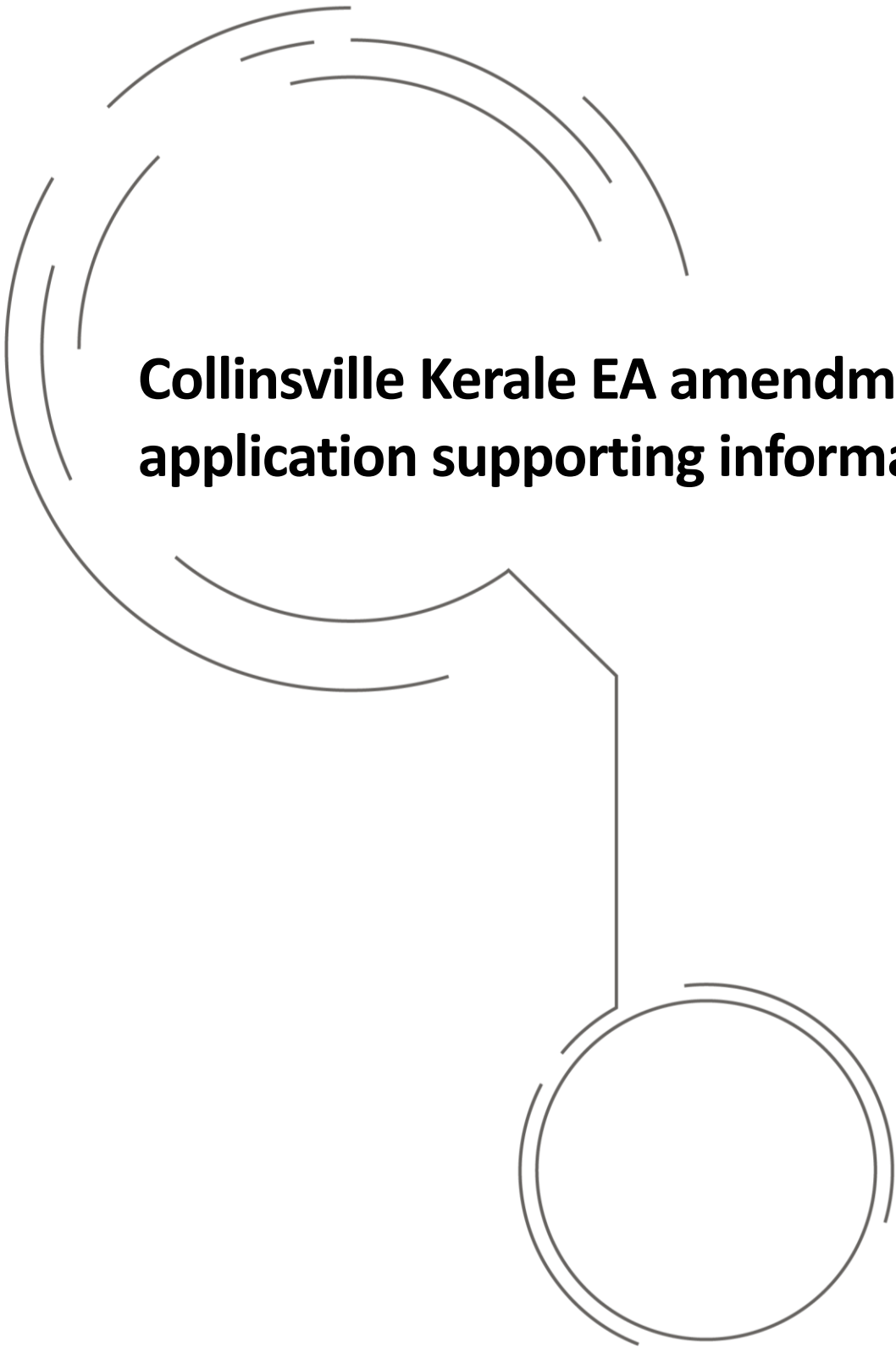


COLLINSVILLE OPEN CUT

GLENCORE



Collinsville Kerale EA amendment application supporting information

Table of Contents

Acronyms and Abbreviations	3
Glossary	5
Executive Summary	6
1. Introduction	8
1.1 Background	8
1.2 Purpose	8
1.3 Document structure	8
2. Context	9
2.1 Location.....	9
2.2 Historical activities	11
2.2.1 Collinsville history	11
2.2.2 Kerale Area	11
2.2.2.1 Kerale Dam.....	11
2.2.2.2 Lime dosing facility	12
2.3 Environmental setting.....	12
2.3.1 Climate	12
2.3.2 Topographic setting.....	14
2.3.3 Surface water	14
2.3.4 Geology and groundwater	16
3. Legislative requirements of an EA amendment application	17
3.1 Content requirements for application	17
3.2 Level of amendment	23
4. Rationale for EA amendment.....	24
4.1 Rationale	24
4.1.1 Approval Requirement	24
4.1.2 Reasoning	24
4.2 Kerale Area Domain	27
4.2.1 Domain boundary development	27
5. Proposed amendments to EPML00332013	28
5.1 Overview	28
5.2 Table H2 – Management measures for Kerale Area Domain	28
5.2.1 Kerale Dam mine feature	29
5.2.2 Kerale Area non-dam mine feature.....	29
5.3 Condition H9 (new)	32
5.4 Condition I39 (new) – Kerale Dam	32
5.5 EA Appendix 1 – Definitions.....	32
6. Description of Environmental Values	33

6.1	Water	33
6.1.1	Surface Water.....	33
6.1.2	Groundwater	36
6.1.3	Wetlands and GDEs	37
6.2	Land.....	40
6.2.1	Land Use	40
6.2.2	Soils	40
6.2.3	Flora and Fauna	41
6.3	Air	42
6.4	Acoustic.....	42
6.5	Waste	42
7.	Likely Impacts on Environmental Values	45
7.1	Details of Emissions or Releases Likely to be Generated	45
7.1.1	Kerale Dam Water Balance	45
7.1.2	Flood Assessment.....	47
7.1.3	Geochemical assessment	49
7.1.4	Groundwater	49
7.2	Description of Risk and Likely Magnitude of Impacts	51
7.2.1	Water.....	51
7.2.1.1	Surface Water	51
7.2.1.2	Groundwater.....	51
7.2.1.3	Wetlands and GDEs.....	52
7.2.2	Land and Biodiversity	52
7.2.3	Air, Acoustic, and Waste	52
7.3	Rehabilitation	52
8.	Management Practices	54
9.	Conclusion.....	56
10.	References	58
	Appendix A – Kerale Dam Seepage Assessment	60
	Appendix B – Water Balance Report – Kerale Dam	61
	Appendix C – Kerale Area Hydraulic Assessment	62
	Appendix D – Geochemical Investigation of Kerale Area Factual Report	63
	Appendix E – Geochemical Investigation of the Kerale Area Interpretive Report	64
	Appendix F – Kerale Study Area Ecology, Sediment and Water Quality Assessment	65

Acronyms and Abbreviations

Acronym	Meaning
AEP	Annual Exceedance Probability
AHD	Australian Height Datum
AMD	Acid Mine Drainage
ANZG	Australian and New Zealand Guidelines
BOM	Bureau of Meteorology
°C	Degrees Celsius
COL	Collinsville Open Cut
CRS	Chromium-reducible sulfur
CSG	Coal Seam Gas
DETSI	Department of the Environment, Tourism, Science and Innovation
EA	Environmental Authority
The EA	EPML00332013
EIS	Environmental Impact Statement
EP Act	Queensland <i>Environmental Protection Act 1994</i>
EPBC Act	Commonwealth <i>Environment Protection and Biodiversity Conservation Act 1999</i>
EPP Water	Queensland Environmental Protection (Water and Wetland Biodiversity) Policy 2019
ERM	Environmental Resources Management Australia Pty Ltd
ESCP	Erosion and Sediment Control Plan
EVs	Environmental Values
GDE	Groundwater Dependent Ecosystem
ha	Hectare
HES	High Ecological Significance
HEV	High Ecological Value
LOD	Land Outcome Document
mAHD	Metres Australian Height Datum

Acronym	Meaning
m	Metres
m ³ /s	Cubic metre per second
mg/l	Milligrams per litre
mm	Millimetres
ML	Mining Lease
NC Act	Queensland <i>Nature Conservation Act 1992</i>
NC Coal	NC Coal Company Pty Limited
NTU	Nephelometric Turbidity Units
NUMA	Non-Use Management Area
% sat	Percent saturation
PMLU	Post-Mining Land Use
pH	Potential of hydrogen – a measure of how acidic or alkaline a liquid or substance is.
PRC Plan	Progressive Rehabilitation Closure Plan
RCP	Representative Concentration Pathway
RE	Regional Ecosystem
Water Act	Queensland <i>Water Act 2000</i>
WQO	Water Quality Objective
µS/cm	Micro siemens per centimetre
µg/l	Micrograms per litre

Glossary

The following terms are used throughout this document.

