmade landform features of the Project area (Engineering Geology Limited 2025a)

2.2 Surface water systems and water resources

2.2.1 Regional setting

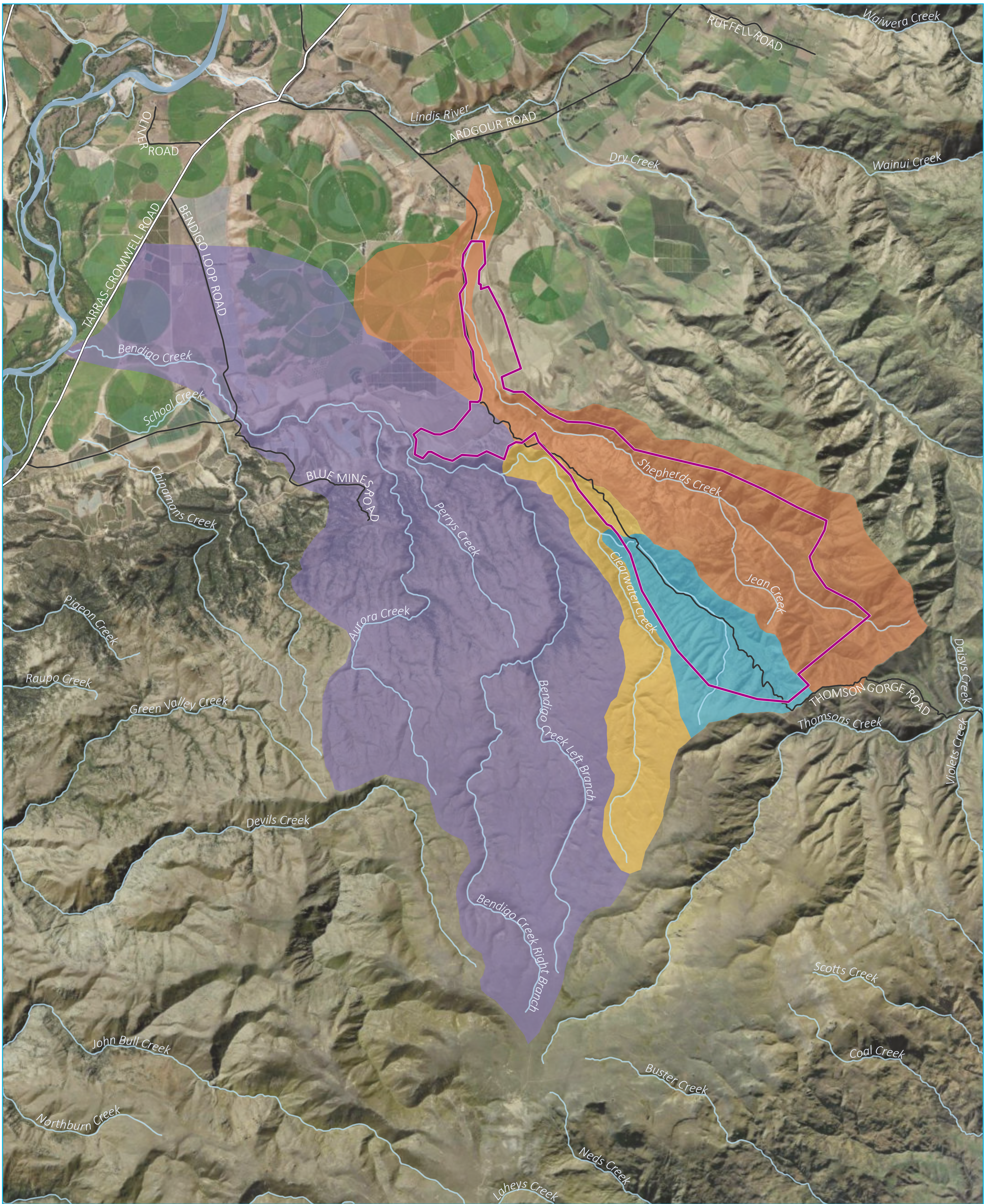
The Project area is situated to the south-east of the Clutha River/Mata-Au, within the Dunstan Rohe of the Clutha Freshwater Management Unit which is defined and managed by Otago Regional Council. The upper Clutha River/Mata-Au is sustained by outflow from Lake Wānaka and Lake Hawea which are glacial lakes of the Upper Clutha Lakes Rohe (refer Figure 2.1). Downstream of the lakes, tributaries of the upper Clutha River/Mata-Au comprise the Cardona River, Luggate Creek, Crook Burn and the Lindis River.

The upper Clutha River/Mata-Au flows adjacent the western boundary of the Bendigo Aquifer to Lake Dunstan, located to the west of the Project area. A regionally significant wetland complex is present at the river delta with Lake Dunstan (Komanawa Solutions Ltd 2025b). Lake Dunstan is a man-made lake which was formed on the Clutha River/Mata-Au due to construction of the Clyde Dam. The lake is used for recreational purposes and supplies irrigation water to adjacent orchards and vineyards.

The Clutha River/Mata-Au and the Lindis River are major river systems that flow through the Bendigo-Tarras basin (Houlbrooke 2010). Irrigation areas are concentrated in the lower catchment of the Lindis River, with large scale abstraction of surface water occurring from the Lindis River in addition to groundwater abstraction from the connected valley alluvial aquifers, predominantly the Lindis Alluvial Ribbon Aquifer. Irrigation abstraction also occurs from the Clutha River/Mata-Au and adjacent aquifers (refer Section 2.3 for further detail).

2.2.2 Local setting

The Project is located within the Bendigo Creek and Shepherds Creek catchments which are sub-catchments of the Clutha River/Mata-Au catchment (refer Figure 2.8). The Bendigo Creek catchment area is approximately 52 km^2 to the confluence with the Clutha River/Mata-Au and encompasses the southern and western portions of the Project area. The Shepherds Creek catchment area is approximately 17 km^2 to the confluence with the Lindis River and encompasses the northern and eastern portions of the Project area.



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Source: EMM (2026); LINZ (2026); ESRI (2026)

0 1 2 km
NZGD 2000 UTM Zone 59S
N

KEY

Project area

Existing environment

Major road

Minor road

Named watercourse

Named waterbody

Catchment boundary

Bendigo Creek

Clearwater Creek

Rise and Shine Creek

Shepherds Creek

Surface water systems and catchment boundaries

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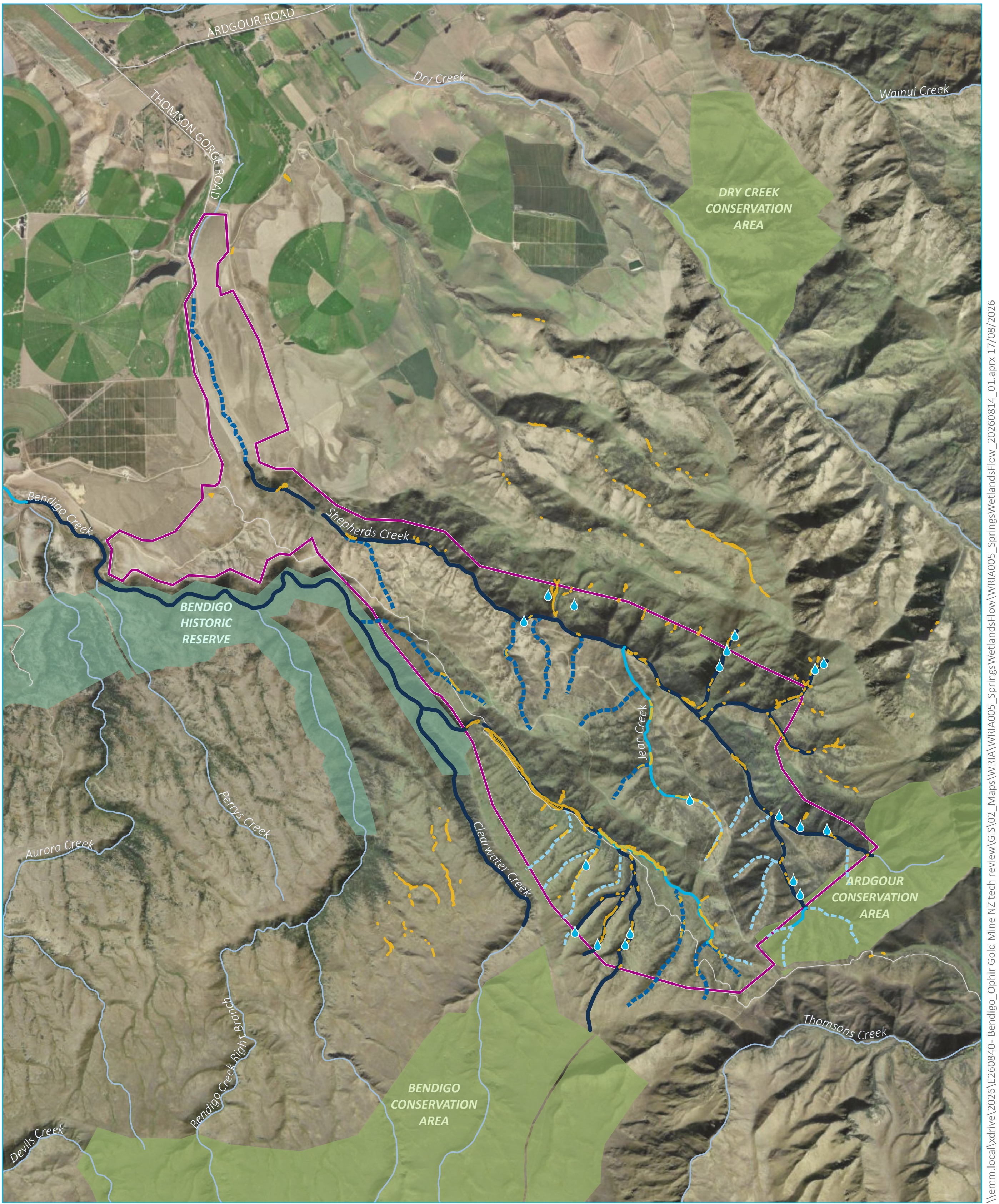

Source: EMM (2026); LINZ (2026); ESRI (2026)

0 1 2 km
NZGD 2000 UTM Zone 59S
N

KEY

Project area
Spring
Wetland

Stream type
Perennial watercourse
Ephemeral watercourse
Intermittent watercourse
Watershed

Existing environment
Minor road
National Park/Reserve
Conservation Area

Springs, wetlands and watercourse flow

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i Shepherds Creek

The headwater tributaries of Shepherds Creek rise along the Dunstan Mountains ridgeline to the south and east of the Project area. Through the majority of the Project area, Shepherds Creek consists of a single channel stream between 0.5 m and 1 m wide flowing along a 10 m to 100 m wide valley floor (Water Ways Consulting 2025). In this reach, the creek flows predominantly as pool and riffle sequences with occasional short cascades over valley floor bars. Upstream of the valley floor bars, wide wetlands have formed (refer Figure 2.9). At the foothills of the Dunstan Mountains, the stream flows across the Ardgour Terrace to the Lindis River, although is ephemeral in nature due to surface water abstraction at the foothills of the Dunstan Mountain and infiltration to the Ardgour Alluvial Aquifer.

As shown in Figure 2.9, the upper reach of Shepherds Creek and several headwater tributaries are perennial, with baseflow supported by groundwater seepage and springs (gaining reach). Water is diverted from Shepherds Creek for irrigation near the base of the Dunstan Mountains (Ardgour Terrace), with residual streamflow infiltrating to the Ardgour Alluvial Aquifer (losing reach). As a result, Shepherds Creek is ephemeral to the confluence with the Lindis River. Further detail on groundwater recharge and discharge processes is provided in Section 2.3.3.

ii Rise and Shine Creek, Clearwater Creek and Bendigo Creek

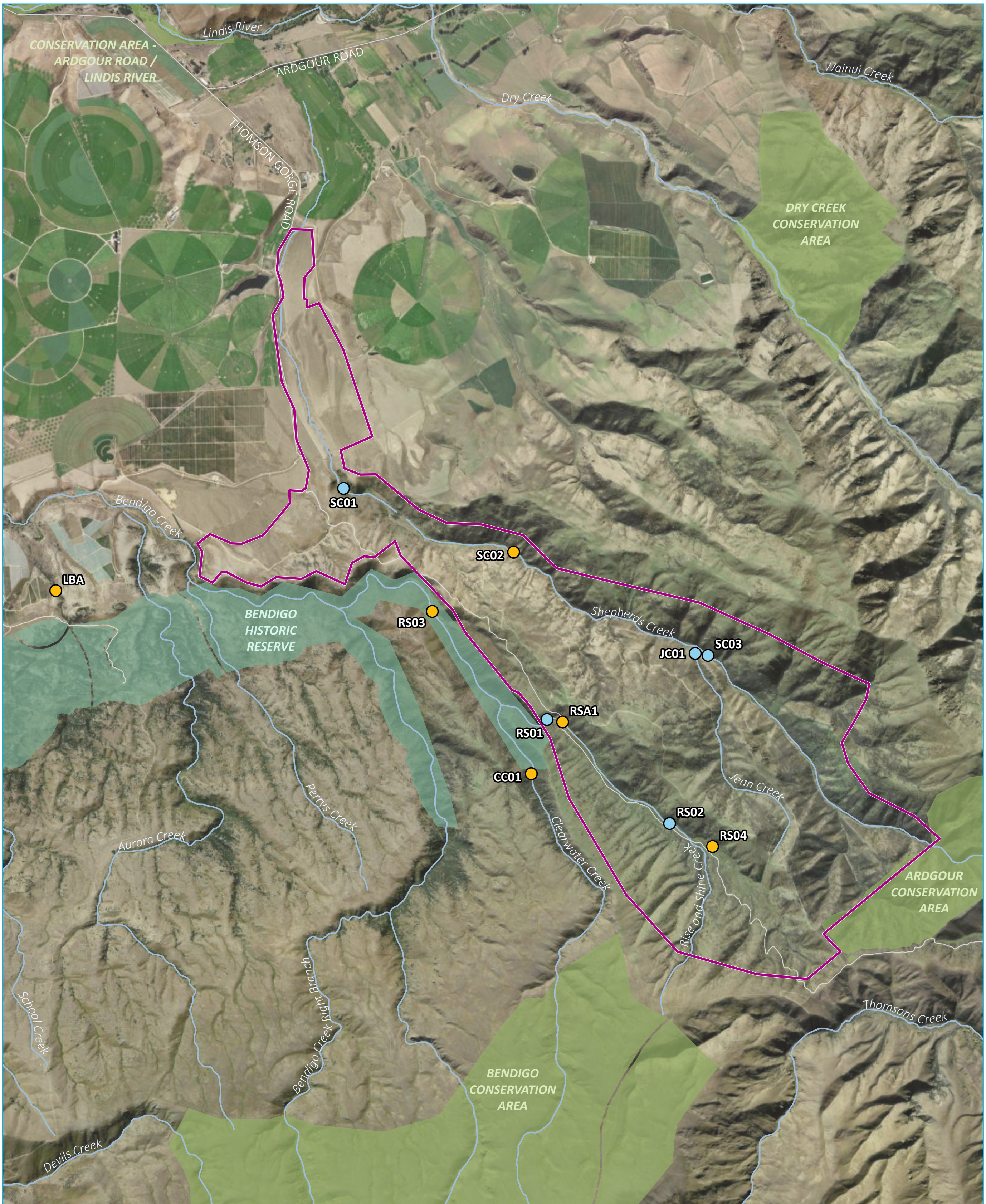
Rise and Shine Creek flows through the south-eastern portion of the Project area. Rise and Shine Creek is a tributary of Clearwater Creek which flows to Bendigo Creek and in turn to the Clutha River/Mata-Au. The upper reach of Rise and Shine Creek is intermittent while the mid to lower reaches are perennial, with baseflow supported by groundwater seepage and springs (refer Figure 2.9). Headwater tributaries of Rise and Shine Creek are steep, with the gradient of Rise and Shine Creek reducing at the valley floor (Water Ways Consulting 2025).

The reach of Rise and Shine Creek upstream of the confluence with Clearwater Creek has been modified with historic dams and water races (Water Ways Consulting 2025). The mainstream channel is narrow, generally less than 1 m wide, however flows through wider wetland areas (refer Figure 2.9).