Lime dosing facility: The facility used to neutralise Acid Mine Drainage (AMD) water. The facility was commissioned in the early-mid 1990s and was decommissioned in the early 2000s. The facility comprised a pond to temporarily hold AMD water prior to neutralisation, a dry lime dosing system, and a mixing pond.

Keralé Area: The area generally comprising the western portion of ML1064 and the south-western portion of ML1037 centred around Keralé Dam, incorporating the location of the former lime dosing facility and the area downgradient of the dam embankment incorporating the alluvial system and surrounds associated with the tributary of Pelican Creek.

Keralé Area Domain: The area shown in Figure 4-1 in Section 4. The Keralé Area Domain follows the inside (eastern) toe of the western diversion landform, encompasses the location of the former lime dosing facility, specifically the mixing pond, follows the lower portion of the adjacent (eastern) spoil dump final landform slope, transitioning between the lower slope segment and the approximate toe of the spoil dump, and encompasses the inferred extent of the alluvial system associated with the tributary of Pelican Creek, to a point approximately 750 m downstream of the Keralé Dam embankment.

Keralé Dam: The area comprising land that is inundated at the full supply level of Keralé Dam (141.5 m Australian Height Datum (AHD)) and the footprint of the dam embankment extending to where the embankment on the downstream face meets natural surface.

Keralé Area non-dam: The area inside the Keralé Area Domain that is not the Keralé Dam.

Executive Summary

This document has been prepared to support an Environmental Authority (EA) amendment application for EA EPML00332013 (EA) which covers all mining leases (MLs) comprising the Collinsville Open Cut (COL), operated by NC Coal Company Pty Limited (NC Coal).

COL is located in the Bowen Basin, approximately 160 kilometres (km) north-west of Mackay and 5 km west of the Collinsville township, comprising both open cut and underground mining over more than 100 years of operation. Due to this length of time and history, COL is a complex site that presents a range of challenges in facilitating ongoing operations and planning for closure.

This document focuses on the Kerale Area, a portion of the COL MLs generally comprising the western portion of ML1064 and the south-western portion of ML1037 centred around Kerale Dam.

The purpose of this document is to provide information in support of an application to amend the EA in relation to legacy contamination issues to:

- Appropriately address the risk of environmental impact associated with the Kerale Area Domain whilst mining activities are being carried out; and
- Nominate a final land outcome for the Kerale Area Domain following the cessation of mining activities.

The Kerale Area Domain is impacted by legacy contamination issues, with historical sampling records indicating the presence of acidic water. Contemporary geochemical and groundwater assessments have identified that the source of the acidic water is likely to be a historical lime dosing facility located in the upper catchment of the Kerale Dam. During its operational period, the lime dosing facility was used to neutralise Acid Mine Drainage (AMD) water.

Due to these legacy contamination issues the Kerale Area Domain cannot satisfy the criteria for 'stable condition' as defined in Section 111A of the *Environmental Protection Act 1994* (EP Act).

The proposed EA amendment comprises the following components, specifically:

- Inclusion of a new condition (H9) prescribing that the Kerale Area Domain be managed in accordance with Table H2;
- Addition of Table H2 outlining the management measures for the Kerale Area Domain;
- Inclusion of a new condition excluding the Kerale Dam from complying with conditions I27 and I28;
- Additional definitions for Kerale Area Domain, Kerale Dam and Kerale Area non-dam in Appendix 1 of the EA; and
- An additional figure for Appendix 2 of the EA defining the footprint of the Kerale Area Domain components.

The potential impacts on environmental values (EVs) of this proposed amendment have been assessed in accordance with the requirements of Section 226A(f) of the EP Act.

This assessment has found that:

- Modelling predicts that all water held in Kerale Dam will be contained and not released as surface water outflows via the bywash;
- In all simulated events, the diversion landforms prevent ingress to the Kerale Dam;
- At the downstream limit of the Kerale Area Domain, the solute will meet water quality objectives;
- At the receiving environment of Pelican Creek, solute concentrations are predicted to be comparable with background concentrations; and
- Impacts to flora and fauna are not anticipated as a result of the proposed amendment.

This document demonstrates how the EA amendment application meets the requirements of the EP Act and is considered a 'properly made amendment application' under s227AAA of the EP Act.

1. Introduction

1.1 Background

This document has been prepared in support of an Environmental Authority (EA) amendment application in relation to the existing EA (EPML00332013) which covers all mining leases (MLs) comprising the Collinsville Open Cut (COL). COL, which is operated by NC Coal Company Pty Limited (NC Coal), has a long history of operations. The EA has been modified and updated periodically to account for the change in mining needs over time. The current version of the EA was approved by the Department of the Environment, Tourism, Science and Innovation (DETSI) on 5 May 2026.

1.2 Purpose

The purpose of this document is to provide information in support of an application to amend the EA in relation to legacy contamination issues to:

- Appropriately address the risk of environmental impact associated with the Kerale Area Domain whilst mining activities are being carried out; and
- Nominate a final land outcome for the Kerale Area Domain following the cessation of mining activities.

1.3 Document structure

The document includes the following sections:

- Section 1: Introduction – includes background information and states the purpose of this document;
- Section 2: Context – provides background information crucial to the understanding and interpretation of the information presented in this document;
- Section 3: Legislative requirements of an EA amendment application – states the requirements for EA amendment applications under the Queensland *Environmental Protection Act 1994* (EP Act) and how these requirements have been addressed;
- Section 4: Rationale for EA amendment – provides reasoning for the EA amendment;
- Section 5: Proposed amendments to EPML00332013 – details the proposed amendments to conditions under EA EPML00332013;
- Section 6: Description of Environmental Values (EVs) – describes the EVs relevant to the EA amendment application;
- Section 7: Likely impact on EVs – provides a description of the likely impact on the EVs described in Section 6;
- Section 8: Conclusion – concludes the information presented in this document; and
- Section 9: References – includes a list of references used throughout this document.

2. Context

2.1 Location

COL is an open cut coal mining operation, located in the Bowen Basin, approximately 160 kilometres (km) north-west of Mackay and 5 km west of the Collinsville township. COL extends over the following MLs:

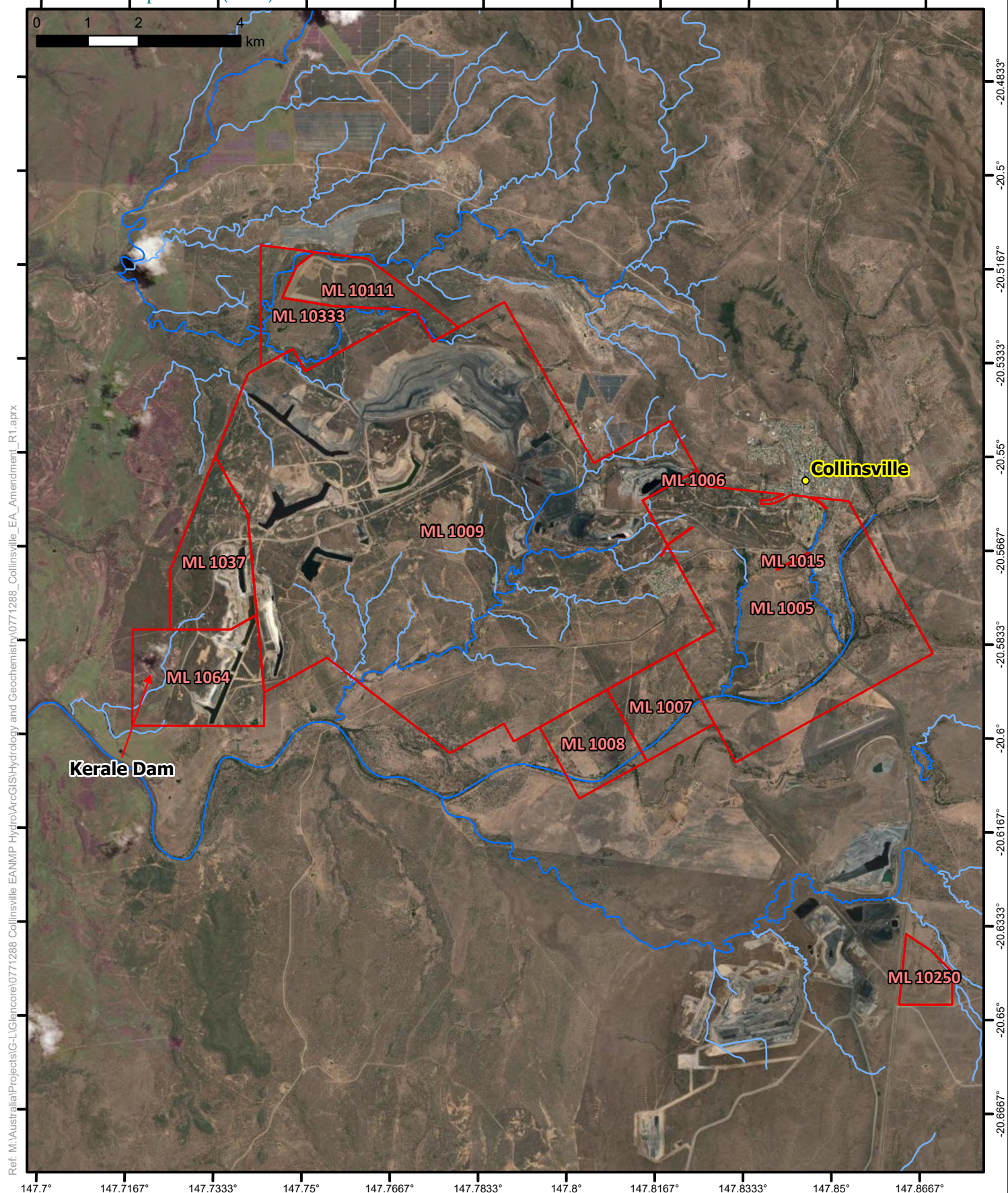
- ML1005;
- ML1006;
- ML1007;
- ML1008;
- ML1009;
- ML1015;
- ML1037;
- ML1064;
- ML10111;
- ML10250; and
- ML10333.

Key features associated with COL such as ML boundaries, watercourses, and the Collinsville township are shown spatially in Figure 2-1.

Figure 2-1 - Collinsville Mine Locality

Collinsville Open Cut (COL)

GLENCORE



Ref: M:\Australia\Projects\G-L\Glencore\0771288 Collinsville EAMMP Hydro\ArcGis\Hydrology and Geochemistry\0771288_Collinsville_EA_Amendment_R1.aprx

Legend

- Mining Lease Boundary
- Watercourse (defined by Water Act 2000)
- Drainage feature (defined by Water Act 2000)
- Collinsville township

Date Created: 6/4/2026 Coordinate System: GDA2020 MGA Zone 55

1:100,000

Map Size: A4 Portrait



DISCLAIMER
Subject To Survey

Glencore makes every effort to ensure the quality of the information available on this map. Before relying on the information on this map, users should carefully evaluate its accuracy, currency, completeness and relevance for their purposes, and should obtain any appropriate professional advice relevant to their particular circumstances. Glencore cannot guarantee and assumes no responsibility for the accuracy, currency or completeness of the information and by using this map you accept that Glencore has no liability for any loss or damage in any form whatsoever caused directly or indirectly from the use of this map.

© State of Queensland 2021
- Dept of Natural Resources Mines and Energy
- Dept of Environment and Science
© Glencore 2021

2.2 Historical activities

2.2.1 Collinsville history

COL has been an operating mine for over 100 years, with both open cut and underground operations carried out during that time, together with other related activities at or within the vicinity of the site. With this length of time and history, COL is a complex site that presents a range of challenges in identifying and determining the approach required to facilitate ongoing operations and enable appropriate management and rehabilitation to be achieved. This complexity and its associated challenges include managing legacy contamination issues at the site.

2.2.2 Kerale Area

The Kerale Area, as shown in Figure 2-2, is impacted by legacy contamination issues. Previously, these issues were characterised by historical sampling records which indicated the presence of acidic water within the Kerale Area. Contemporary geochemical and groundwater assessments have identified that the source of the acidic water is likely to be a historical lime dosing facility located in the upper catchment of the Kerale Dam. This facility was commissioned prior to NC Coal's acquisition of the COL and was subsequently decommissioned in the early 2000s. The contemporary assessments have better informed NC Coal's understanding of the geochemical constraints of the Kerale Area and the appropriate associated management measures.

The purpose of this document is to provide information in support of an application to amend the EA for COL to:

- Recognise that the Kerale Area Domain is impacted by legacy contamination issues, and therefore, it is an area which requires appropriate management measures to be implemented to minimise the risk of environmental impact; and
- Enable NC Coal to implement appropriate management measures in relation to the Kerale Area Domain while mining activities are being carried out during the life of the COL, and nominate a final land outcome for the Kerale Area Domain following cessation of mining activities.

2.2.2.1 Kerale Dam

Kerale Dam was constructed in 1991 / 1992 across an ephemeral, stream order 1 tributary of Pelican Creek. The tributary is defined by the Queensland *Water Act 2000* (Water Act) as a drainage feature (refer Figure 2-2). The dam is an earth fill embankment, designed with a clay core capped with rock fill on both the upstream and downstream faces. The dam has a crest elevation of 142.5 metres Australian Height Datum (mAHD) and a bywash crest elevation of 141.5 mAHD. The dam height is approximately 11 metres (m).

The catchment reporting to the dam is relatively small. Landforms to the west and east of the dam divert overland flow away from the area impounded by Kerale Dam, conveying catchment runoff to the tributary of Pelican Creek downgradient (south) of the dam embankment.

The dam was historically used to store acid mine drainage (AMD) water which had been neutralised by the lime dosing facility. Kerale Dam has not been used for the storage of neutralised AMD water since the early 2000s when the lime dosing facility was decommissioned. Kerale Dam is not part of the

COL operational mine water management system. The only surface water inputs are from direct rainfall on the dam catchment which is approximately 64 hectares (ha).

2.2.2.2 Lime dosing facility

The lime dosing facility was commissioned in the early-mid 1990s after construction of the Kerale Dam. The facility was used to raise the pH of AMD water that had collected in pits to near neutral (from approximately pH 2.5 to 6.5). A dry lime silo was used to house the lime product. Lime was mixed with the AMD water at a dosing rate of approximately 2,800 milligrams per litre (mg/l). The water and lime solution was held in a mixing pond, with neutralised water stored in the dam (WRC, 1996).

2.3 Environmental setting

2.3.1 Climate

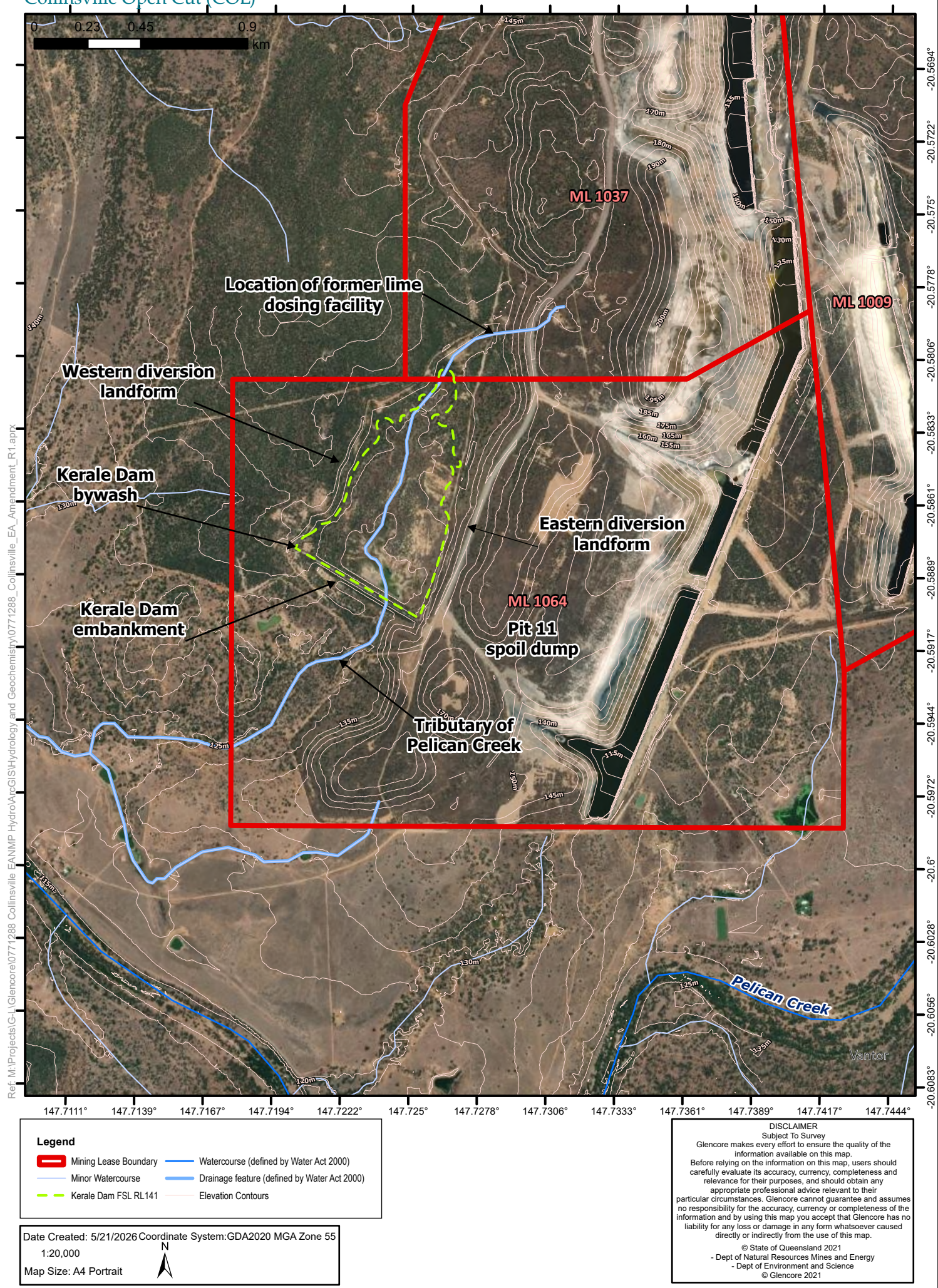
COL is in a subtropical climate zone with distinct wet and dry seasons. The climate is characterised by hot, wet, humid summers and cool, dry winters. The region has an annual average rainfall of 706 millimetres (mm), based on 87 years of records (from 1939-2026) at the Collinsville Post Office weather station (Bureau of Meteorology (BOM), 2026). During the wet season from December to March, average monthly rainfall ranges from 94 mm to 154 mm. Heavy rain and flooding associated with cyclonic low-pressure systems are a feature of the regional climate at COL.