As shown in Figure 2.10, Clearwater Creek and the upper to mid reach of Bendigo Creek are perennial. On the valley flats (Bendigo Terrace), flow is abstracted from Bendigo Creek for irrigation. The lower reach of Bendigo Creek is intermittent, with streamflow infiltrating to the Bendigo Aquifer (losing reach).

2.2.3 Baseline surface water resources

Baseline surface water monitoring has been conducted since September 2022 at several sites within and adjacent to the Project area. The baseline monitoring sites are shown in Figure 2.10 and listed in Table 2.1.



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Source: EMM (2026); LINZ (2026); ESRI (2026)

0 1 2 km
NZGD 2000 UTM Zone 59S
N

KEY

Project area

Monitoring site (type)

Streamflow

Surface water

Existing environment

Minor road

Named watercourse

National Park/Reserve

Conservation Area

Baseline surface water monitoring sites

Bendigo-Ophir Gold Project
Water Resources Impact Assessment
Summary Report
Figure 2.10

EMM
creating opportunities

Table 2.1 Surface water monitoring sites

Monitoring site	Description	Monitoring program
SC01	Shepherds Creek downstream monitoring site at Ardgour Terrace	Water quality and streamflow
SC02	Shepherds Creek adjacent proposed underground portal	Water quality
SC03	Shepherds Creek upstream of Jeans Creek confluence	Water quality and streamflow
JC01	Jeans Creek (tributary of Shepherds Creek)	Water quality and streamflow
RSB	Rise and Shine Battery site on Rise and Shine Creek	Water quality
RSA1	Rise and Shine historical adit	Water quality
RS01	Immediately downstream of historical Rise and Shine workings	Water quality and streamflow
RS02	Rise and Shine Creek upstream of historical workings	Water quality and streamflow
RS03	Rise and Shine Creek downstream monitoring site	Water quality
RS04	Rise and Shine Creek upstream monitoring site	Water quality
CC01	Clearwater Creek reference site (outside of historical or future mining influences)	Water quality
LBA	Lower Bendigo adit historical working	Water quality

i Streamflow

Summary statistics of streamflow recorded at five monitoring sites within the Project area are presented in Table 2.2.

Table 2.2 Streamflow statistics

Monitoring site	Catchment area (km^2)	Period of record	Flow rate (L/s)			
			Minimum	Maximum	Mean	Median
SC01	12	Dec 2022 – May 2024	2.17	113.3	14	10.4
SC03	6.4	Dec 2022 – May 2024	0	103.0	9.7	5.71
JC01	1.4	Jul 2023 – May 2024	0	13.9	1.47	1.38
RS01	4.7	Dec 2022 – May 2024	0.01	74.7	7.12	4.29
RS02	2.9	Dec 2022 – May 2024	0.52	76.9	7.28	4.93

Source: Komanawa Solutions Ltd (2025a), Mine Waste Management (2025b)

ii Surface water quality

The water quality of surface water systems within and adjacent the Project area is considered influenced by (Mine Waste Management 2025b):

- livestock grazing and pastoral activities
- historical mining activities
- geology and local mineralisation.

Baseline water quality monitoring of Shepherds Creek and Bendigo Creek was initially evaluated and summarised in Mine Waste Management (2025b) and updated in 2026 by Boffa Miskell (2026) and Geocontam Risk Management (2026).

a 2025 baseline water quality key findings

The key findings of the baseline water quality monitoring conducted in the Shepherds Creek catchment are summarised as follows (Mine Waste Management 2025b):

- slightly acidic (pH 5.4) to slightly alkaline (pH 8.5) conditions were recorded at Shepherds Creek catchment monitoring sites, with an average pH 8.11 recorded at monitoring site SC01
- electrical conductivity (EC) ranged from 253 µS/cm to 626 µS/cm, with an average EC of 489 µS/cm recorded at monitoring site SC01
- nutrients (nitrate and ammoniacal nitrogen) were elevated, likely attributed to livestock
- copper concentrations were elevated at monitoring site JC01 on Jeans Creek in comparison to relevant guideline values.

The key findings of the baseline water quality monitoring conducted in the Bendigo Creek catchment are summarised as follows (Mine Waste Management 2025b):

- slightly acidic (pH 6) to alkaline (pH 9.3) conditions were recorded at Bendigo Creek monitoring sites, with an average pH 7.42 recorded at RS03
- electrical conductivity (EC) ranged from 22 µS/cm to 526 µS/cm, with an average EC of 86 µS/cm recorded at RS03
- nutrients (nitrate and ammoniacal nitrogen) were elevated, likely to due to the presence of livestock
- arsenic, cobalt, copper and iron concentrations recorded at RSA1 were elevated at times in comparison to relevant guideline values
- arsenic and iron concentrations recorded monitoring site LBA were elevated at times in comparison to relevant guideline values.

b 2026 baseline water quality key findings

Baseline surface water conditions were further assessed in 2026 by Boffa Miskell (2026) and Geocontam Risk Management (2026). The updated baseline surface water monitoring focussed on two additional monitoring sites, one on Bendigo Creek (SW13) and one on the Lindis River (SW14). These monitoring locations were established downstream of the Project area to characterise baseline receiving-environment water quality conditions prior to

Project development and to provide a dataset against which future Project related effects could be assessed during the operational, closure and post-closure phases of the Project. Geocontam Risk Management (2026) conducted water quality monitoring on two occasions in 2026, while Boffa Miskell conducted monitoring in July 2026, reflecting winter conditions and elevated flows associated with snowmelt.

Water quality conditions recorded at SW14 were near neutral (pH 6.6 – 7.1) and fresh (EC < 100 uS/cm), with the surface water characterised as low-mineralisation calcium bicarbonate (Ca-HCO_3) water type. Turbidity and total suspended solids (TSS) were slightly elevated (>30 NTU and 50 mg/L respectively). Total Nitrogen was generally low (<1 mg/L) , however, higher than that recorded at upstream compliance site SC01 on Shepherds Creek. Iron concentrations were elevated (1 – 3 mg/L) in comparison to the proposed compliance criteria of 0.3 mg/L total iron. The baseline surface water quality data reflects a freshwater system with the ability to support the protection of sensitive aquatic species and the maintenance of freshwater ecosystem functions. Notwithstanding, there is evidence of anthropogenic inputs from pastoral and grazing land use with nitrate levels elevated in comparison to Shepherds Creek.

At SW13 (Bendigo Creek), water quality was near neutral (pH 6.5) and fresh (EC 32.5 uS/cm) with the major ionic composition indicating calcium dominated bicarbonate water. Turbidity (2 .8 NTU) and total suspended solids (8 mg/L) were low. Total nitrogen was less than 1 mg/L and comprised mostly organic nitrogen. Elevated concentration of metals including Al, Sb and Fe suggest the influence of localised geological conditions, natural weathering processes and / or sediment mobilisation. Based on the 2026 monitoring records, the water quality of Bendigo Creek at SW13 is considered to support high freshwater environmental values and is generally consistent with the protection of sensitive aquatic ecosystems. The water quality values are broadly comparable to those recorded at RS03 on Rise and Shine Creek and indicate that historical mining activities are not currently impacting water quality at the downstream monitoring site on Bendigo Creek.

Boffa Miskell (2026) state that Bendigo Creek and the lower Lindis River currently support aquatic communities typical of Central Otago waterways and are generally in fair-to-good ecological condition, with these downstream receiving environments containing conservation-significant indigenous fish species, diverse macroinvertebrate communities, and pollution-sensitive Ephemeroptera, Plecoptera and Trichoptera (EPT) taxa, and recognised fisheries values within the lower Lindis River. Ecological condition in both waterways was found to be influenced by multiple interacting stressors, including hydrological variability, water abstraction, climatic conditions and wider catchment land uses.

2.3 Groundwater system and water resources

2.3.1 Hydrostratigraphy

Groundwater within the Bendigo district is divided into two key domains:

- saturated consolidated rocks - generally fractured schist basement
- alluvium or outwash sediments - generally coarse sandy sediments of the Lindis Alluvial Ribbon Aquifer (or Lindis Alluvium), Ardgour Alluvial Aquifer, Bendigo Creek Alluvium and Bendigo Aquifer (or Bendigo Outwash).

In the Project area, Komanawa Solutions Ltd (2025c) defines the hydrostratigraphic units (HSUs) as follows (in stratigraphic order):

- surficial veneers of alluvium, colluvium, and more extensively weathered basement rock (i.e. schist)
- TZ3 (Textural Zone 3) Schist: Rakaia Terrain Quartzofeldspathic schist and greyschist

- RSSZ (Rise and Shine Shear Zone): The shear zone and associated fault gouges were created by both brittle and ductile deformation associated with multiple activations of the Thompsons Gorge Fault. This zone is the target of the proposed mining activities.
- TZ4 (Textural Zone 4) Schist: Rakaia Terrain Quartzofeldspathic schist, greyschist, and gneiss.

i Project area HSUs

a Surficial veneers of alluvium and colluvium

Surficial veneers within the Project area are understood to predominantly comprise (refer Section 2.1.4ii):

- Dredged tailings and sluiced gravels, loess, Holocene and undifferentiated Quaternary landslide deposits – located on valley slopes and in the base of valleys across the Project area (refer Figure 2.7).
- Alluvial deposits and fans (Q1) – located in the base of valleys across the Project area including Rise and Shine Creek and the lower reach of Shepherds Creek (refer Figure 2.4).

The surficial veneers of alluvium and colluvium reside on schist basement rock.

b Schist basement rock

The schist rock is differentiated by shallow, weathered schist and deeper, unweathered schist. Due to the low permeability of the fractured rock, potential groundwater recharge of excess precipitation is largely rejected at the soil/regolith interface. The schist-alluvium contact is considered an impermeable interface by Komanawa Solutions Ltd (2025d).

The Thomsons Gorge Fault has been described by Komanawa Solutions Ltd (2025b) to cross the Project area, cutting through both the Rise and Shine Creek and lower Shepherds Creek. The Shear zone (Rise and Shine Shear Zone) associated with this fault is the main source of mineralisation in the Project area.

ii Regional HSUs

The key relevant HSUs the broader Project area, and in the regional area, comprise (refer Figure 2.4):

- Alluvial deposits and fans (Q1):
    - Lindis Alluvial Ribbon Aquifer (or Lindis Alluvium)
    - Ardgour Alluvial Aquifer (or Ardgour Alluvium)
    - Bendigo Creek Alluvium
- Late Pleistocene outwash deposits (Q2):
    - Bendigo Aquifer (or Bendigo Outwash)
    - Ardgour Alluvial Aquifer (or Ardgour Alluvium)
- Till (Q12 & Q16):
    - Bendigo Terrace
    - Ardgour Terrace

The lower reaches of the Lindis River flow over schist outcrop and outwash terraces. An alluvial floodplain has developed on the river banks (Lindis Alluvial Ribbon Aquifer), with a high degree of hydraulic connectivity between surface and subsurface flows. South-east of the lower Lindis River, outwash gravel deposits have been deposited and preserved from later erosion. The outwash is classed within the Ardgour Alluvial Aquifer in addition to alluvial deposits. The Ardgour Alluvial Aquifer is a deeper aquifer structure (greater than 30 m) than that of the Lindis Alluvial Ribbon Aquifer.

In the mid reach of Bendigo Creek, sandy gravel alluvium (Bendigo Creek Alluvium) has accumulated on the basement schist and between bedrock gorges. The Bendigo Creek Alluvium is of high permeability and porosity and has a high degree of hydraulic connectivity with Bendigo Creek.

Post-glacial outwash has accumulated between the Clutha River/Mata-Au and Bendigo Terrace and hosts the Bendigo Aquifer. The Bendigo Aquifer is a high yielding aquifer and hosts approximately 30 production bores.

2.3.2 Groundwater levels and flow

i Local Project area

The hydrogeology of the Project area is considered to comprise two principal components (Komanawa Solutions Ltd 2025c):

1. Surficial veneer aquifer - a very thin surficial system which is predominantly recharged by rainfall and predominantly discharges to Shepherds Creek and Clearwater Creek, with small volumes of discharge and recharge to and from the hard rock aquifer.

2. Hard rock aquifer – a deeper, more massive, “aquifer” in which flow is dominated by that constrained to fractures, with small volumes of discharge and recharge to and from the surficial veneer aquifer and potential discharge to Shepherds Creek, Rise and Shine Creek and Clearwater Creek.

The watertable in the Project area is a muted version of topography across areas of sharply undulating terrain. Measured groundwater depths across the Project area were recorded at up to 42 m beneath steep ridges and near ground surface at the base of slopes (Komanawa Solutions Ltd 2025c).

Groundwater flows in the schist basement are considered to be low, especially within the intact parts of the schist basement rocks.

Groundwater pressures within the low permeability TZ4 (footwall) schist were found to be elevated and may be higher than the overlying land surface. Artesian pressures (i.e. hydraulic head higher than topography, such that water could flow freely from and open bore) were encountered at four locations, suggesting groundwater pressure compartmentalisation.

Groundwater level data reported in Komanawa Solutions Ltd (2025b) indicates the following:

- groundwater flows from topographic highs to lows (e.g. local creeks).

- lateral hydraulic gradients are relatively steep, ranging between 0.2 and 0.5 m/m, suggesting a relatively low hydraulic conductivity setting

- vertical gradients are mixed, with some upward and some downward

- localised, but persistent flowing artesian conditions were noted in four locations suggesting some form of compartmentalisation.

ii Bendigo Aquifer

The hydraulic conductivity of the Bendigo Aquifer is at least four orders of magnitude greater than the basement schist groundwater system, with a hydraulic conductivity of 250 m/d calculated by Komanawa Solutions Ltd 2025b) from pumping tests. effective porosity is around 20% in comparison to the schist rock at 2%. Figure 2.11 (taken from Komanawa Solutions Ltd 2025b) presents the inferred watertable in the Bendigo Aquifer, based on measurements of hydraulic head in 23 bores in 2009 as reported in Houlbrooke (2010). The watertable depth is up to 30 m in the south-east and as low as 1.7 m adjacent the Lindis River, Clutha River/Mata-Au and Lake Dunstan.

The Bendigo Aquifer is largely devoid of densely packed silt or clay that would constrain hydraulic conductivity and, thus, has some of the highest groundwater bore yields in the Otago Regio in the range of 120 L/s.

2.3.3 Recharge and discharge processes

A conceptual schematic of the Project area groundwater recharge and discharge processes is presented in Figure 2.12, with the key processes summarised as follows.

i Fresh schist bedrock, slumps and landslides

In the fresh schist bedrock, groundwater flows predominantly through fractures, re-emerging as diffuse seepage, spring flow and baseflow to watercourses within the Project area (e.g. Rise and Shine Creek, Shepherds Creek, Clearwater Creek). Springs most typically occur at steep slope transitions at the top of slumps and landslides (Komanawa Solutions Ltd 2025d).

ii Lindis River Alluvial Ribbon Aquifer and Ardgour Alluvial Aquifer

Residual streamflow in Shepherds Creek following irrigation diversion infiltrates to the Ardgour Alluvial Aquifer and the associated Lindis River Alluvial Ribbon Aquifer.

The Lindis River Alluvial Ribbon Aquifer and Lindis River are directly connected. During periods of higher groundwater levels (e.g. November), the aquifer discharge to the river. When the groundwater level declines below the river level, discharge ceases and the river recharges the aquifer (Houlbrooke 2010). During low flow periods, Lindis River flows may infiltrate entirely to the subsurface resulting in reaches of zero flow in the lower Lindis River.

iii Bendigo Aquifer

The Bendigo Aquifer is recharged at the north (upstream) margin with the Clutha River/Mata-Au and Lindis River (i.e. at the confluence of the Clutha River/Mata-Au and Lindis River) and discharges to the south where the Clutha River/Mata-Au meets Lake Dunstan (Houlbrooke 2010). The Bendigo Aquifer is also recharged by the Bendigo Creek, resulting in intermittent flows in the lower reach of Bendigo Creek (Komanawa Solutions Ltd 2025b).