Average maximum temperatures range from 25.1 degrees Celsius (°C) in July to 34.2 °C in December. Minimum average temperatures range from 9.3 °C in July to 22.1 °C in January (BOM, 2026).

The annual mean daily evaporation is 5 mm, ranging from 6 to 7 mm during summer and 3 to 4 mm during winter. Mean evaporation exceeds mean monthly rainfall, placing the region in a net moisture deficit.

Figure 2-2 - Kerale Area
Collinsville Open Cut (COL)

GLENCORE



2.3.2 Topographic setting

Within COL, the natural topography of the land is generally flat to undulating with elevation ranging from 130 mAHD to 200 mAHD. In the Kerale Area, the topography declines from higher elevations of around 150 mAHD in the north, to lower elevations of around 125 mAHD at the junction between the boundary of ML1064 and the tributary of Pelican Creek. Beyond the boundary of ML1064, the terrain slopes generally to the south towards Pelican Creek. The spoil dump to the immediate east of the Kerale Dam sits above the landscape with a maximum elevation of around 170 mAHD.

2.3.3 Surface water

The natural surface water features in the vicinity of the Kerale Dam are ephemeral, flowing for a short time following episodic rainfall events. The tributary of Pelican Creek is a drainage feature (as defined by the Water Act).

The Kerale Dam captures surface water runoff from the contributing catchment. As the dam catchment area of approximately 64 ha is small relative to the impoundment footprint of the dam (approx. 36 ha) and given that average monthly evaporation exceeds average monthly rainfall, the water level in the dam is typically low (approx. 2-3 m deep at its lowest point). The water level in the dam is typically only a small fraction (<5 %) of the dam's volumetric water storage capacity.

The Kerale Dam is bound to the west by the western diversion landform which diverts water from the external catchment south of the dam. The haul road landform to the east (eastern diversion landform) diverts runoff from the haul road (and land to the east of the haul road) to the south of Kerale Dam. Runoff to the west of the haul road reports to Kerale Dam. Overland flow characteristics associated with these landform features are represented in the cross-sectional profile presented in Figure 2-3, and shown spatially in Figure 2-4. Also included in Figure 2-4 are arrows which conceptually depict the direction of overland flow within the Kerale Area.

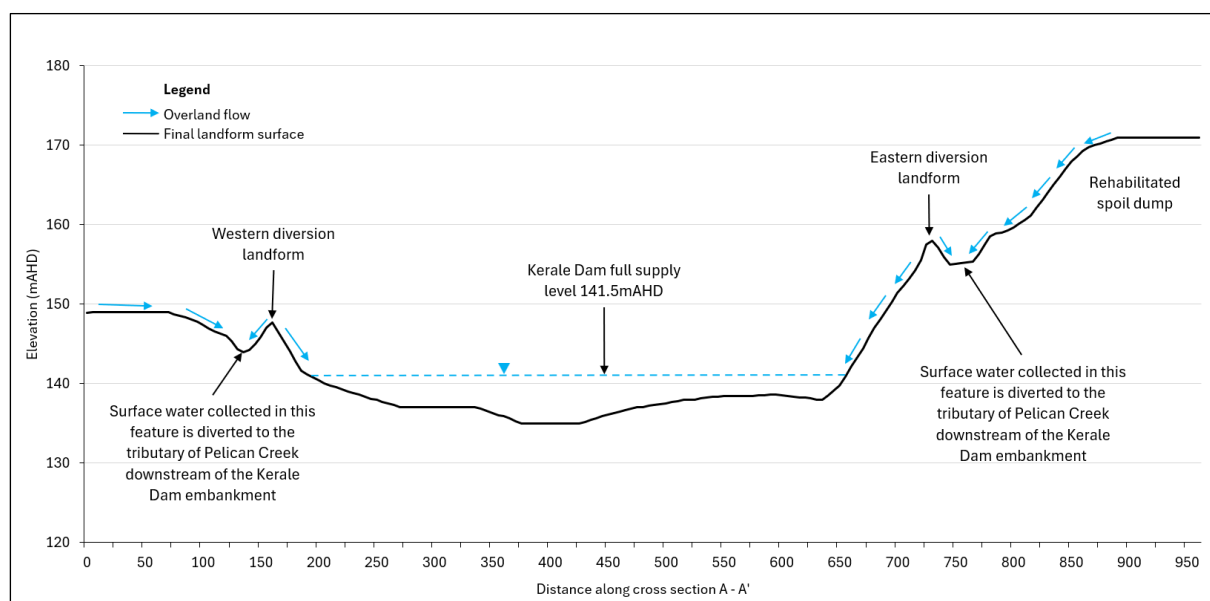
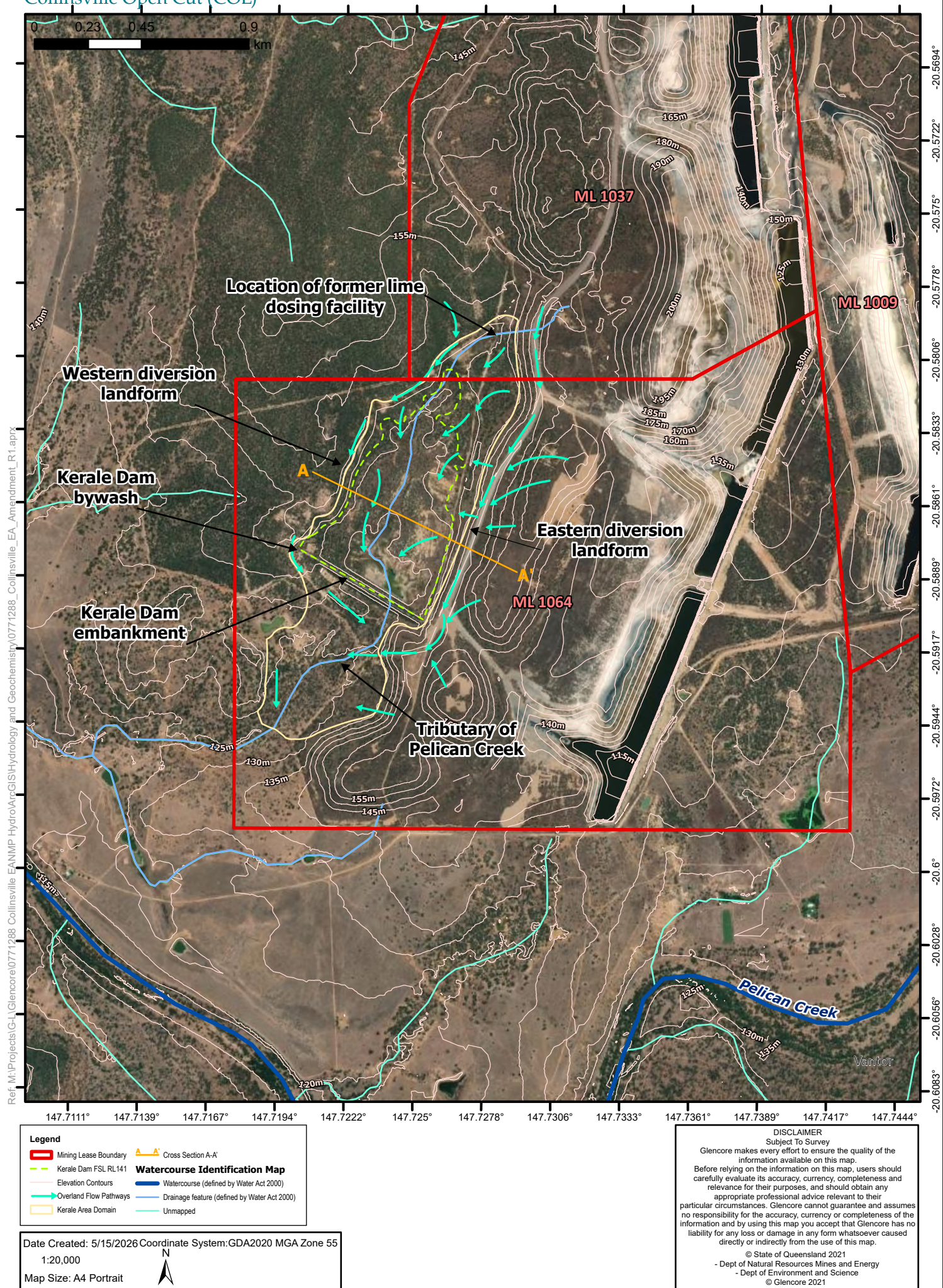