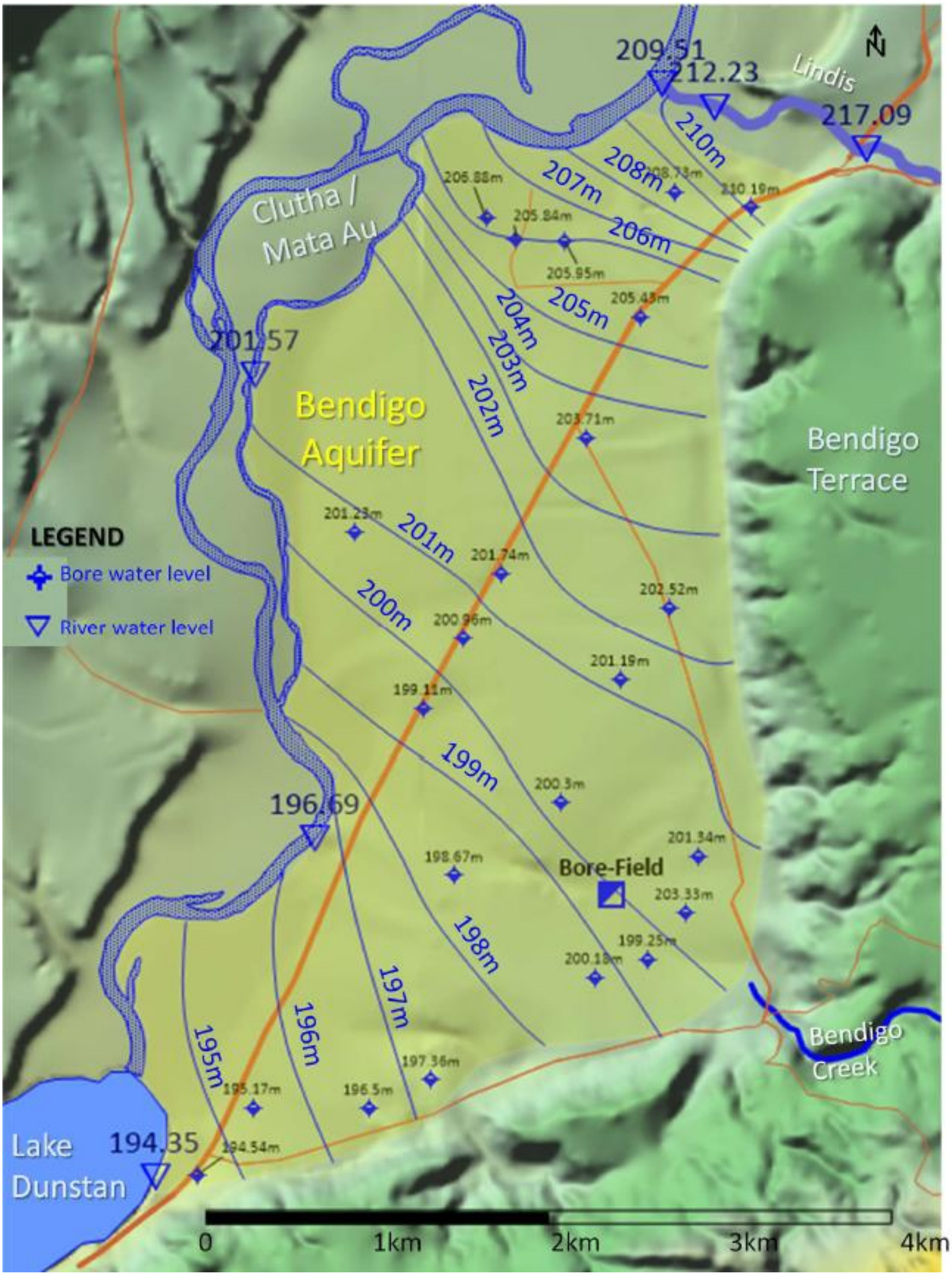


Figure 2.11 Inferred 2009 water table elevation contours in the Bendigo Aquifer (Komanawa Solutions Ltd 2025b)

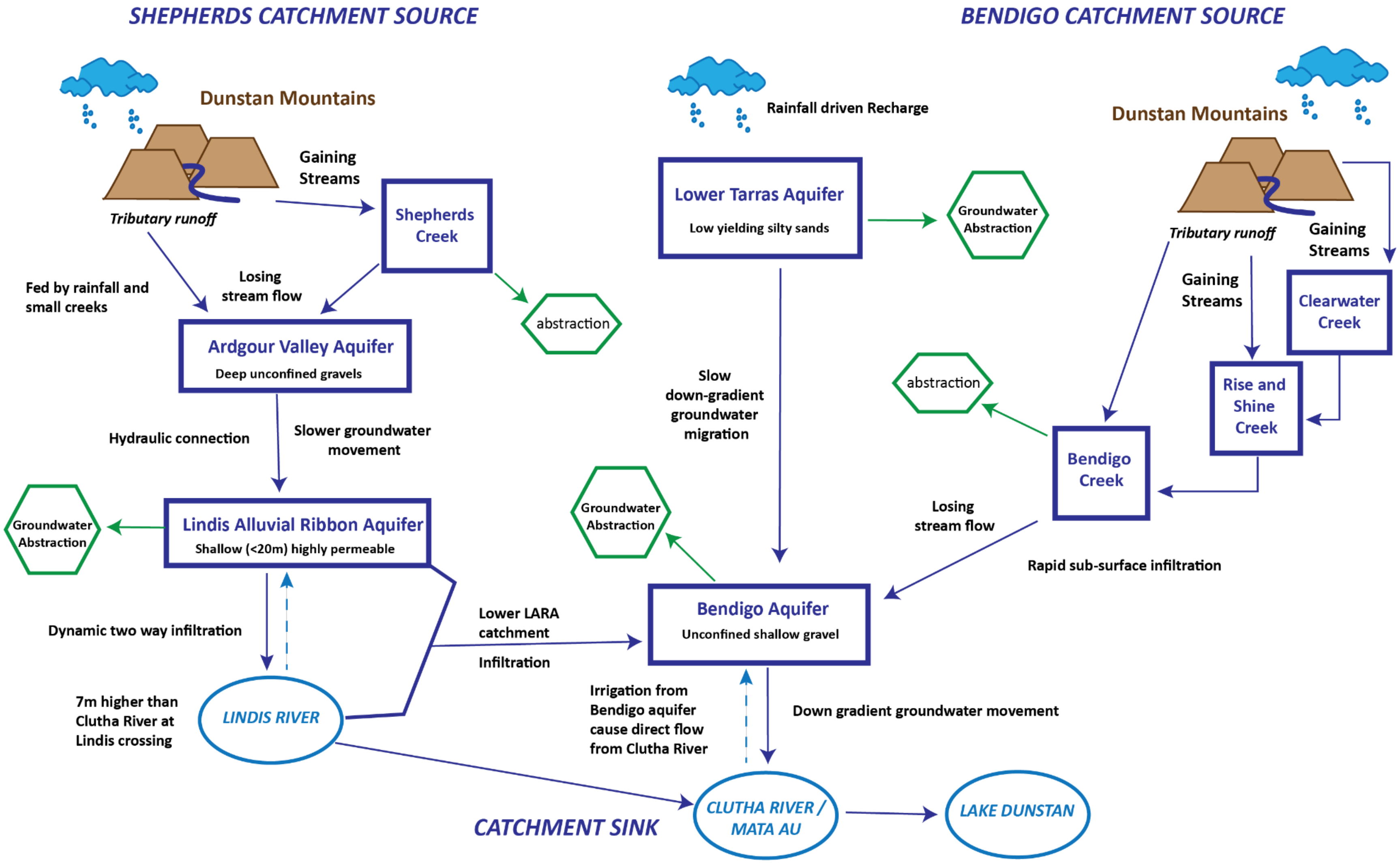


Figure 2.12 Conceptual groundwater recharge and discharge processes

2.3.4 Groundwater quality

Baseline groundwater quality monitoring has been conducted since September 2022 at three sites within the Project area (refer Figure 2.13). The key findings of the baseline groundwater quality monitoring are summarised as follows (Mine Waste Management 2025b):

- near neutral (pH 6.8) to slightly alkaline (pH 8.7) conditions were recorded over the period of record, with an average of pH 8.1 recorded at MDD015, pH 8.0 at MRC002 and pH 7.8 at MDD302
- electrical conductivity (EC) ranged from 106 µS/cm to 550 µS/cm, with an average EC of 446 µS/cm recorded at MDD015, 250 µS/cm at MRC002 and 493 µS/cm at MDD302
- arsenic concentrations exceeded relevant guideline values at times at all sites
- copper, strontium and thallium concentrations exceeded relevant guideline values at times at MDD015
- zinc concentrations exceeded relevant guideline values at times at MRC002.

2.3.5 Groundwater use

The Lindis Alluvium and Bendigo Aquifer are beneficial water sources for drinking and domestic use, stock use, frost fighting and irrigation. The dominant water demand from these sources is for irrigation of pasture and horticultural or viticultural plantings, with more than 30 irrigation water supply bores installed (Komanawa Solutions Ltd 2025b).

2.4 Water dependent ecosystems

A total of 290 natural inland wetlands were identified within and adjacent the Project area, with 3.12 hectares (ha) of wetlands (94 individual wetlands) located within the direct disturbance area associated with the Project (RMA Ecology Ltd 2025). RMA Ecology Ltd. (2025) define the wetland types as:

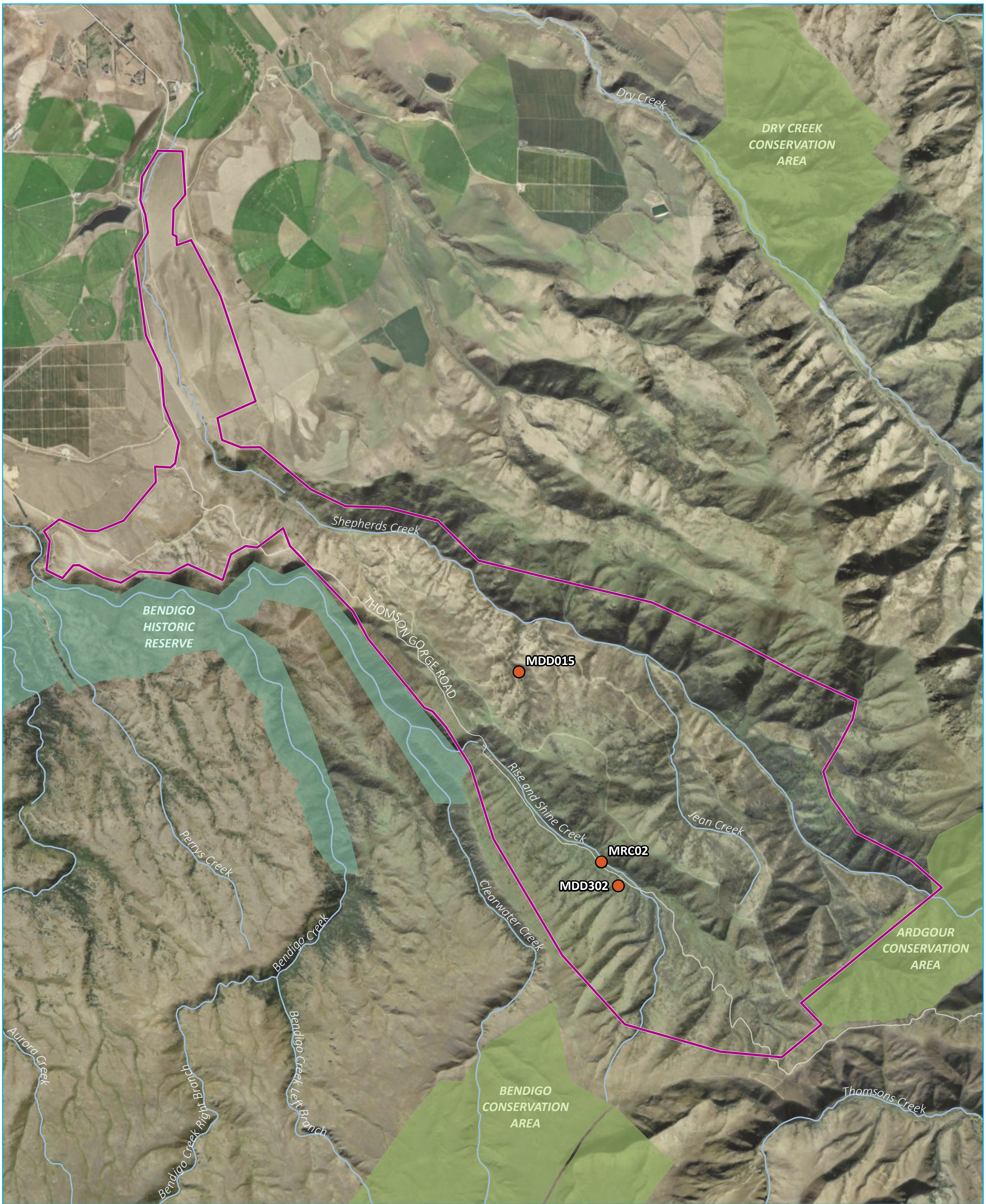
- seepage wetlands: vegetation supported by hillslope seepages that are primarily groundwater fed
- gully fens: fens present in narrow gullies that are fed by groundwater or surface water
- swamps and marshes: present in valley floors and at the downstream extent of larger gullies.

Seepage wetlands were more common on the south-facing slopes above Shepherds Creek and predominantly comprised grassland/sedgeland, mossfield/grassland and herbfield/rushland vegetation communities.

Fens were mostly located within gully landforms and were primarily palustrine, with some grading to riverine hydrosystems. The dominant vegetation communities present in the fens comprised exotic grassland, exotic rushland and native sedgeland.

Swamps and marshes were present in valley floors and at the downstream extent of larger gullies and had the greatest dominance of native species in comparison to seepage wetlands and fens. The swamps and marshes were identified primarily as riparian palustrine systems, with riverine components where influenced by flood events.

Considerable sediment deposition in the Rise and Shine Creek, associated with historic gold mining by sluicing, is considered to have promoted the development of the large wetland area present in the creek (refer Figure 2.9)



Source: EMM (2026); LINZ (2026); ESRI (2026)

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KEY

Project area

Groundwater monitoring site

Existing environment

Minor road

Named watercourse

National Park/Reserve

Conservation Area

Baseline groundwater monitoring sites

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Water Resources Impact Assessment
Summary Report
Figure 2.13

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2.4.1 Ecological value

i Watercourses

The upper to mid reaches of Shepherds Creek are considered to have moderate to high ecological value with limited modification, good water quality, low to moderate habitat diversity and no introduced species (Water Ways Consulting 2025). The downstream extent of Shepherds Creek is considered of moderate ecological value due to habitat modification, water abstraction and stock impacts (Water Ways Consulting 2025).

Due to the varying nature of Rise and Shine Creek (ephemeral, intermittent and perennial reaches), Rise and Shine Creek is considered to range from low to high ecological value (Water Ways Consulting 2025).

ii Wetlands

The seepage wetlands within the Project area are considered to have moderate ecological value, with low to moderate condition, high rarity and distinctiveness, low to moderate species and community diversity and being predominantly small and compact (RMA Ecology Ltd 2025). Fens were defined as having moderate ecological value, with low to moderate condition, high rarity and distinctiveness, moderate species and community diversity and moderate size. Swamps and marshes were defined as having high ecological value, with moderate condition, high rarity and distinctiveness, moderate species and community diversity and providing a high degree of buffering/connection.

2.4.2 Geochemistry

i Acid Base Accounting (ABA)

The geochemical factual report (Mine Waste Management 2025c) concluded that all materials tested in the Project area are classified as Non Acid Forming (NAF), with circum-neutral pH drainage expected from mine domains that contain these materials. However, Neutral Mine Drainage (NMD) is likely to occur with elevated levels of arsenic (As), sulphate (SO_4), trace metals and potentially nitrogenous compounds (Mine Waste Management 2025c).

The key geochemical attributes of the materials investigated across the Project are summarised as follows:

- a total of 1,608 samples were analysed
- the main sulphide mineral identified was arsenopyrite and the main carbonate mineral identified was dolomite
- total Sulphur (TS) ranged between <0.01 and 1.4% with an average of < 0.1% for waste rock units (mixed TZ3, TZ4 and RSSZ) and TS average of 0.5% for ore materials
- average Maximum Potential Acidity (MPA) was 3 kg H_2SO_4/t for waste rock and 15 kg H_2SO_4/t for ore materials
- Average Acid Neutralising Capacity (ANC) values for waste rock were 38 kg H_2SO_4/t and 75 kg/H_2SO_4/t for ore materials
- MPA and ANC values provided negative Net Acid Producing Potential (NAPP) values indicating overall NAF classed materials
- the oxidation and dissolution of arsenopyrite may potentially release As, SO_4 and iron (Fe), while dissolution of dolomite may release calcium (Ca), magnesium (Mg), and alkalinity
- trace metals copper (Cu), cobalt (Co), lead (Pb) and zinc (Zn) may be released due the oxidation of sulphide minerals

- TZ3 materials were enriched in As and Co
- TZ4 and RSSZ materials were enriched in As, sulphur (S) and potentially Antimony (Sb).

ii Leachate testing

Both static and kinetic testing has been conducted (Mine Waste Management 2025c) to understand the capacity for contaminants of concern (COCs) to be mobilised from mine materials and then potentially pose risks to environmental receptors and third party water users.

Static Synthetic Precipitation Leaching Procedure (SPLP) test results indicate that TZ4 and RSSZ materials saw mobilisation of aluminium (Al), As and chromium (Cr). SPLP tests of soils collected from site identified the mobilisation of Al, As, Fe, Co, Cu and Zn.

Subsequent completion of metal ecotoxicity quotient (MEQ) analysis against water quality compliance limits derived by Mine Waste Management (2025a) identified that:

- Al, As, Co and Cu are elevated and should be subjected to compliance monitoring
- Cd and V are slightly elevated and should be subjected to performance monitoring.

Kinetic testing, undertaken for a 12-month period, of materials including TZ3, TZ4/RSSZ, weathered grab samples and a metallurgical tailings sample indicated that the following PCoC Al, As, Co, Cu, Fe, Sb and Zn should be of focus in regard to compliance monitoring. In addition, the PCoC B, Cr, Mo, Se and V should also be considered for seepage performance monitoring.

Total sulphur concentrations are shown to correlate with both As and Sb concentrations. It has been demonstrated that there is a strong correlation between the total As concentration in excavated mine materials and the As concentration determined in the leachate, the higher the As the more As that will be mobilised.

iii Main geochemical material risk

Although the risk of acid mine drainage generation is overall low it is most at risk of occurring within both the TZ4 and RSSZ materials some of which will become waste rock, but some will be processed (gold extraction) with resultant tailings produced. The key geochemical risk is associated with the TZ4 and RSSZ lithologies which contain 95% of the As and 22% of the Total Sulphur, however, these lithologies represent only 9% of the predicted disturbed waste rock materials.

2.5 Conceptual surface water and groundwater model – existing environment

A conceptual diagram of the existing surface water and groundwater system of the Project area is presented in Figure 2.14.

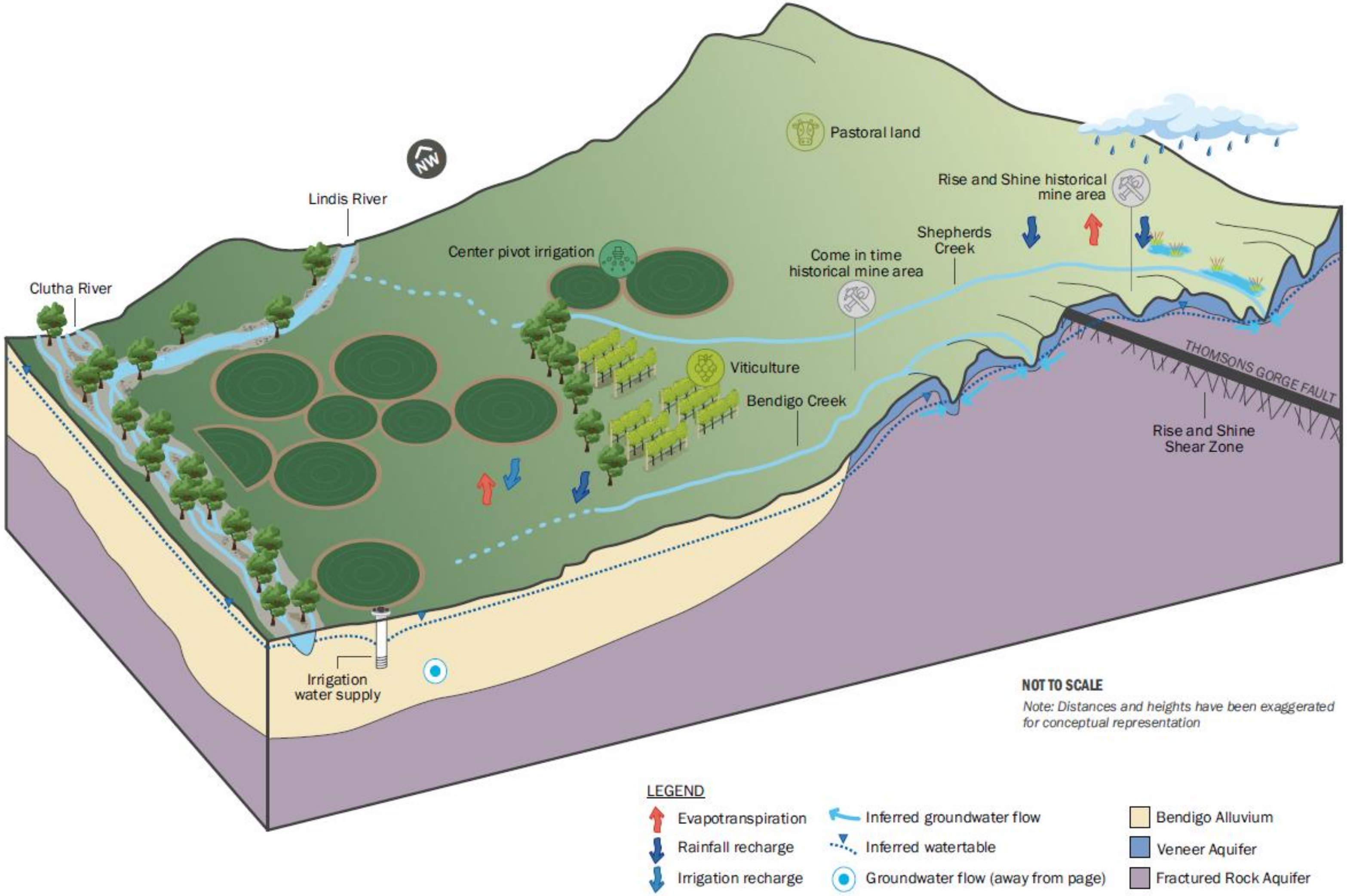

Figure 2.14 Conceptual surface water and groundwater model – existing environment

3 Project development and water management system

3.1 Project activities

As stated in Section 1.2, the Project would comprise the following key water-affecting activities:

- staged establishment of the RAS Open Pit and Underground Mine, and SRX Open Pit, which will remain as open voids and potential pit lakes post-closure
- establishment of the CIT Open Pit, which will be progressively backfilled with waste rock from the RAS Open Pit and rehabilitated
- establishment of the SRE Open Pit, which will be progressively backfilled with waste rock before becoming an engineered landform for the adjoining SRX Open Pit
- establishment of an engineered Tailings Storage Facility (TSF) in the upper reach of Shepherds Valley (including a seepage collection sump), which will utilise overburden waste rock from the development of the RAS Open Pit and be buttressed by the Shepherds Engineered Landform (ELF)
- establishment of three ELFs to permanently store overburden waste rock, being the Shepherds ELF, SRX ELF and Western ELF
- a conventional hard-rock gold processing plant in the lower reach of Shepherds Valley, along with associated infrastructure and ancillary activities
- realignment of Shepherds Creek to form the Shepherds Stream Diversion (as part of wider stream diversion activities)
- establishment of temporary topsoil, vegetation and brown rock stockpiles around the Project site
- establishment of the Shepherds Silt Pond at the base of the Shepherds ELF and water storage tank(s) for use at the processing plant and for dust suppression
- abstraction of groundwater from the Bendigo Aquifer via a lawfully established bore and a proposed new bore for use in mining-related activities (and to supplement flows in Shepherds Creek, Rise and Shine Creek and wetlands).

The locations of key activities/infrastructure at during the construction phase, at full Project development and post-closure are shown in Figure 3.1 to Figure 3.3.