Figure 2-3 Cross-sectional profile ('A' on Figure 2-4) through Kerale Dam impoundment

Figure 2-4 Overland Flow Pathways

Collinsville Open Cut (COL)

GLENCORE



2.3.4 Geology and groundwater

The geology within the Kerale Dam and surrounds comprises Quaternary-age sediments (Qhh/m) overlying Permian-age units, including the Collinsville Coal Measures (Pbc). Alluvial deposits (Qa) are located downgradient of the Kerale Dam embankment. These deposits are associated with Pelican Creek and its minor tributaries. The Quaternary-age sediments represent the shallow geological units most relevant to interactions between the dam footprint and the near-surface zone.

The local hydrostratigraphic units in the vicinity of the Kerale Dam include Quaternary Alluvium, Colluvium and Regolith, and Permian overburden. The shallow alluvial channel along the tributary of Pelican Creek is likely to exhibit higher permeability when compared against other hydrostratigraphic units in the area.

3. Legislative requirements of an EA amendment application

This section states the requirements for EA amendment applications as set out in the EP Act, provides commentary on how these requirements have been addressed in this document and the application for amendment, and includes an assessment of the level of amendment.

3.1 Content requirements for application

Table 3-1 outlines how the requirements of s226 of the EP Act have been addressed in this document and application for EA amendment.

Table 3-1 Requirements for amendment applications for environmental authorities (EP Act s226)

Requirement	Response
1. Be made to the administering authority;	Complies. This proposed amendment is submitted to DETSI as the administering authority for EPML00332013 under the EP Act.
2. Be in the approved form;	Complies. The amendment application is in the approved form ESR/2015/1733 with relevant attachments provided.
3. Be accompanied by the fee prescribed by regulation;	Complies. The application fee associated with the initial application is \$379.90, paid at the time of submission. It is noted that further application fees will be paid upon receipt of DETSI's assessment level decision.
4. Describe the proposed amendment;	Complies. The purpose of the amendment of EA EPML00332013 is to provide information in support of an application to amend the EA in relation to legacy contamination issues to: • Appropriately address the risk of environmental impact associated with the Kerale Area Domain whilst mining activities are being carried out; and • Nominate a final land outcome for the Kerale Area Domain following the cessation of mining activities. Additional details in relation to the proposed amendment are provided in Section 5 of this application report.
5. Describe the land that will be affected by the proposed amendment; and	Complies. Section 2 of this application report provides a description of the land subject to the proposed amendment. EVs relevant to the proposed amendment are detailed on Section 6 of this application report.

Requirement	Response
	The potential impact on these matters has been provided in Section 7 of this application report.
6. Include any other document relating to the application prescribed by regulation	Complies. Additional information has been appended to this application report which address impacts to the water, land and biodiversity. This application report provides a summary of the findings from the technical assessments relating to the proposed amendment of the EA.

Table 3-2 outlines how the content requirements of s226A of the EP Act have been addressed in this document and application for EA amendment.

Table 3-2 Requirements for amendment applications for environmental authorities (EP Act s226A)

Content Requirement	Response
1. If the amendment application is for the amendment of an environmental authority, the application must also—	
a. describe any development permits in effect under the Planning Act for carrying out the relevant activity for the authority; and	The EA (EPML00332013) relates to a resource activity subject to the <i>Minerals Resources Act 1989</i> . There are no <i>Planning Act 2016</i> approvals relevant to the proposed amendment.
b. state whether each relevant activity will, if the amendment is made, comply with the eligibility criteria for the activity; and	There are no applicable eligibility criteria for the activity. The proposed amendment relates to site-specific conditions.
c. if the application states that each relevant activity will, if the amendment is made, comply with the eligibility criteria for the activity—include a declaration that the statement is correct; and	Not applicable.
d. state whether the application seeks to change a condition identified in the authority as a standard condition; and	The proposed amendment does not relate to any standard conditions.
e. if the application relates to a new relevant resource tenure for the authority that is an exploration permit or GHG permit—state whether the applicant seeks an amended environmental authority that is subject to the standard conditions for the relevant activity or authority, to the extent it relates to the permit; and	The proposed amendment does not relate to new relevant resource tenures.
f. include an assessment of the likely impact of the proposed amendment on the environmental values, including—	
i. a description of the environmental values likely to be affected by the proposed amendment; and	The EVs relevant to the proposed amendment have been identified and described in Section 6 of this application report.

Content Requirement	Response
ii. details of emissions or releases likely to be generated by the proposed amendment; and	The proposed amendment relates to the ongoing management of the Kerale Area Domain, and the nomination of a final land outcome for the Kerale Area Domain following the cessation of mining activities. There are no active emissions or releases related to the proposed amendment. Potential impacts to EVs associated with the proposed amendment are detailed in Section 7 of this application report.
iii. a description of the risk and likely magnitude of impacts on the environmental values; and	The potential impact on EVs from the proposed amendment has been described and assessed in Section 7 of this application report.
iv. details of the management practices proposed to be implemented to prevent or minimise adverse impacts; and	The proposed amendment relates to the ongoing management of the Kerale Area Domain, and the nomination of a final land outcome for the Kerale Area Domain following the cessation of mining activities.
v. if a PRCP schedule does not apply for each relevant activity—details of how the land the subject of the application will be rehabilitated after each relevant activity ends; and	
g. include a description of the proposed measures for minimising and managing waste generated by amendments to the relevant activity; and	There is no waste generated by activities the subject of the EA amendment. There is no proposed amendment to Schedule C (Waste) or Schedule G (Water Treatment Plant) of the EA.
h. include details of any site management plan or environmental enforcement order issued under section 362 (1) that relates to the land the subject of the application.	No site management plan or environmental enforcement order is associated with the proposed amendment.
2. Subsection (1)(f) does not apply for an amendment application for an environmental authority if—	
a. either— (i) the process under chapter 3 for an EIS for the proposed amendment has been completed; or (ii) the Coordinator-General has evaluated an EIS for the proposed amendment and there are Coordinator-General's conditions that relate to the proposed amendment; and	The proposed amendment is not subject to an Environmental Impact Statement (EIS).
b. an assessment of the environmental risk of the proposed amendment would be the same as the assessment in the EIS mentioned in paragraph (a)(i) or the evaluation mentioned in paragraph (a)(ii).	An assessment process similar to an EIS is not proposed as part of this application.
3. Also, subsection (1)(a), (d), (e), (f), (g) and (h) does not apply to an application for a condition conversion.	A condition conversion is not proposed as part of this application.
4. Despite subsection (1)(f), (g) and (h), if the amendment application is for an environmental authority for the prescribed ERA mentioned in the	The proposed amendment relates to a resource environmentally relevant activity (ERA) in the

Content Requirement	Response
Environmental Protection Regulation 2019, schedule 2, section 13A—	Environmental Protection Regulation 2019, schedule 3.
a. it need only include the matters mentioned in subsection (1)(f)(i) to (iv), (g) and (h) to the extent the matters relate to fine sediment, or dissolved inorganic nitrogen, entering the water of the Great Barrier Reef or Great Barrier Reef catchment waters; and	
b. subsection (1)(f)(v) does not apply for the amendment application.	

Note that s227 of the EP Act, requirements for amendment applications—coal seam gas (CSG) activities, is not applicable as this application does not relate to an EA for a CSG activity.

Similarly, s227AA of the EP Act, requirements for amendment applications—underground water rights, is not applicable as this EA amendment application does not involve changes to the exercise of underground water rights.

Table 3-3 outlines the standard criteria in Schedule 4 of the EP Act and includes commentary on how these standard criteria have been met.