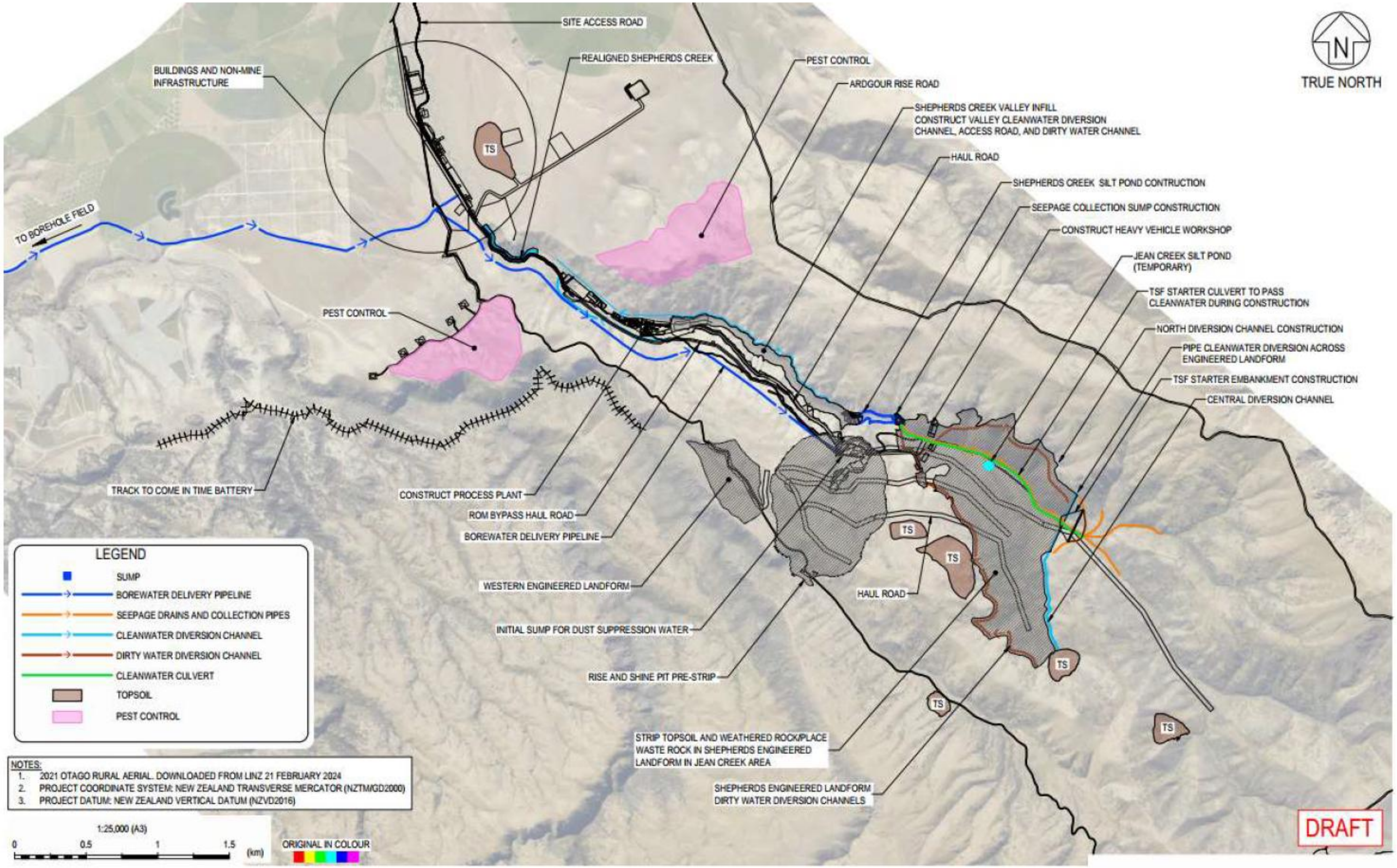

Figure 3.1 **Project Development (0.5 to 2 years)**

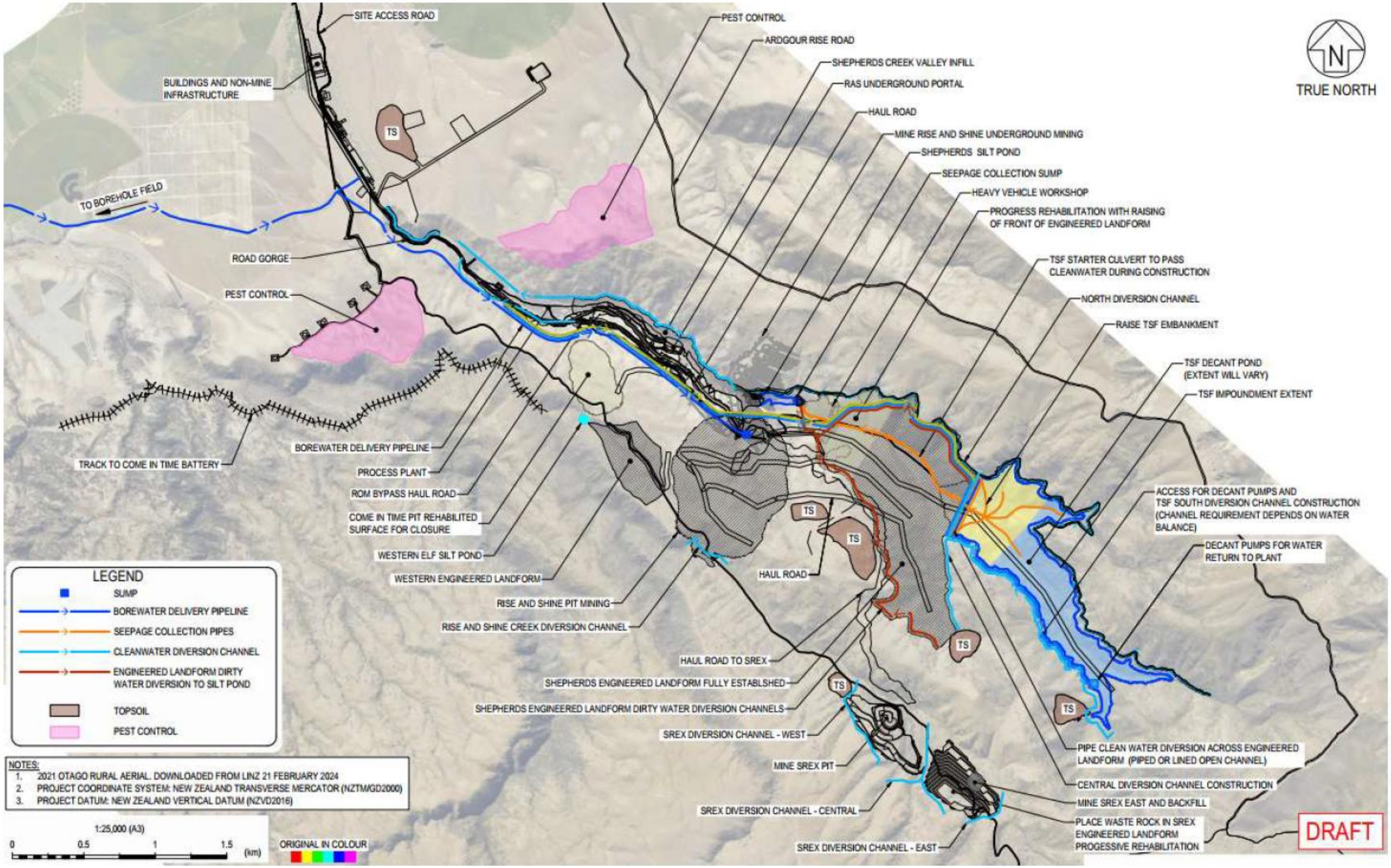

Figure 3.2 **Full Project development (10 to 13.3 years)**

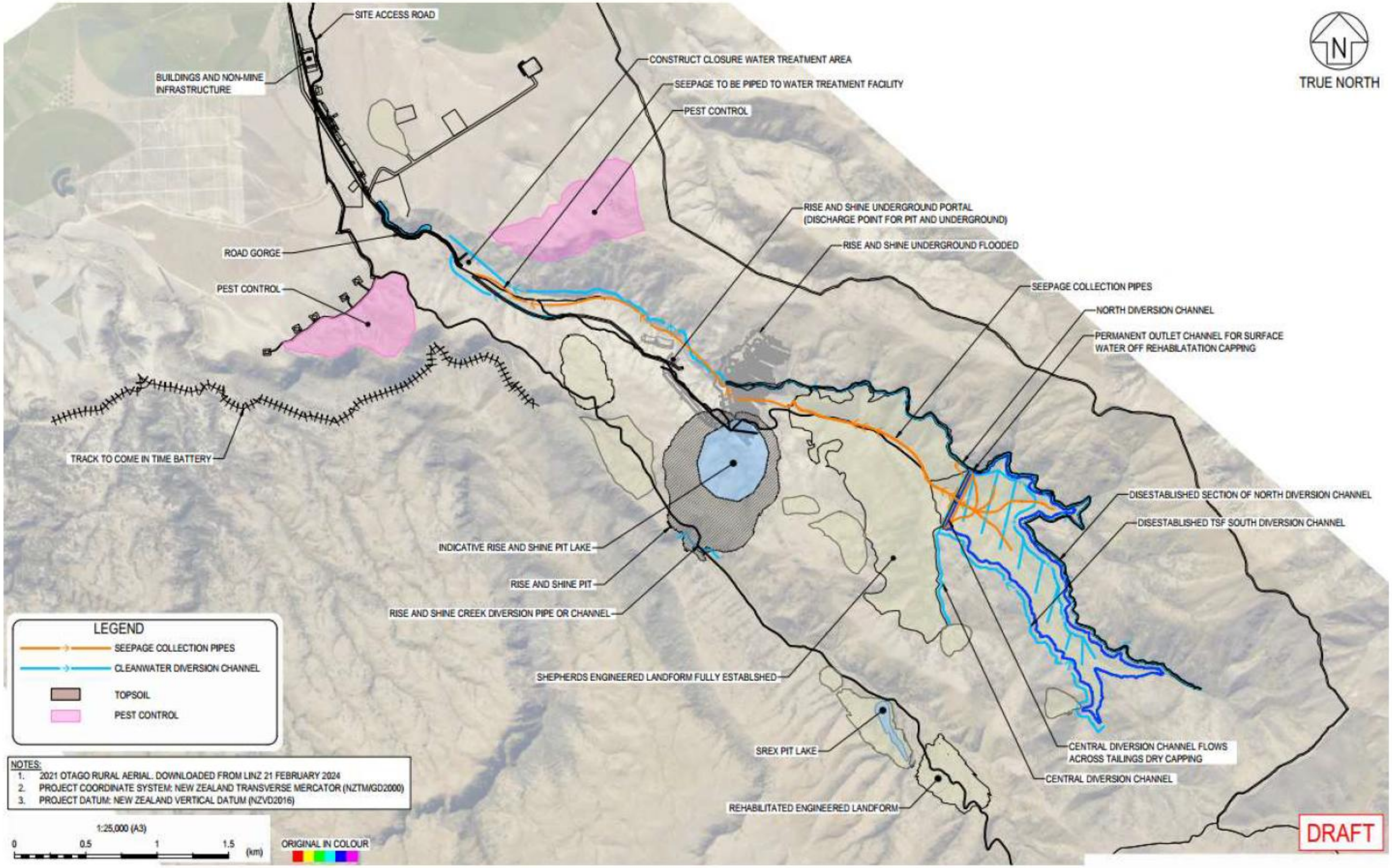

Figure 3.3 **Post-closure (year 31 onwards)**

3.2 Project timeline

The proposed timeline of each phase of the Project is summarised in Table 3.1.

Table 3.1 Project timeline

Timing (Project year)	Phase	Description of phase
0 - 0.5	Construction/development	• Pre-stripping and initial earthworks • Construction of sumps and silt ponds
0.5 - 2		Construction of: • Process plant • TSF embankments • Shepherds Creek Silt Pond • Diversion channels • Internal collection drains • Water supply and transfer pipelines • Main haul road • Initial Shepherds ELF works
3 - 4.5	Operations	• Mining of RAS Open Pit • Implementation of TSF decant pumps/pipeline • ELF development
4.5 – 5		• Mining of RAS Open Pit • Underground Mine development • ELF development
6 – 11		• Mining of RAS Open Pit and Underground Mine • ELF development
		• Mining of RAS Open Pit, Underground Mine and CIT Open Pit • ELF development
		• Construction of SRX and SRE Open Pit diversion channels • Mining of RAS Open Pit, Underground Mine, SRX Open Pit and SRE Open Pit • Backfill of CIT pit • ELF development
10 - 13.3		• Mining of Underground Mine • ELF development
11 – 31	Closure	• Active closure of pits, TSF and ancillary infrastructure • Construction and operation of water treatment plant
31+	Post-closure	Passive treatment, maintenance and monitoring

3.3 Water management system

The Project water management system would be designed to manage the following water types:

- Undisturbed area runoff: upstream catchment runoff/streamflow that has not been in contact with mine disturbance areas
- Mine-impacted water comprising two categories:
  - Surficial mine-impacted runoff: runoff from mining areas that may be high in total suspended solids and other potential constituents of concern (PCoC)
  - Mine circuit water: all water that has had contact with the mine circuit, including ELF and TSF seepage, decant water, pit lake water, As-rich runoff from topsoil, infrastructure area runoff, underground workings, and any seepage collected from groundwater seepage interception systems
- Aquifer water: water pumped from the Bendigo Aquifer and used for service water, dust suppression and potable water supply
- Treated water (closure phase):
  - Active treated water initially applied to all accumulated mine circuit water
  - Passive water treatment once concentrations of PCoC have declined to ranges whereby passive treatment can achieve agreed water quality limits.

3.3.1 Water management infrastructure

The key water management infrastructure designed to manage each water type is described as follows.

i Undisturbed area diversion channels

Diversion channels will be constructed to divert undisturbed area runoff around key mine infrastructure. The diversion channels will include:

- Shepherds TSF and ELF diversion channels – diversion of runoff from the upstream catchment area around the TSF and Shepherds ELF with discharge to the Shepherds Creek diversion channel
- Shepherds Creek diversion channel – diversion of approximately 3.1 kilometres (km) of Shepherds Creek around the eastern extent of the Project area with discharge to the Ardgour Terrace
- SRX ELF diversion channel – diversion of runoff from the upstream catchment area around the SRX ELF with discharge to the Rise and Shine Creek.

ii Surficial mine-impacted water management

Surficial mine-impacted water would be managed via a series of collection drains and water management storages.

a Internal collection drains

Collection drains will be constructed, operated and maintained to capture disturbed area runoff from haul roads, topsoil stockpiles, general infrastructure areas and ELF surfaces. The collected runoff would be conveyed to water management storages (silt ponds).

b Water management storages

Silt ponds would be constructed, operated and maintained to capture sediment-laden runoff from the Project area, allowing for sediment settling prior to discharge to the receiving environment. The key silt ponds are proposed to comprise:

- Shepherds Silt Pond – treatment of sediment-laden runoff from Shepherds ELF prior to discharge to the Shepherds Creek diversion channel
- Western ELF Silt Pond – treatment of sediment-laden runoff from the Western ELF and the RAS Open Pit catchment prior to discharge to the Clearwater Creek catchment
- SRX ELF Silt Pond - treatment of sediment-laden runoff from SRX ELF prior to discharge to Rise and Shine Creek.

Other silt ponds would be constructed as necessary to manage sediment laden runoff during the construction and operational phases of the Project.

iii Mine circuit water

Water with the potential to impact the downstream receiving environment would be retained and reused on-site during the construction and operational phases of the Project.

a ELF seepage management

Seepage from the ELFs would be captured via underdrains and collection sumps, with water returned to the mine water management system for internal reuse.

b TSF water management

Tailings generated from the Processing Plant would be pumped to the TSF located in the upper reaches of the Shepherds Creek catchment. The TSF has been designed to provide adequate freeboard for a 1 in 1,000 year Probable Maximum Precipitation (PMP) rainfall event.

Runoff on the surface of the TSF and water released from tailings (decant water) will be collected in the TSF decant pond and returned to the Processing Plant for reuse.

Seepage from the TSF will be captured by a seepage interception system including a network of subsurface drains, vertical chimney drain within the TSF embankment and seepage collection sump, with captured water transferred back to the TSF or to the Processing Plant for reuse.

c Dewatering system

Groundwater inflow and rainfall runoff to the open cut pits will report to a pit sump for transfer to the mine circuit water management system. Dependent on the quality of water pumped from the pit sumps, the water may be reused on-site for dust suppression or directed to the TSF for storage.

d Topsoil stockpile water management

During development of the ELFs and open cut pits, arsenic-rich topsoil will be stripped and stored in dedicated stockpiles with seepage and runoff captured in the ELF seepage management system and directed to the TSF for storage.

3.3.2 Aquifer water

Additional water would be sourced from a proposed borefield, consisting of two bores installed in the Bendigo Aquifer, for the following purposes:

- Processing Plant make-up requirements
- Dust suppression
- Drinking water supply (following treatment)
- Other uses as required including augmentation of surface water flows to Shepherds Creek, Rise and Shine Creek and wetlands within the Project area.

3.3.3 Treated water

Closure of the Project is estimated to commence from Year 11 with rehabilitation of mine domains and transition from water storage and reuse to water treatment of mine circuit water via an active Water Treatment Plant (WTP). The WTP will operate in the Shepherds Creek catchment for an estimated 50 years post-closure until such time as constituent concentrations have reduced sufficiently to achieve required water quality objectives with passive water treatment. Following this period, passive water treatment would continue. Further detail regarding the water treatment processes is provided in Section 2.1.4.

3.4 Conceptual surface water and groundwater model – with Project

A conceptual diagram of the Project surface water and groundwater system is presented in Figure 3.4. Figure 3.5 presents a conceptual cross-section of the surface water and groundwater system with the RAS Open Pit.

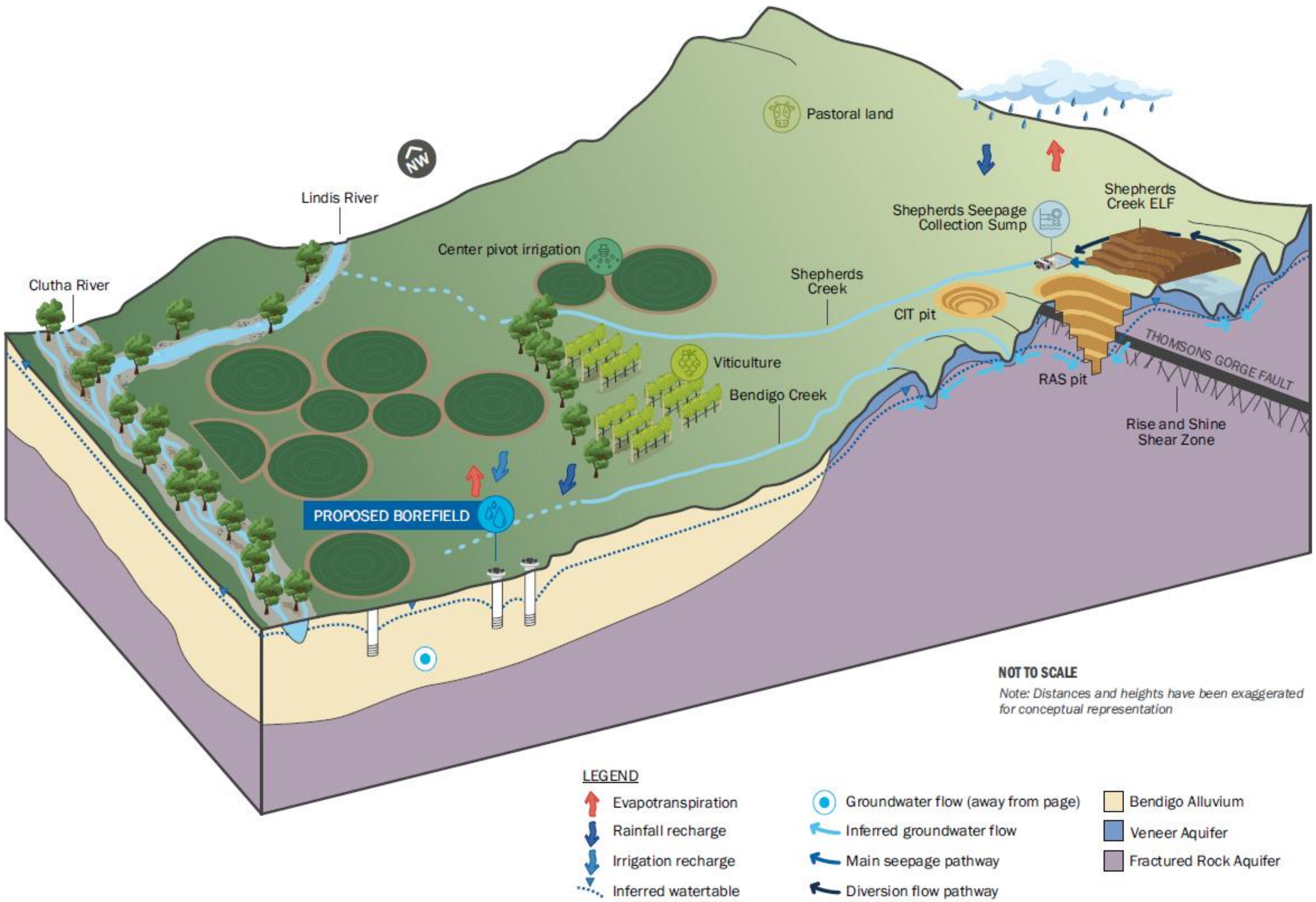

Figure 3.4 Conceptual surface water and groundwater model – with Project

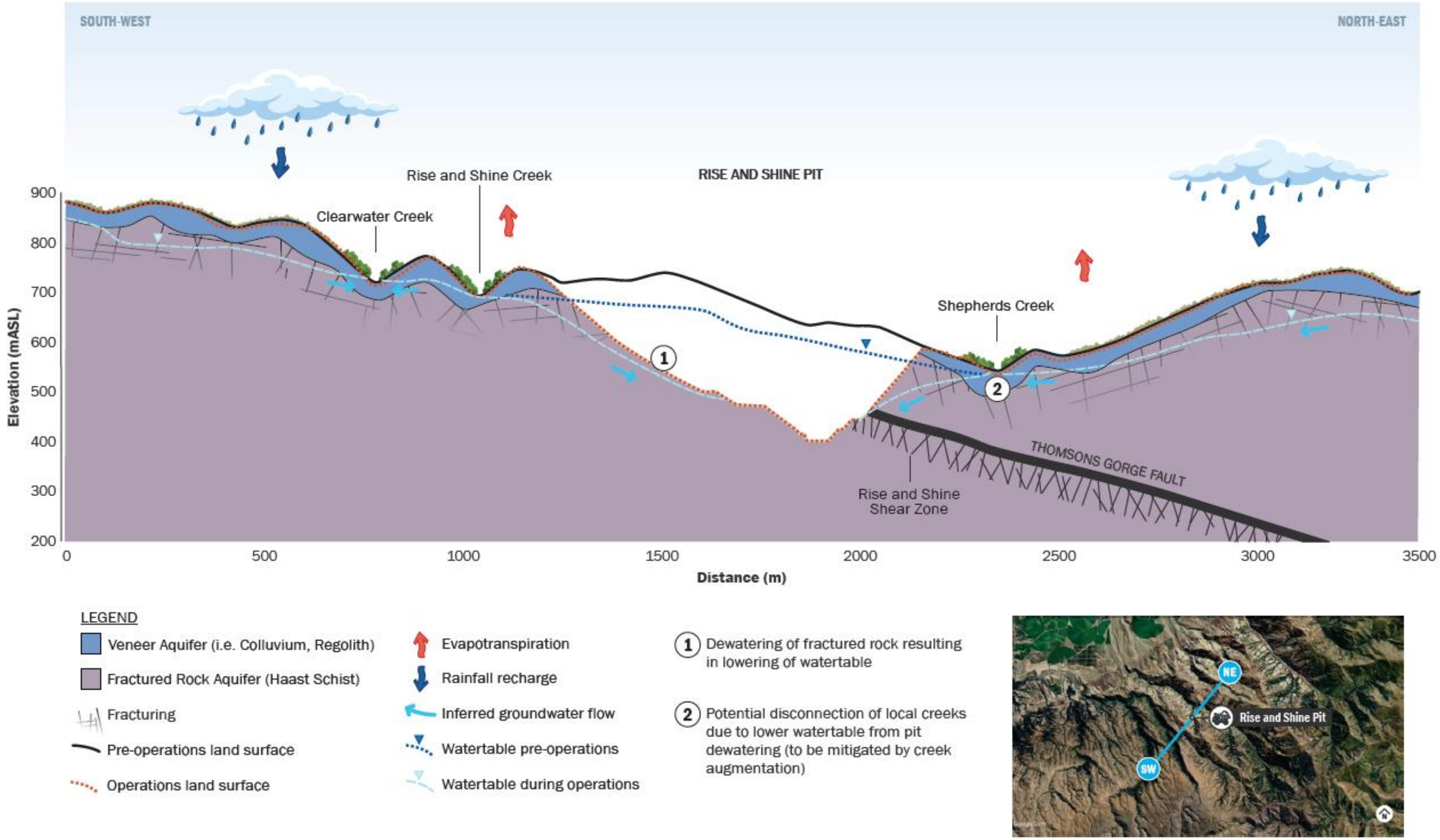

Figure 3.5 **Surface water and groundwater system cross-section – with RAS Open Pit**

4 Risks and potential impacts to water resources

Impact assessments define how impacts of a Project may adversely affect environmental assets (receptors), the potential pathways of the impacts from sources to receptors, and how these pathways might interact with each other (Commonwealth of Australia 2024). As described in Section 2.1.4, water-related receptors in the Project area include:

- surface water, groundwater and associated water resources (e.g. Lake Dunstan)
- wetlands (seepage wetlands, fens and swamp and marsh wetlands)
- ecology (aquatic and terrestrial)
- other water users (e.g. irrigators, pastoral activities).

4.1 Summary of potential impact pathways and receptors

Based on the outcomes of the impact assessments conducted for the Project in relation to water resources (as listed in Table 1.1), Table 4.1 presents a summary of the key potential impact pathways to water-related receptors associated with the Project.

As described in Section 2.4.2, the PCoC are considered to comprise:

1. Sulphate
2. Nitrogen compounds: NO_3, ammoniacal nitrogen
3. Metals: predominantly Al, As, Fe, Cd, Co, Hg, Mo, Mn, Ni, Pb, Sb, Tl, Zn
4. Petroleum hydrocarbons
5. Cyanide

Table 4.1 Potential impact pathways and receptors

Phase	Source	Stressor	Process
Construction / operations	Historic mine workings/areas	Disturbance of historic mine workings/areas	Transport/release of PCoC (1-3) Aeolian transport of dust containing PCoC (1-3)
	Historic pastoral land use	Disturbance of former pastoral areas	Transport/release of PCoC (2)
	Project activities	Vegetation clearing, soil disturbance	Erosion and sediment transport Aeolian transport of dust containing PCoC (1-3)
	Geology – As rich minerals	Ore extraction and processing	Transport/release of PCoC (1-3)
	Watercourse / surface flow diversion	Vegetation clearing, soil disturbance	Erosion and sediment transport Change in hydrological conditions, altered flow regimes
		Overflow to pits during flood events	Reduction in Shepherds Creek peak flood flow

Phase	Source	Stressor	Process
		Controlled release of flood flow from pits	Release of PCoC (1-4)
Operations	Underground mining	Subsidence induced increase in hydraulic conductivity	Change in groundwater flux, groundwater level drawdown
		Groundwater inflow to underground mine and associated dewatering	Change in groundwater flux, groundwater level drawdown
		Blasting to develop stopes resulting in exposure of fresh rock faces	Oxidation of arsenopyrite, release of PCoC (1-4)
		Interaction with Thomsons Gorge Fault	Change in groundwater flux, groundwater level effects
	Open pit mining	Interception of watercourses/flow paths (catchment area excision)	Streamflow reduction
		Development of open pit	Removal of wetlands
		Blasting and excavation resulting in exposure of fresh rock faces	Oxidation of arsenopyrite, release of PCoC (1-4)
		Groundwater inflow to open pit and associated dewatering	Change in groundwater flux, groundwater level drawdown
		Interaction with Thomsons Gorge Fault	Change in groundwater flux, groundwater level effects
	ELFs	Interception of watercourses/flow paths (catchment area excision)	Streamflow reduction
		Development of ELFs	Removal of wetlands
		Disposal of material containing sulfide minerals (including arsenopyrite) and blast residue	Oxidation of sulfide minerals, generation of acidity, transport/release of PCoC (1-3)
		Exposed waste rock	Erosion and sediment transport
		Seepage generation/migration	Transport/release of PCoC (1-3)
	TSF landform	Interception of watercourses/flow paths (catchment area excision)	Streamflow reduction
		Development of TSF	Removal of wetlands
		Storage of fine-grained waste material	Transport/release of PCoC (1-3)
			Aeolian transport of dust containing PCoC (1-3) during periods of low water inventory
		Seepage generation/migration	Transport/release of PCoC (1-3)
		Excess water storage on TSF	Increased seepage rates and transport/release of PCoC (1-3)

Phase	Source	Stressor	Process
	ROM Pad	Temporary storage of excavated or mined material	Oxidation of sulfide minerals and release of PCoC (1-3)
Operations	Processing Plant	Processing of excavated material	Transport/release of PCoC (1-5)
		Generation of tailings waste stream	
	Topsoil stockpiles	Exposure of topsoil stockpiles to natural elements	Erosion and sediment transport
			Aeolian transport of dust containing PCoC (1-3)
			Transport/release of PCoC (1-3)
	Dust suppression	Use of mine impacted water for dust suppression purposes	Transport/release of PCoC (1-3)
	Water supply	Abstraction of water from the Bendigo Aquifer for mine water supply	Change in groundwater flux, groundwater level drawdown
	Storage overflow	Discharge from silt ponds when capacity is exceeded	Change in hydrological conditions, altered flow regimes Transport/release of PCoC (1-3)
Closure and post-closure	Rehabilitated landforms (general)	Rainfall runoff from rehabilitated landforms	Erosion and sediment transport
		Seepage generation/migration from rehabilitated landforms	Transport/release of PCoC (1-3)
		Release of surface water from rehabilitated landforms to the receiving environment	Change in hydrological conditions, altered flow regimes
			Transport/release of PCoC (1-3)
	Underground mine	Groundwater inflow to underground mine/discharge from underground mine to groundwater system	Change in groundwater flux, groundwater level
			Transport/release of PCoC (1-3)
	Final void lakes (RAS and SRX pits)	Groundwater inflow to pits/discharge from pits to groundwater system	Change in groundwater flux, groundwater level
			Transport/release of PCoC (1-3)
		Surface flow of pit lake water into the Shepherds Creek catchment and Rise and Shine Creek	Change in hydrological conditions, altered flow regimes
			Transport/release of PCoC (1-3)
	Backfilled pits (SRE and CIT pits)	Exposed waste rock	Erosion and sediment transport
		Seepage generation/migration through TZ3 waste rock used to backfill pits	Transport/release of PCoC (1-3)

As described in Section 3.3, water management measures will be implemented during the construction, operational, closure and post-closure phases of the Project to reduce the potential for the impact pathways summarised in Table 4.1 to arise. As detailed in Section 5.3, mitigation measures will be implemented for those pathways and potential impacts which are unable to be managed by the Project water management system.

4.2 Residual predicted impacts

While the proposed water management system will reduce potential impacts to water resources, several residual impacts will remain which are expanded on below.

4.2.1 Operational phase

The key residual predicted impacts during the operational phase of the Project include:

- Groundwater drawdown:
  - Calculated drawdown as a result of the Project indicates that groundwater level decline of over 1 m could extend up to 550 m from the Project dewatering activities (e.g. RAS Open Pit and Underground Mine) (Hydro Geochem Group 2025).
  - The potential drawdown area encompasses all three wetland types, with the swamp and marsh wetlands associated with the Rise and Shine Creek comprise the majority of the wetland areas likely to be affected (Hydro Geochem Group 2025).
  - The Rise and Shine alluvial aquifer and any nearby wetlands are predicted to be significantly impacted by the mining activities – possibly leading to the drying up of the wetlands and the loss of the alluvial system (Komanawa Solutions Ltd 2025c).
- Reduction in watercourse flow associated with catchment excision and mine water circuit capture:
  - Mean flow rates at monitoring site SC01 on Shepherds Creek and RS03 on Rise and Shine Creek are estimated to be reduced by approximately 17% and 13% respectively, at full Project development. Low flow conditions are predicted to increase with the seven day mean annual low flow decreasing by approximately 27% and 15%, for SC01 and RS03 respectively (Mine Waste Management 2025d).
- Reduction in baseflow (groundwater discharge to Shepherds Creek and Rise and Shine Creek) due to mine dewatering induced groundwater depressurisation:
  - Maximum predicted reduction of 5.2 L/s to Shepherds Creek and 17.3 L/s to Rise and Shine Creek (Komanawa Solutions Ltd 2025b).
- Un-intercepted seepage from the TSF:
  - Minor seepage is expected to bypass the seepage interception systems (Hydro Geochem Group 2026).

Mitigation measures proposed to reduce potential impacts to sensitive receptors are described in Section 5.3.

4.2.2 Closure and post-closure phases

The key potential residual impacts during the closure and post-closure phases of the Project include (Komanawa Solutions Ltd 2025c, Mine Waste Management 2025a, Mine Waste Management 2025c):

- Continued groundwater depressurisation/drawdown and associated reduction in baseflow contribution to surface water systems as pit lakes develop.
- Potential for groundwater and surface water quality effects associated with:
  - release of surface runoff from rehabilitated landforms (including the TSF) to the receiving environment
  - release of pit lake water to the receiving environment (overflow and/or seepage)
  - release of seepage from the TSF and rehabilitated landforms to the receiving environment.

Mitigation measures proposed to reduce potential impacts to sensitive receptors are described in Section 5.3.

4.3 Conceptualisation of Project impact pathways, receptors and management and mitigation measures

Figure 4.1 presents conceptually the project activities/landforms potential impact pathways, receptors and management and mitigation measures for the construction and operational phases of the Project. Figure 4.2 presents conceptually the project activities/landforms potential impact pathways, receptors and management and mitigation measures for the closure and post-closure phases of the Project.

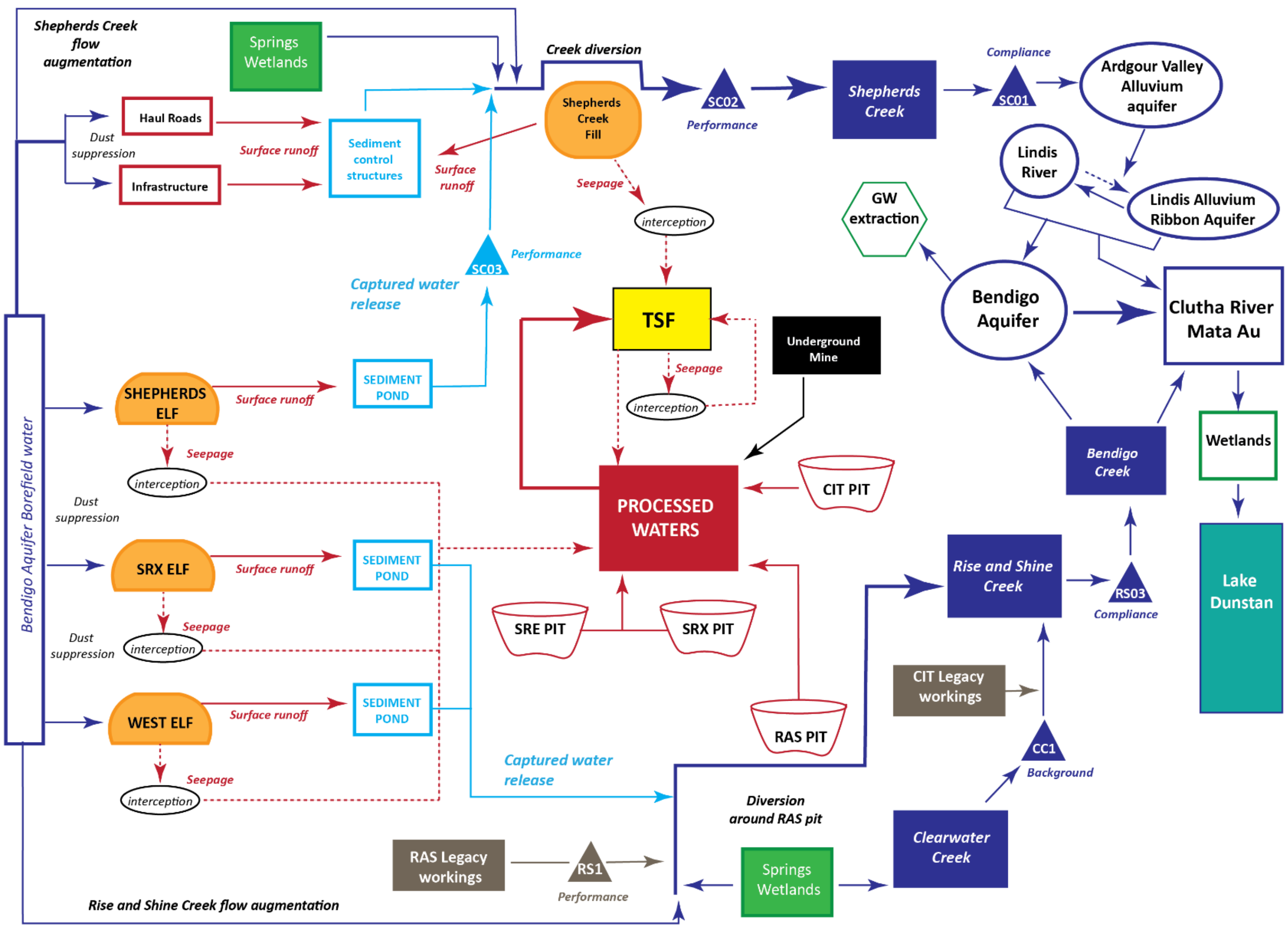

Figure 4.1 Project construction and operations - potential impact pathways, receptors and management and mitigation measures

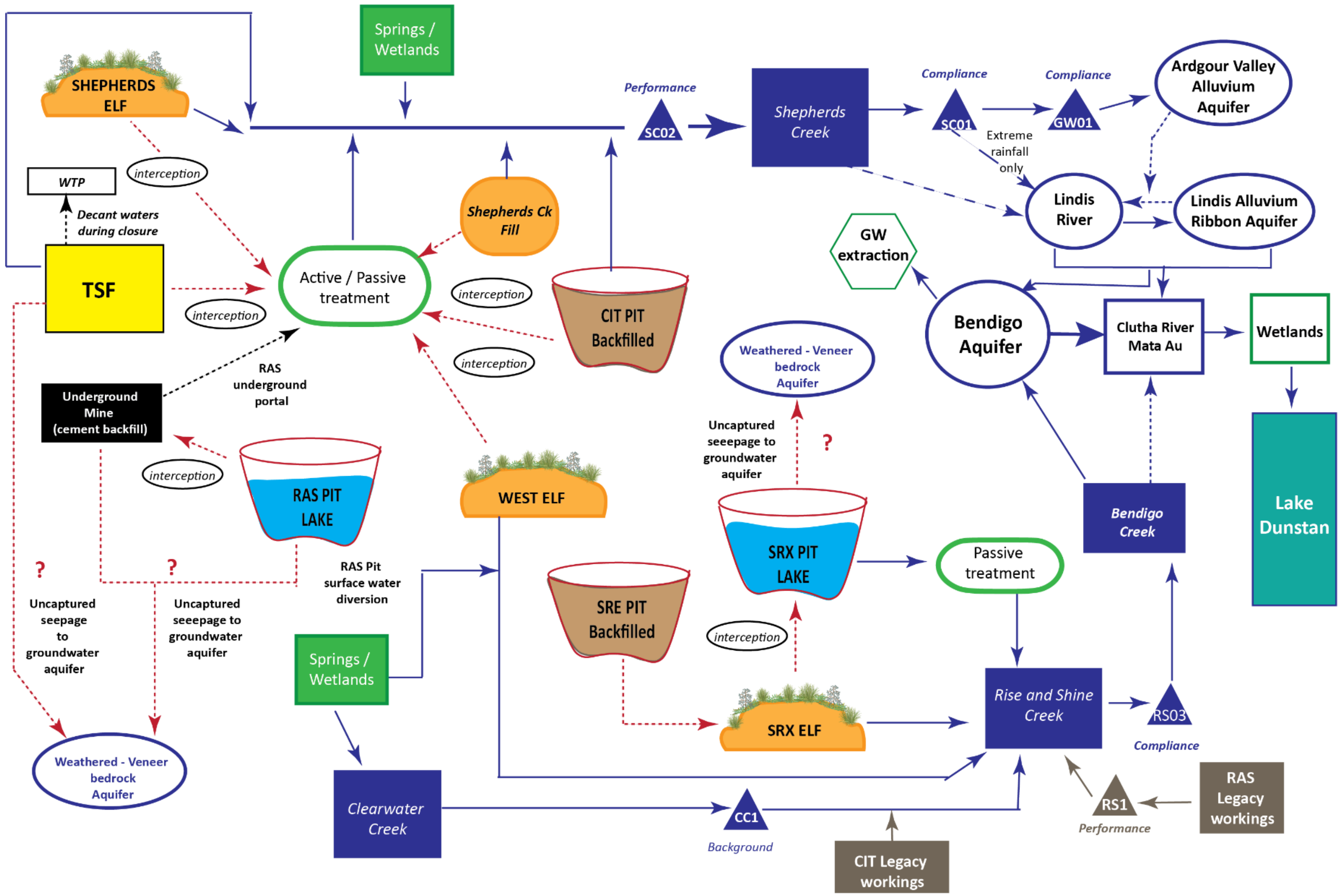

Figure 4.2 Closure and post-closure - potential impact pathways, receptors and management and mitigation measures

5 Monitoring, management and mitigation measures

5.1 Introduction

The identification, management and mitigation of risks associated with the Project, for both operational and closure phases are summarised in several management plans (Matakanui Gold Limited 2026a, b, c, d, e) and the Mine Closure Plan (Mine Closure Management 2025). Operational management plans include water, tailings, ELFs, soils and sediment and pond and reservoirs.