Table 3-3 Standard criteria considerations defined in Schedule 4 Dictionary of the EP Act

No	Standard criteria	Response
(a)	the following principles of environmental policy as set out in the Intergovernmental Agreement on the Environment— (i) the precautionary principle; (ii) intergenerational equity; (iii) conservation of biological diversity and ecological integrity; and	Precautionary Principle As further described in Section 4 of the application report, the proposed amendment is required due to historical mining-related activities which have occurred within and around the Kerale Area Domain which are likely to have contributed to the acidic conditions observed in water and land within the Kerale Area Domain. This EA amendment application is seeking to recognise that, as a result of historical activities leading to contamination issues at COL, it is not practicable for the Kerale Area Domain to meet the definition of 'stable condition' under s111A EP Act on the basis of the quality characteristics of surface water present within the Kerale Dam and the chemistry of the soils and groundwater in the Kerale Area Domain. To reach the above conclusion, the precautionary principle has been applied with the most conservative outcome proposed as part of this application. This approach is considered consistent with the criteria and appropriate in the context of the potential risk to EVs as detailed in Section 7 of this application report.

No	Standard criteria	Response
		Intergenerational equity The Kerale Area is located on Lot 4914 on Plan SP255401 (the Lot). The Lot is subject to a rolling term lease (reference: 40065005) with the Kerale Area not currently used or accessible for the current lease purpose. There is no change to the lease use proposed as part of this application, nor will it limit the current lease from continuing to operate in its current form. It is therefore considered that the proposed amendment to the EA will not impact intergenerational equity. Conservation of biological diversity and ecological integrity This EA amendment application is seeking to recognise that, as a result of historical activities at COL, it is not practicable for the Kerale Area Domain to meet the definition of 'stable condition' under s111A EP Act on the basis of the quality characteristics of surface water held within the Kerale Dam and the chemistry of the soils and groundwater in the Kerale Area Domain. Potential biodiversity and ecological impacts of this proposed amendment have been considered and assessed in Section 7 of this application report.
(b)	any Commonwealth or State government plans, standards, agreements or requirements about environmental protection or ecologically sustainable development; and	NC Coal holds appropriate State and Commonwealth authorisation for the operation of the COL. The proposed amendment does not conflict with or alter the existing approvals which have been considered throughout the preparation of this application report.
(d)	any relevant environmental impact study, assessment or report; and	The potential impacts of the proposed amendment on relevant EVs has been completed and provided in Section 7 of this application report. This impact assessment is supported by technical reports, appended to this application report.
(e)	the character, resilience and values of the receiving environment; and	EVs relevant to the proposed amendment, including surrounding areas, have been described in Section 6 of this application report. Technical assessments providing additional information in relation to potential impacts associated with the proposed amendment have been appended to this application report.

No	Standard criteria	Response
(f)	all submissions made by the applicant and submitters; and	It is anticipated that this proposed amendment will be subject to the public notification requirements of the EP Act. Any submissions received through this process will be considered and NC Coal will respond as appropriate.
(g)	the best practice environmental management for activities under any relevant instrument, or proposed instrument, as follows— (i) an environmental authority; (ii) a transitional environmental program; (iii) an environmental enforcement order; (iv) a disposal permit; (v) a development approval; and	Full consideration of the relevant regulatory instruments has been undertaken in the preparation of this amendment report. The EA has been reviewed and proposed amendments to the conditions are included in Section 5 of this amendment report. No transitional environmental program; environmental enforcement order; disposal permit; or development approval, is relevant to the proposed amendment.
(h)	the financial implications of the requirements under an instrument, or proposed instrument, mentioned in paragraph (g) as they would relate to the type of activity or industry carried out, or proposed to be carried out, under the instrument; and	The financial impacts associated with the EA amendment will be considered and accounted for as per residual risk requirements. There are no expected financial impacts to the public associated with the EA amendment.
(i)	the public interest; and	The purpose of the EA amendment is to to amend the EA in relation to legacy contamination issues to: • Appropriately address the risk of environmental impact associated with the Kerale Area Domain whilst mining activities are being carried out; and • Nominate a final land outcome for the Kerale Area Domain following the cessation of mining activities. The proposed amendment does not affect the public interest as impacts would be contained within the ML. Assigning a land outcome for the Kerale Area Domain will not change this. Further it is in the public interest to provide for a suitable regime for addressing the risk of environmental impact from the Kerale Area Domain and specify a final land outcome.
(j)	any relevant site management plan; and	There is no site management plan as described in the EP Act relevant to the proposed amendment.
(k)	any relevant integrated environmental management system or proposed integrated environmental management system; and	There is no relevant or proposed integrated environmental management system associated with this proposed amendment.

No	Standard criteria	Response
(I)	any other matter prescribed under a regulation.	Consistent with regulation, impact assessment of the potential impacts to EVs associated with the proposed amendment have been completed and are provided in Section 7 of this application report.

3.2 Level of amendment

Under the EP Act, an amendment application for an EA may be:

- A minor amendment (condition conversion) to convert all the EA conditions to standard conditions;
- A minor amendment (threshold); or
- A major amendment, which is an amendment that is not a minor amendment.

The proposed amendment is considered a major amendment as it does not meet the criteria for a minor amendment (threshold) under s223 of the EP Act. Specifically, if approved, the proposed amendment to the EA will change rehabilitation objectives stated in the EA in a way likely to result in significantly different impacts on EVs than the impacts previously permitted under the EA.

A major amendment application for an EA under s235 of the EP Act is assessed using the same criteria as that of a site-specific EA application, and is required to comply with the relevant provisions under s176(2) of the EP Act that would be applicable to a site-specific EA application.

Under s230 of the EP Act, an application to amend an EA will require public notification if the EA amendment relates to a resource activity and is a major amendment.

4. Rationale for EA amendment

4.1 Rationale

4.1.1 Approval Requirement

COL has a long history of mining operations across several MLs. Historical mining-related activities have occurred within and around the Kerale Area Domain which are likely to have contributed to the acidic conditions observed in water and soil within the Kerale Area Domain. Whilst the lime dosing facility was decommissioned in the early 2000s, and Kerale Dam not used subsequently for water storage, constituents from the lime dosing process remain present in soils within the Kerale Area Domain, as observed through chemical analysis of soil samples from recent investigations.

The definition of 'stable condition' under s111A EP Act cannot be satisfied for the Kerale Area Domain as a result of the legacy contamination issues. Land is in a stable condition if:

- (a) the land is safe and structurally stable;
- (b) there is no environmental harm being caused by anything on or in the land; and
- (c) the land can sustain a post-mining land use (PMLU).

For the reasons indicated later in Sections 6 and 7 of this report, as the Kerale Area Domain will not be able to achieve a PMLU, the Kerale Area Domain cannot satisfy the criteria for 'stable condition'. The Kerale Area Domain is therefore required to be managed as a Non-Use Management Area (NUMA) following the cessation of mining activities at COL.

Accordingly, this EA amendment application seeks to nominate a final land outcome of NUMA for part of the land located on ML1064 and ML1037, referred to as the Kerale Area Domain (Figure 4-1). This EA amendment application also seeks to recognise the legacy contamination issues impacting the Kerale Area Domain and identify appropriate management measures that NC Coal will implement to minimise the risk of impact to the receiving environment.

4.1.2 Reasoning

The Kerale Dam is known to contain acidic waters, the source/s of which is likely to be mineralised sulfate in the soil (refer to Section 6). The current technical studies discussed in Section 6, indicate that the acidic waters observed within the Kerale Dam are likely to be attributable to the migration of constituents from the former lime dosing facility. However, contribution from other sources, such as naturally occurring acid sulfate soils disturbed by dam construction in 1991 / 1992, cannot be precluded at this time and are subject to further investigation.

In reference to the definition of 'stable condition' under s111A EP Act and particularly subsection (c) – ability to sustain a PMLU, the acidic surface waters contained within the Kerale Dam mean that the stock water drinking guidelines (ANZG, 2023) cannot be met. This means that for the Kerale Dam portion of the Kerale Area Domain, a grazing PMLU cannot be achieved. Similarly, the surface water quality exceeds the Australian and New Zealand Guidelines (ANZG) for the protection of aquatic ecosystems, meaning that a PMLU of aquatic ecosystems cannot be met.

Acidic conditions are also present within the Kerale Area non-dam, specifically in soils near the former lime dosing facility and immediately downgradient of the Kerale Dam embankment. This is indicated by data from soil sampling. The acidic conditions in the soil means the Kerale Area Domain is considered unable to achieve a PMLU, for the purposes of s111A(c).

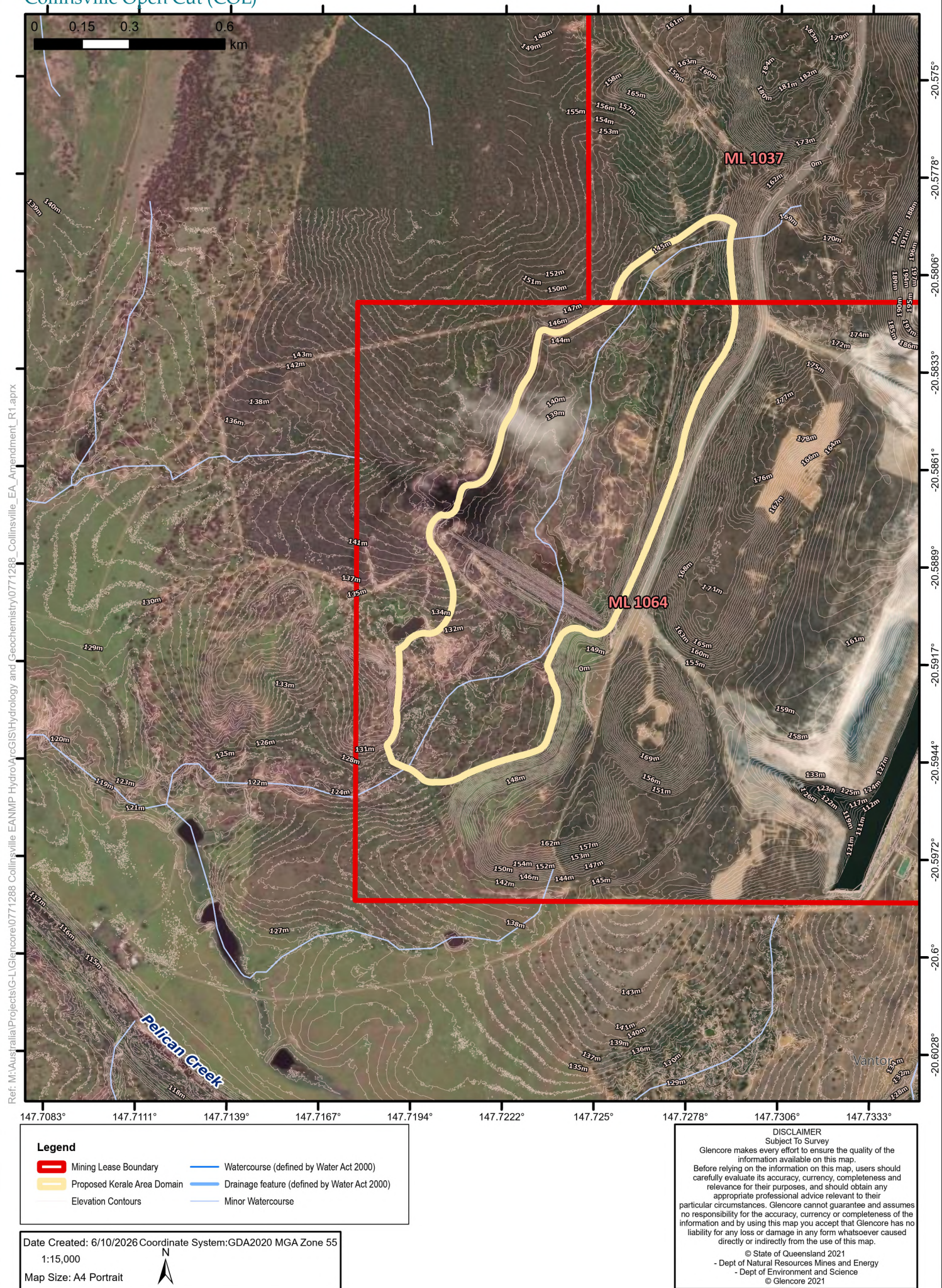
Acidic conditions have been observed in the surficial alluvial groundwater system which follows the ephemeral tributary of Pelican Creek downgradient of Kerale Dam. This is indicated by monitoring data collected at two groundwater bores downgradient of the Kerale Dam embankment. The conditions in the shallow aquifer near the embankment do not meet the ANZG water quality objectives for aquatic ecosystem protection (ANZG, 2023), meaning that the EV of aquatic ecosystem protection would not be supported.

This EA amendment application is seeking to recognise that, as a result of historical activities at COL, the Kerale Area Domain cannot meet the definition of 'stable condition' under s111A EP Act on the basis of the quality characteristics of surface water held within the Kerale Dam and the chemistry of the soils and groundwater in the Kerale Area Domain.

Figure 4-1 – Kerale Area Domain

Collinsville Open Cut (COL)

GLENCORE



4.2 Kerale Area Domain

The Kerale Area Domain is shown spatially in Figure 4-1. The boundary of the Kerale Area Domain:

- Follows the inside (eastern) toe of the western diversion landform;
- Encompasses the location of the former lime dosing facility, specifically the mixing pond;
- Follows the lower portion of the adjacent spoil dump final landform slope, transitioning between the lower slope segment and the approximate toe of the spoil dump; and
- Encompasses the inferred extent of the alluvial system associated with the tributary of Pelican Creek, to a point approximately 750 m downstream of the Kerale Dam embankment.

This distance is based on the understanding of seepage migration potential from the Kerale Dam and through the surficial alluvials of the tributary of Pelican Creek.

The seepage rate estimates identified an average rate of seepage movement of around 5 m/year. The analytical seepage assessment suggests a slow-moving seepage front with a limited spatial extent. There is predicted to be dilution of solute in the local surficial alluvial groundwater system. Interaction with deeper hydrostratigraphic units is predicted to be limited due to their comparatively low hydraulic conductivity. Significant dilution is predicted in the surface water system during wet periods.

Potential impact of seepage is expected to be limited to no more than several hundred metres downstream from the Kerale Dam embankment. The time required for solute to migrate along the alluvial network from the Kerale Dam embankment to Pelican Creek is in the order of centuries (Klohn Crippen Berger, 2026) (refer Appendix A).

Within the Kerale Area Domain, two distinct zones have been identified:

- Kerale Dam: The area comprising land that is inundated at the full supply level of Kerale Dam (141.5 mAHD) and the footprint of the dam embankment extending to where the embankment on the downstream face meets natural surface; and
- Kerale Area non-dam: The area inside the Kerale Area Domain that is not the Kerale Dam.

4.2.1 Domain boundary development

The Kerale Area Domain boundary has been determined by considering the following:

- Existing topographic setting;
- Proposed final landform;
- Surface water and groundwater quality data;
- Soil and sediment chemistry data;
- Kerale Dam features including elevation at the full supply level, bywash location and elevation and dam design information;
- Water management features such as the western and eastern diversion landforms;
- Mine domains such as the spoil dumps adjacent to the Kerale Dam;
- The location of the former lime dosing facility and activities undertaken at this facility; and
- Hydrogeological conceptualisation of the Kerale Dam and surrounds including site geology, local hydrostratigraphy, dam water storage and related processes, and groundwater mechanisms and seepage migration.

5. Proposed amendments to EPML00332013

5.1 Overview

The proposed EA amendment for the Kerale Area Domain comprises the following:

- **Table H2 – Management Measures for Kerale Area Domain:** The Kerale Area Domain cannot meet the completion criteria specified in Table H1 for mining domains. It is therefore proposed that a new standalone table, Table H2 – Management Measures for Kerale Area Domain be included to address the bespoke management measures for the Kerale Area Domain. Details are provided in Section 5.2;
- **New condition H9:** Inclusion of a new condition to require the Kerale Area Domain to be managed in accordance with the new Table H2 – Management Measures for Kerale Area Domain (see above). All subsequent conditions in Schedule H are to be renumbered accordingly. Details are provided in Section 5.3;
- **New condition I39:** Inclusion of a new condition I39 to exclude the Kerale Dam from the decommissioning and rehabilitation requirements for Regulated Structures. As the Kerale Dam is currently a Regulated Structure, it must comply with the requirements of EA Schedule I, including Conditions I27 and I28. The requirements of Conditions I27 and I28 are, however, not compatible with a NUMA and how the Kerale Area Domain will be managed during the operation of the COL and post-closure. Therefore, it is proposed that a new condition (I39) is added to the end of Schedule I to clarify the applicability of Conditions I27 and I28. See Section 5.4 for details;
- **Additional Definitions for Appendix 1 of the EA:** Kerale Area Domain, Kerale Dam and Kerale Area non-dam definitions are proposed to be inserted into the EA. See Section 5.5 for details; and
- **Additional figure for Appendix 2 of the EA:** A new figure defining the footprint of the additional Kerale Area components is proposed to be added to Appendix 2. The figure (represented in this document as Figure 4-1) will be provided at the end of Appendix 2 (as Figure 6).

Proposed amendments to the EA are shown in *italics* in the below sections.

5.2 Table H2 – Management measures for Kerale Area Domain

Within the proposed new Table H2, management goals, objectives, indicators and criteria have been defined for the two spatial features which comprise the Kerale Area Domain (i.e., Kerale Dam, and Kerale Area non-dam). These two features are proposed to be included in Table H2 as separate entries in the Mine Feature Names column. Management goals of safe, stable, and non-polluting are proposed for each mine feature.

The management requirements in Table H2 have been developed to align with the current approach to manage similar features at COL (refer Table 5-1). This provides consistency and continuity with the existing frameworks for environmental management at COL.