The Mine Closure Plan frames the current understanding of the project within the surrounding environment at closure and describes the strategies to be implemented by Matakanui Gold Limited to manage closure risks and to meet the proposed closure outcomes. The Mine Closure Plan addresses key areas of safety, cultural heritage, infrastructure, contamination, geotechnical stability, revegetation, hydrology, hydrogeology workforce and relinquishment.

The management of mine impacted waters and associated PCoC is a key area of risk for the Project that will continue through the construction, operations and closure phases.

5.2 Compliance and performance water monitoring

The proposed locations of compliance and performance water monitoring sites are shown in Figure 5.1 and described in the following sections.

5.2.1 Key Contaminants of Concern

Key PCoC identified in the geochemistry investigations by Mine Water Management (2025a, b, c) include:

- elevated total suspended solids (TSS) in surface waters
- NMD with potentially elevated PCoC including As, SO_4, and trace metals
- nitrate rich drainage sourced from ANFO used for blasting
- cyanide used in the gold recovery process.

5.2.2 Water quality compliance monitoring suite

The Water Management Plan (Matakanui Gold Limited 2026a) includes the following list of PCoC for both compliance and performance monitoring:

- N compounds (NO_3-N and Amm-N)
- Sulphate (SO_4)
- Metals Al, As, Cd, Co, Cu, Cr, Fe, Mn, Mo, Ni, Pb, Sb, Se, Sr, U and Zn.
- Cyanide (CN)
- pH
- Turbidity.

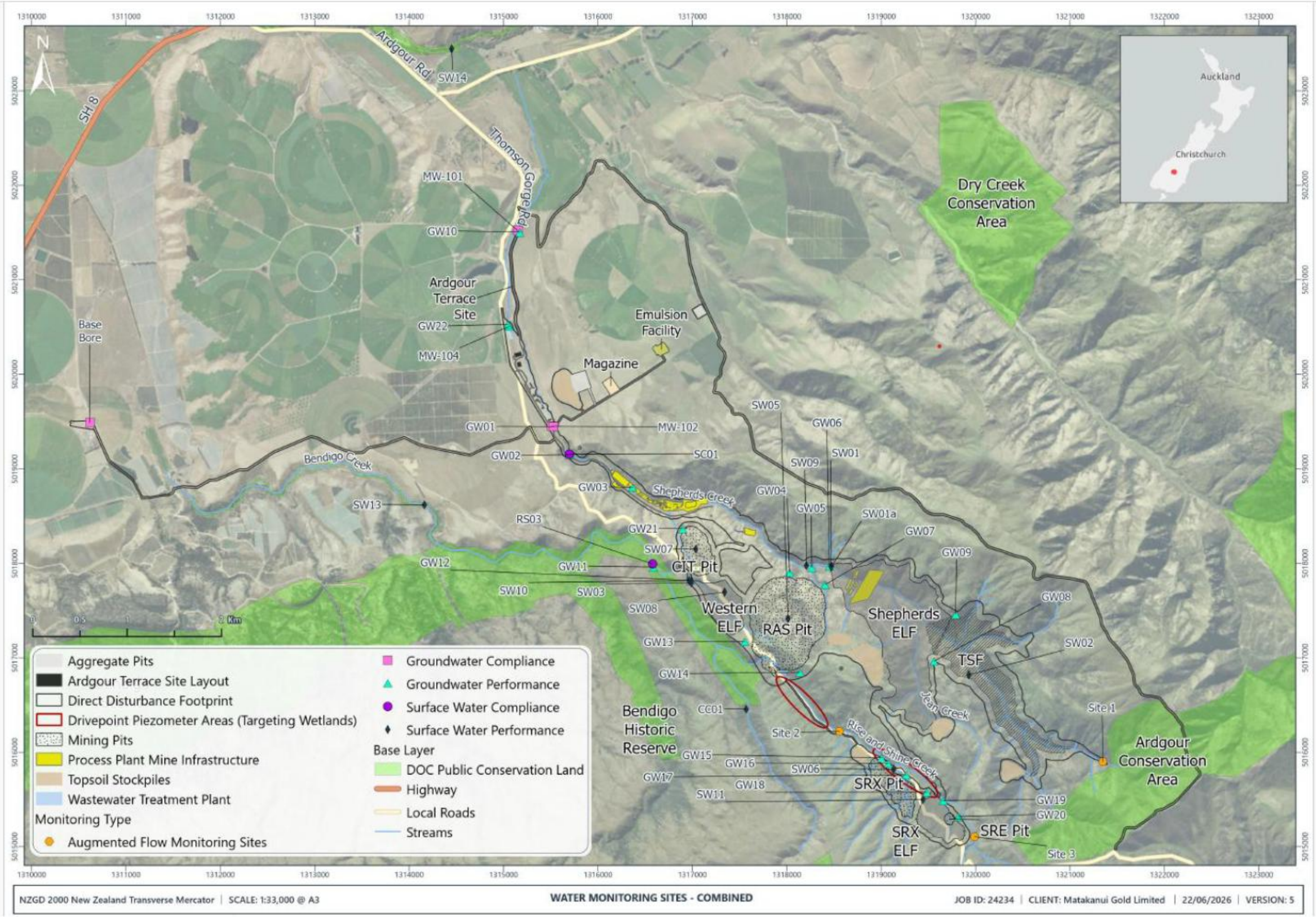

Figure 5.1 Proposed compliance and performance water monitoring sites

An additional suite of PCoC were agreed during the conference of expert panellists in June 2026 including:

- Boron (B)
- Sulphide (S^{2-})
- Chemical oxygen demand (COD)
- Total Petroleum Hydrocarbons (TPH)
- Dissolved Oxygen (DO).

5.2.3 Surface water compliance monitoring

Three surface water locations are nominated for monthly surface water compliance monitoring (Matakanui Gold Limited 2026a):

- SC01 – Shepherds Creek. Located downstream of the entire project area. This site monitors water quality and flow relating to the Shepherds Creek Catchment.
- RS03 – Rise and Shine Creek. Located downstream of main mine footprint the location would monitor collective runoff from SRX, SRE and West ELFs, mine domains and associated pits. Monitors water quality and flow associated with the Rise and Shine Creek.

Table 5.1 Surface water compliance parameters and limits (Matakanui Gold Limited 2026a)

Parameter	Units	SC01	RS03	Basis for compliance assessment
pH	unitless	6.5 – 9.0	6.5 – 9.0	Within stated pH range
Turbidity (NTU)	NTU	5	5	5-year 80th percentile
Total Ammoniacal-N	NH_3-N (mg/L)	0.24 (annual median) 0.4 (annual 95th percentile)	0.24 (annual median) 0.4 (annual 95th percentile)	
Total Nitrate-N	NO_3-N (mg/L)	1.11	1.11	Annual 95th percentile[1]
Total Cyanide (CN)	CN- (mg/L)	0.007	0.007	Annual 95th percentile[1]
Total Sulphate	SO_4 (mg/L)	2503	5004	SC01 – maximum absolute RS03 – 12 month < 20% exceed compliance
Dissolved Aluminium	Al (mg/L)	0.0555	0.0555	Annual 95th percentile[1]
Total Antimony	Sb (mg/L)	0.02	0.074 / 0.25	5 sample average / max absolute value
Dissolved Arsenic	As(V) (mg/L)	0.013	0.042	Annual 95th percentile[1]
Dissolved Boron	B (mg/L)	0.94	0.94	Annual 95th percentile[1]
Dissolved Cadmium	Cd (mg/L)	0.0002	0.0002	Annual 95th percentile[1]
Dissolved Chromium	Cr (mg/L)	0.001 / 0.0067	0.001 / 0.0067	Annual 95th percentile[1]
Dissolved Cobalt	Co (mg/L)	0.001 / 0.11	0.001 / 0.11	Annual 95th percentile[1] / max absolute value
Dissolved Copper	Cu (mg/L)	0.0014	0.0014	Annual 95th percentile[1]

Parameter	Units	SC01	RS03	Basis for compliance assessment
Total Iron	Fe (mg/L)	0.3	0.3	Annual 80th percentile[1]
Dissolved Manganese	Mn (mg/L)	1.9	1.9	Annual 95th percentile[1]
Dissolved Molybdenum	Mo (mg/L)	0.01	0.034	Annual 95th percentile[1]
Total Selenium	Se (mg/L)	0.005	0.005	Annual 95th percentile[1]
Dissolved Sulphide	H_2S (mg/L)	0.001	0.001	Less than LOR
Dissolved Zinc	Zn (mg/L)	0.008	0.008	Annual 95th percentile[1]

1. ANZG 95% species protection (toxicant)

Table 5.2 Treated wastewater discharge standard limits

Parameter	Unit	Discharge limit
Carbonaceous Biochemical Oxygen Demand (CBODs)	g/m^3	20
Total Suspended Solids (TSS)	g/m^3	30
Faecal Coliforms	MPN/100 mL	10^4
Escherichia coli (E.coli)	MPN/100 mL	10^4
Total Nitrogen (TN)	g/m^3	50
Total Phosphorous (TP)	g/m^3	18

5.2.4 Groundwater compliance monitoring

Two bores have been nominated for monthly groundwater compliance monitoring (refer Figure 5.1):

- MW-102 (GW01) Compliance bore: Located near Shepherds Creek, this bore targets the Shepherds Creek Alluvial Aquifer, with groundwater level and quality monitored. Monitoring data from this location will be used to assess potential impacts from mining activities on downstream groundwater resources.
- Abstraction borefield production bore (Base bore): Located in the Bendigo Aquifer Borefield, abstraction rates and quality for operation use are monitored. Used for abstraction rate compliance and drinking water standards.

Table 5.3 Groundwater compliance parameters and limits (Matakanui Gold Limited 2026a)

Parameter	Units	Value	Basis for compliance
pH	unitless	7.0 – 8.5	Within stated pH range
Total Dissolved Solids	NTU	1,000	Maximum absolute value
Total Ammoniacal-N	NH_3-N (mg/L)	1.5	Maximum absolute value
Total Nitrate-N	NO_3-N (mg/L)	11.3	Maximum absolute value
Total Cyanide (CN)	CN- (mg/L)	0.08	Maximum absolute value
Total Sulphate	SO_4 (mg/L)	250	Maximum absolute value
Dissolved Aluminium	Al (mg/L)	1	Maximum absolute value
Total Antimony	Sb (mg/L)	0.02	Maximum absolute value
Dissolved Arsenic	As(V) (mg/L)	0.01	Maximum absolute value
Dissolved Boron	B (mg/L)	0.5	12 month 80th percentile
Dissolved Cadmium	Cd (mg/L)	0.004	Maximum absolute value
Dissolved Chromium	Cr (mg/L)	0.05	Maximum absolute value
Total Chloride	Cl (mg/L)	175	12 month 80th percentile
Dissolved Cobalt	Co (mg/L)	0.05	12 month 80th percentile
Dissolved Copper	Cu (mg/L)	0.4	12 month 80th percentile
Total and Dissolved Iron	Fe (mg/L)	0.2	Maximum absolute value
Dissolved Lead	Pb (mg/L)	0.01	Maximum absolute value
Dissolved Manganese	Mn (mg/L)	0.2	12 month 80th percentile
Dissolved Mercury	Hg (mg/L)	0.002	Long term medium
Dissolved Molybdenum	Mo (mg/L)	0.01	12 month 80th percentile
Dissolved Selenium	Se (mg/L)	0.04	12 month 80th percentile
Dissolved Zinc	Zn (mg/L)	2	12 month 80th percentile
Dissolved Fluoride	F (mg/L)	1	12 month 80th percentile
Total Sodium	Na (mg/L)	175	12 month 80th percentile
Dissolved Strontium	Sr (mg/L)	4	Long term medium
Dissolved Uranium	U (mg/L)	0.01	12 month 80th percentile

5.2.5 Water quality performance monitoring

In addition to the compliance monitoring sites detailed above, are a proposed number of performance monitoring locations for both the surface and groundwater systems. The purpose of the performance monitoring network is to assess the effectiveness of water management infrastructure (silt ponds, seepage collection assets and treatment systems) and operational practices. It complements the compliance monitoring by providing early warning of potential issues and informs adaptive management processes.

i Surface water performance monitoring

A total of fifteen surface water performance monitoring sites are proposed (Matakanui Gold Limited 2026a). This total comprises eight locations related to the mine circuit water (underdrains, sumps, TSF decant and seepage interception), one related to surficial mine impacted water (MIW) (ELF As-rich stockpile), and four clean water locations within the mine area (3 silt pond discharge points and one above the TSF). An additional two clean water locations are proposed downstream of the Project area at Bendigo Creek and Lindis River.

Monthly monitoring frequency is proposed for surface water performance monitoring locations; this frequency will be reviewed on an ongoing basis. The suite of parameters currently proposed is the same as detailed in Table 4.1, with the addition of major cation and anions, EC, dissolved oxygen and hardness. This will also be reviewed on an on-going basis.

ii Groundwater performance monitoring

In addition to the surface water performance monitoring sites, a performance monitoring bore network is designed specifically to:

- detect bypass of seepage collection systems
- detect and support assessment of changes in groundwater levels including drawdown and seasonal fluctuations.
- identify potential migration of PCoC from upgradient mine domains.

A total of 22 groundwater bore locations are proposed, seven of which are vibrating wire piezometers (VWP) that will measure phreatic surfaces at high resolution. The remainder are conventional monitoring bores, with 1 to 3 (nested) standpipes at each location. Of the 22 locations, two bores are currently installed (GW16 and GW10), with an additional groundwater monitoring drilling program completed in July 2026 to support additional groundwater modelling. The remaining bores will be installed 12 months prior to the development of main mine components such as underground mine (GW05), and the development of the SRX (GW15, 18, 20), the SREX (GW17) and the CIT (GW21).

5.3 Water related management and mitigation measures

The water management strategy for BOGP will vary across phases of the LOM.

- During the operational phase, MIW will be retained on site with surficial runoff from disturbed areas (infrastructure, roads and ELFs) discharged via sediment control structures. It is anticipated that majority of seepage will be captured and managed on-site. Clean water diversion channels will be established to convey clean water around specific mine domains, such as the SRE, TSF and Shepherds ELF and the RAS pit.
- During the closure and post-closure phases, seepage originating from the ELFs, TSF and pit voids (both pit lake and backfilled) will be collected and treated via active and passive treatment processes.

5.3.1 Mitigation of mine impacted water quantity

i Creek flow augmentation

A potential reduction in creek flow volumes may occur as mine domains become active and the influence of groundwater drawdown expands. A reduction in the catchment area reporting to creeks, and changes in the runoff processes of disturbed area, could also have an impact on reducing creek flows.

To reduce these predicted mining impacts, creek flows will be augmented with groundwater abstracted from the Bendigo Aquifer. Flow augmentation will occur in the headwaters of Shepherds Creek and Rise and Shine Creek, with mean monthly surface water flow rates maintained at the estimated pre-mining monthly surface flow rates.

- For Shepherds Creek (SC01):
  - A constant 10 L/s once the RAS Underground Mine commences
  - 1.7 L/s for all months once the CIT Open Pit commences
- For Clearwater Creek and Rise and Shine Creek (RS03):
  - 15.3 L/s for all months once SRX Open Pit commences

Creek augmentation will continue until after the cessation of mine-related dewatering and it is identified that creek flows respond back to pre-mining flows.

Creek flow will be monitored at established automated creek flow gauging sites that will be established to record flow volumes and rates to monitor and assess impacts of mine operations on creek flow regimes. These will be established at the compliance monitoring locations RS03 (Clearwater and Rise and Shine Creeks) and SC01 (Shepherds Creek). Surface flow monitoring will be complimented by the performance monitoring groundwater network which will monitor mine-related drawdown.

It is anticipated that the augmented creek flow strategy will aid in the mitigation of the effects of drawdown and water balance changes on the swamp and march wetlands systems in the Rise and Shine Valley. Performance monitoring and adaptive management will allow for the augmentation approach to be proactively modified if it is not sufficient for maintaining wetland hydraulic and ecological function.

ii Seepage mitigation

The potential for seepage generation, and elevated PCoC, from mine infrastructure assets which could potentially bypass seepage collection schemes is a key risk. However, recent groundwater modelling suggests that this risk is low and that the majority of seepage will be restricted to the weathered bedrock aquifer in the valley floors. Thus, seepage collection systems and contingency measures are required to mitigate the seepage migration risks. The proposed seepage interception infrastructure relating to each main mine asset is detailed in Table 5.4.

Table 5.4 Seepage collection systems proposed for BOGP

Mine infrastructure	Seepage collection system
Shepherds ELF	Toe underdrain Low permeability toe bund Seepage collection Sump
TSF	Tailings underdrainage Embankment Chimney drain Upstream cut off drain Low permeability core Seepage pumped to Shepherds sump
Shepherds Valley Fill	Subsurface drains at Rom Pad and processing plant
Western ELF	Underdrainage system Collection sump
SREX ELF	Perimeter drain cut to rock

Hydro Geochem Group (2026) identified that the Shepherds ELF seepage collection sump is the most important as it is down valley of the Shepherds ELF and TSF, which together have the largest mine footprint (total 172 ha) and as such is expected to intercept the highest volume of seepage and load of PCoC.

The smaller ELFs pose lower risk given their smaller footprints (<20 ha). The Western ELF is in an incised gully and cutoff is possible at the toe. At the SREX ELF perimeter cutoff can be achieved in rock along the downstream. Subsurface drains will collect Shepherds Creek Valley Fill seepage.

Hydro Geochem Group (2026) stated, after evaluating the hydrogeological system, that conditions are favourable for high proportions of seepage to be collected in the planned network system outlined in Table 5.4. It is projected that only minor seepage is expected to bypass the primary collection system in the valley. Thus, groundwater performance monitoring along key potential seepage migration pathways is proposed to ensure that any seepage bypass remains at levels that pose at a low risk to downstream receptors.

If this performance monitoring identifies unacceptable levels of seepage bypass, then contingency seepage interception systems (SIS) can be deployed. SIS can include shallow rock-filled drains, interception wells and low permeability cut off wells. The constrained valleys provide multiple opportunities to intercept seepage along potential valley flow paths, making the SIS approach effective.

The low risk postulated by Hydro Geochem Group (2026), and confirmed through recent groundwater modelling, indicating that vast majority of seepage will migrate through shallow weather bedrock aquifer, still requires (field validation during the operational phase at primary seepage collection systems, once the infrastructure is in place.

Performance monitoring of seepage interception efficiency should focus on sulphate (SO_4) and nitrate (NO_3) due to their conservative transport properties under most conditions.

5.3.2 Management of mine-impacted water quality

Water quality predictive studies (MWM 2025a,b,c) for the Project have identified key MIW PCoC and the likely points of generation, pathways and potential receptors. As part of the WMP, water treatment requirements across the LOM have been assessed and proposed.

Three key stages of water management are as follows:

- construction phase physical water management
- operational phase internal water treatment circuit
- active and passive water treatment post mine operations into closure, with a decadal passive treatment legacy.

i Water management during construction

Construction phase water management will focus on clean water diversion, erosion and sediment control and creek flow augmentation. The development of an operational MIW management system will include:

- diversion and release of clean surface waters from the project area
- sediment inventory control and erosion minimisation
- surficial MIW capture and release via sediment management structures (ponds)
- capture and control of mine circuit water and pumping to TSF impoundment
- zero release of untreated mine-impacted water

- continuation and adjustment of creek flow augmentation.

ii Water management during operations

During the mine operational phase, mine-impacted water will be collected, used and stored on site. Only episodic runoff from haul roads and ELF surfaces will be directly discharged offsite. The proposed operational water management system is described in Section 3.3. During the operational phase the reduction of the risk of both cyanide and arsenic will be required via treatment processes.

a Cyanide detoxification

Cyanide (CN_{WAD}) detoxification is a key requirement before tailings are discharged to the TSF. An INCO (O2/SO2) circuit for cyanide destruction will be used on process water that will be discharged to the TSF.

b Arsenic treatment

An arsenic treatment process is proposed for process waters that will be discharged to the Shepherds TSF. This will include the addition of ferric chloride ($FeCl_2$) to the process water stream before discharge to absorb arsenic from solution. Preliminary test work has demonstrated that arsenic concentrations decrease from 6 mg/L to <1 mg/L.

iii Water management during closure and post-closure

a Active MIW treatment

MIW will be treated by an active Water Treatment Plant (WTP) and discharged to the receiving environment down Shepherds Creek. This is planned to commence at year 11 and will be required until such time that PCOC loads have reduced sufficiently such that passive water treatment solutions can achieve water quality criteria. Analysis of modelling results determined that the WTP process can be replaced by a passive treatment phase within decades of mining cessation.

The WTP will apply the Ettringite treatment process, lime and aluminium hydroxide to remove sulphate and heavy metals from MIW. The advantage of Ettringite is that it has very low solubility resulting in low sulphate concentrations in the treated waters post precipitation and settling.

Given the baseline water quality investigations, the Ettringite precipitation process is recommended as it is effective for sulphate concentrations of 2,000 mg/L. The process can also provide polishing effect which allows the precipitation of metals Mo, Sb, Ni, Cd, Cu, Zn, As and Se. A portion of B and F and Cl and N can also potentially be removed. Water quality outcomes are unlikely to be achieved without the WTP (Paul Weber 2026), therefore, it is seen as an essential requirement rather than a management option.

b Passive MIW treatment closure and post-closure

It is anticipated that passive water treatment that commences in the closure phase will continue into the post-closure phase. Passive treatment is expected to utilise pit lakes and engineered wetlands to remove contaminants. Further work is planned to understand these systems. Passive, or enhanced passive (chemical addition) treatment will be required in the closure and post-closure phases for MIW originating from the TSF, Shepherds Creek ELF, open pits (RAX and SRX) and underground mine footprint.

Passive treatment options proposed include:

- sediment management to mitigate any residual sediment and prevent passive treatment being overwhelmed with sediment
- oxidation to encourage $Fe(OH)_3$ precipitation and absorption of metals such as As

- anaerobic treatment to remove NO_3, SO_4 and precipitate metals as sulphides
- polishing pond to remove secondary contaminants generated in the anerobic treatment stage (sulphide NH_3.

Passive treatment locations are proposed at both the Shepherds Creek (before SC01) and within SRX pit. Passive treatment at the SRX pit will commence at closure, with the transition of active treatment to passive treatment in the Shepherds Creek to be determined through ongoing studies.

5.3.3 Soil, sediment and dust risk management

Soil, sediment and dust risk management is important as if not undertaken effectively all can act as sources of PCoC for the Project, including turbidity, metals, nutrients and sulphates.

i As-Cd rich soils

The management of risks associated with As-Cd bearing soils is outlined in Matakanui Gold Limited (2026e). These soils are expected to require management during excavations of the SRE, SRX and CIT pits and to a lesser extent the RAS pit where elevated As is located in hotspots and high Cd in the southern section only.

A key aspect to the management of As-Cd soils is their segregation from non As-Cd soils, as outlined in the Soil Management Plan. Beyond the segregation of high and low As-Cd soils, successful management also requires delineation and validation of materials prior to segregation, and the implementation of dust suppression and erosion minimisation via revegetation and engineering controls. Impact minimisation will also be achieved via the re-use of high As-Cd soils in rehabilitation of areas with naturally high level As-Cd soils, as outlined in the Soil Management Plan

As-Cd soils related to the SRE and SRX pit excavations will be moved and stored at the SRX ELF dedicated area. The CIT pit area will have its own dedicated storage area for As-Cd soils. The Western ELF will store high As-Cd soils related to the RAS pit excavation. Both the Western and SRX ELFs will retain As-Cd in dedicated storage areas, while As-Cd soils from the Processing Plant Mine Infrastructure area will be moved to storage at the Western ELF.

ii Topsoil

Management of the organic and nutrient rich soils (topsoil) is essential for rehabilitating mine landforms post-closure. Topsoil management at BOGP will consist of:

- topsoil disturbance minimisation
- in areas of disturbance, maximise topsoil reclamation
- appropriate storage of reclaimed topsoils in appropriately constructed stockpiles, minimising erosion and dust generation
- prompt use of topsoil materials during progressive rehabilitation of the mine site
- record keeping of topsoil volumes reclaimed
- separation of As-Cd rich topsoils from other topsoil inventories.

iii Dust

Dust management aims to minimise the potential generation of airborne dust during land disturbance activities such as excavation, earthworks, and transport. Dust suppression water will be primarily sourced from the Bendigo Aquifer; however, treatment processes are anticipated to allow the use of pit sump water. The proactive use of pit sump water for dust suppressant reduces the reliance and abstraction of the Bendigo Aquifer borefield, whilst reducing the volume of water that would be otherwise be sent to the mine circuit water.

To use the pit sump water this will require monitoring and confirmation as well an assessment of water quality parameters that will confirm the treated MIW is suitable for use as a dust suppressant. If MIW is used and not of suitable quality then PCoC migration issues may become more widespread across the BOGP. Currently the use of MIW is not planned, but is rather a contingency, so the risk will only eventuate under those circumstances.

iv Erosion and sediment control

Erosion and sediment control measures enable the prevention of soil loss, thus protecting environmental receptors from turbidity and associated PCoC during and after land disturbance activities. This is achieved by minimising the hydrological transport of soil particles by best practice engineering practices to reduce erosion and sufficient erosion capture infrastructure (bunds). Dust suppression mentioned above is also important aspect of sediment control.

5.3.4 Tailings water management

Tailings water management aims to reduce water balance and quality risks associated with the tailings. Tailings will be stored in the Shepherds TSF, which will be formed by a dam, above the Shepherds ELF. The embankment for the TSF will be constructed predominantly from mine waste rock obtained from RAS pit.

A water balance model is to be developed and maintained for the TSF throughout its operational life. Inputs to model include direct rainfall, tailings slurry water content, surface water runoff from upstream catchment and groundwater inflows. Outputs include evaporative loss, seepage and water reuse or discharge, with discharge not currently anticipated or planned

TSF pond and water management will include monitoring and maintaining minimum freeboard and design flood criteria, controlling decant pumps, and routine monitoring of pond volumes, rainfall and runoff. Emergency spillway controls are also vital in the management of the water balance associated with the TSF.

Daily and weekly visual inspections will be conducted on embankment crests and slopes, clean water diversions, tailings delivery system and discharge locations and pond locations, and water management systems. Weekly ABA testing of tailings slurry will be completed for the first 3 months of operations, with frequency reduced thereafter. In regard to the geotechnical safety inspections of the TSF embankment, these will be managed by New Zealand Society of Large Dams (NZSOLD) under New Zealand Dam Safety Guidelines (NZDSG).

Post-closure the surface of the Shepherds TSF will be capped and shaped to avoid surface water ponding, with the surface sloping north-west towards the closure wetland and auxiliary spillway. An outlet channel will drain surface water along the edge of the Shepherds Creek ELF into Shepherds Creek. Flows less than 1 in 100 years will be retained on the TSF below the level of the auxiliary spillway.

Post-closure monitoring will be on-going and include:

- pore water pressures and seepage flows
- surface erosion and vegetation establishment
- water quality in surrounding receptors

- TSF and associated infrastructure structural integrity.

5.3.5 Pond and reservoir management

Operational freeboard and emergency spillway controls are to be monitored and maintained. This may include:

- monitoring of water levels, flow rates and water quality
- sediment removal and desilting
- contingency plans for high rainfall events
- maintenance of emergency spillways

5.3.6 Engineered landform management

The four ELFs (Shepherds, SRX, CIT and West) are potential sources of seepage and associated PCoC. One of the key drivers of seepage generated from these ELFs is their design and construction, which is critical. Mitigation measures for the key risk of seepage generation and associated release of PCoC are outlined below. Key mitigation measures

Key mitigation measures are:

- place high risk materials (high S schist) in centre of the ELF
- ensure net percolation/infiltration is below 20%
- design covers and batters including porosity, thickness and chemical inertness to minimise the depth and extent of oxygen ingress
- minimise the extent of PCoC basal seepage with a low risk 3 m thick base.

Material classification according to physical appearance, stratigraphic position and chemical composition is required to be undertaken. Materials excavated will be classed as topsoil (As or non-As), brown rock (weathered zone), schist (low geochemical risk) and schist (high geochemical risk). Placement criteria based on material classification are detailed in Table 5.5.

Table 5.5 Material classification-placement criteria for ELFs

Material	Cover*	Outer fill zone	Bulk Fill Zone (ELF Core)	Basal Layer
Top soil	Yes	No	No	No
As-rich top soil	Yes^	No	No	No
Brown rock	Yes	No	No	Potentially
Schist (very low S and As)	No	Potentially	No	Yes
Schist low geochemical risk		Yes	Not preferred	Not preferred
Schist high geochemical risk		No	Yes	No

*Cover layer includes root zone

^Only in locations where As rich soil was naturally occurring.

i Secondary mitigation measures

In addition to the design and construction of the ELF itself, additional secondary mitigation structures can aid in reducing the risk and impact that seepage generated from ELFs can potentially have on environmental receptors. These include:

- capture seepage via underdrainage and deliver it to the ELF toe collection system
- reduce amount of water interacting with ELFs by installing clean water diversion
- capture and control of sediment laden runoff from ELF.

ii Monitoring

Ongoing monitoring is required to understand changes to risk once the ELF are constructed allowing comparisons of estimated seepage rates to actual seepage rates.

Ongoing testing-monitoring activities will include:

- validate ELF materials with monthly geochemical testing
- confirm that water quality of seepage aligns with predictions
- evaluate ELF runoff quality
- measure in-situ oxidation rates and temperature

5.3.7 Adaptive management considerations

Adaptive management processes relevant to the Project water management plan were agreed upon in the mid 2026 consent workshops and will include but not be limited to responding to the following:

- uncontrolled discharge of MIW surface and seepage waters
- ELF and TSF seepage at rates higher than expected
- ELF and TSF seepage quality poorer than expected
- no reduction of turbidity levels in retention and silt ponds
- spills from collection sumps, retention or silt ponds are of limited capacity and efficacy
- active water treatment plant cannot achieve water quality limits
- passive water treatment system cannot achieve water quality limits
- pit sump water is required for dust suppression
- creek flow augmentation rate is either too low or high.

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