The technical chapters from Section 6 include additional reasoning and justification about why the requirements in Table H2 have been proposed.

5.2.1 Kerale Dam mine feature

For the Kerale Dam mine feature, the safe and stable management goals are centred around the geotechnical and erosional stability of the dam embankment (as distinct from the definition of 'stable condition' under s111A of the EP Act). The completion criteria include physical measures to prevent access by humans/livestock and a risk assessment for slopes >30 % and 10 m vertical, which is consistent with the approach for other mine features at COL.

The non-polluting management goal for the Kerale Dam mine feature comprises objectives for both surface water and groundwater, which follow existing management requirements in the EA. Management requirements are associated with meeting water quality objectives for seepage at seepage monitoring locations, and limits for groundwater level and water quality at established bores.

Seepage through the Kerale Dam embankment into the downstream alluvial system is subjected to natural attenuation processes and dilution with local groundwater. During high rainfall periods, dilution of seepage in the surficial alluvial system would be significantly enhanced through interactions with surface water generated from the rainfall runoff processes in the catchment external to Kerale Dam. These factors, combined with the predicted slow moving seepage front, significantly reduce the likelihood of exceeding the requirements of Table F3 – Seepage monitoring water quality objectives.

Additionally, modelling and assessment of Kerale Dam shows that the only mechanism for outflow is through seepage (and evaporation) with no predicted overtopping of the dam and no ingress from external catchments. The long-term water balance of Kerale Dam shows a steady state water level more than 7 m below the bywash invert, with no release of surface water via the bywash predicted. The flood assessment shows that the western and eastern diversion landforms are effective in diverting flows around Kerale Dam for all design flood events assessed (up to and including the 0.1 % annual exceedance probability (AEP) event). Floodwaters are predicted to remain within the drainage network (up to and including the 0.1 % AEP event) and floodplain areas.

5.2.2 Kerale Area non-dam mine feature

The safe management goal for the Kerale Area non-dam mine feature is safety for humans and livestock through geotechnical stability, as certified by an appropriately qualified person; fencing of this feature is not considered practicable. As this mine feature does not contain any engineered structures or significant landform features, the stable management goal is centred around achieving compliance with the erosion and sediment control plan as required by the EA.

The non-polluting management goal includes the same criteria as the Kerale Dam mine feature, with the existing requirements pertaining to seepage water quality and groundwater quality and level required to be met to achieve the completion criteria.

Table 5-1 Proposed new Table H2 – management measures for Kerale Area Domain

Mine Domain	Mine Feature Name	Management Goal	Management Objectives	Management Indicators	Management Criteria
Kerale Area Domain	Kerale Dam	Safe	Safe for humans and livestock	Geotechnical and erosional stability	Kerale Area Domain extent as generally depicted in Figure 6 in Appendix 1. Minimise human / livestock access (e.g. bunding and/or security fencing as practicable).
		Stable	Low probability of slumping of dam embankment or inert material loss	Geotechnically stable and structurally sound with no major slumping or erosion.	Risk assessment for slopes greater than 30 % and greater than 10 m vertical, to not exceed Moderate ranking.
		Non-polluting	Surface water quality met downstream of Kerale Area Domain Groundwater quality objectives met downgradient of Kerale Area Domain	Compliance with the requirements of Table F3 – Seepage monitoring water quality objectives and Table F2 - Location of seepage monitoring and seepage collection devices. Operations in line with the Seepage Identification, Monitoring and Management Program as required by condition F12. Compliance with the requirements of Table E2 – Groundwater quality and level limits	Water quality within the objectives listed in Table F3 water quality objectives. Water quality within the objectives listed in Table F3 - Seepage monitoring water quality objectives. Groundwater quality and level within the limits listed in Table E2 – Groundwater quality and level limits
	Kerale Area non-dam	Safe	Safe for humans and livestock	Geotechnical stability	Kerale Area Domain extent as generally depicted in Figure 6 in Appendix 1 is certified to be geotechnically stable by an appropriately qualified person.

Mine Domain	Mine Feature Name	Management Goal	Management Objectives	Management Indicators	Management Criteria
		Stable	Compliance with the Erosion and Sediment Control Plan (required by condition F10)	Erosional stability	Gully and rill erosion <0.3 metres.
		Non-polluting	Surface water quality met downstream of Kerale Area Domain	Compliance with the requirements of Table F3 – Seepage monitoring water quality objectives and Table F2 - Location of seepage monitoring and seepage collection devices.	Water quality within the objectives listed in Table F3 water quality objectives.
			Groundwater quality objectives met downgradient of Kerale Area Domain	Operations in line with the Seepage Identification, Monitoring and Management Program as required by condition F12.	Water quality within the objectives listed in Table F3 - Seepage monitoring water quality objectives.
				Compliance with the requirements of Table E2 – Groundwater quality and level limits	Groundwater quality and level within the limits listed in Table E2 – Groundwater quality and level limits

5.3 Condition H9 (new)

A new condition (H9) is required to link the management requirements for the Kerale Area Domain with the new Table 5-1– Management Measures for Kerale Area Domain (see above). With the addition of new condition H9, all subsequent conditions in Schedule H are to be renumbered. The new condition H9 is as follows:

(H9) Notwithstanding Condition H8, the Kerale Area Domain must be managed in accordance with Table H2 – Management Measures for Kerale Area Domain.

5.4 Condition I39 (new) – Kerale Dam

The requirements of Conditions I27 and I28 are not compatible with a NUMA as they relate to decommissioning and rehabilitation. To facilitate the management of the Kerale Area Domain as a NUMA, the proposed new condition I39 is as follows:

(I39) Conditions I27 and I28 do not apply to the Kerale Area Domain.

5.5 EA Appendix 1 – Definitions

The following definitions are proposed to be included in Appendix 1 - Definitions in the amended EA:

Kerale Area Domain: *The area shown in Figure 6 in Appendix 2. The Kerale Area Domain follows the inside (eastern) toe of the western diversion landform, encompasses the location of the former lime dosing facility, specifically the mixing pond, follows the lower portion of the adjacent (eastern) spoil dump final landform slope, transitioning between the lower slope segment and the approximate toe of the spoil dump, and encompasses the inferred extent of the alluvial system associated with the tributary of Pelican Creek, to a point approximately 750m downstream of the Kerale Dam embankment.*

Kerale Dam: *The area comprising land that is inundated at the full supply level of Kerale Dam (141.5 m Australian Height Datum (AHD)) and the footprint of the dam embankment extending to where the embankment on the downstream face meets natural surface.*

Kerale Area non-dam: *The area inside the Kerale Area Domain that is not the Kerale Dam.*

6. Description of Environmental Values

This section addresses the requirements of Section 226A(f)(i) of the EP Act in providing a description of the EVs likely to be affected by the proposed amendment.

6.1 Water

6.1.1 Surface Water

The predominant surface water feature downstream of the Kerale Area Domain is Pelican Creek, located approximately 2 km south (in a straight line) of the Kerale Dam embankment. Hydrological connection between the Kerale Dam and Pelican Creek occurs through an ephemeral, stream order 1 tributary of Pelican Creek (Figure 6-1). This tributary, which is defined as a Drainage Feature under the Water Act, discharges into Pelican Creek approximately 2.7 km downstream of the Kerale Dam embankment.

Pelican Creek is a Watercourse as defined by the Water Act and is a stream order 5 watercourse according to the Strahler method of stream order classification (Department of Resources, 2024). Pelican Creek has a large catchment of 528 km² at the location near the confluence with the tributary (Queensland Government, 2026), and flows west into the Bowen River, which continues west before joining the Burdekin River. The Burdekin River discharges into the Pacific Ocean near Ayr.

The Pelican Creek catchment is a sub-catchment of the Bowen River drainage sub-basin and located within the central eastern region of the wider Burdekin drainage basin and Burdekin Great Barrier Reef Catchment. End-of-catchment anthropogenic water quality targets for the broader Burdekin Great Barrier Reef Catchment are outlined in the Reef 2050 Water Quality Improvement Plan (Queensland Government, 2017).

The Queensland Government's Environmental Protection (Water and Wetland Biodiversity) Policy 2019 (EPP Water) provides Water Quality Objectives (WQOs) to support and protect the various EVs identified for waters within the Pelican Creek catchment. The aquatic ecosystem WQOs for Pelican Creek are presented in Table 6-1 **Error! Reference source not found.** WQOs for all other EVs are outlined in the Burdekin River (lower) and Bowen River Sub-basin Environmental Values and Water Quality Objectives (Department of Environment and Science, 2022). Surface water EVs for the Pelican Creek sub-catchment are:

- Aquatic ecosystem;
- Irrigation;
- Farm supply/use;
- Stock water;
- Human consumer;
- Secondary recreation;
- Visual recreation;
- Drinking water;
- Industrial use; and
- Cultural and spiritual values.

Table 6-1 Pelican Creek Aquatic Ecosystem Water Quality Objectives

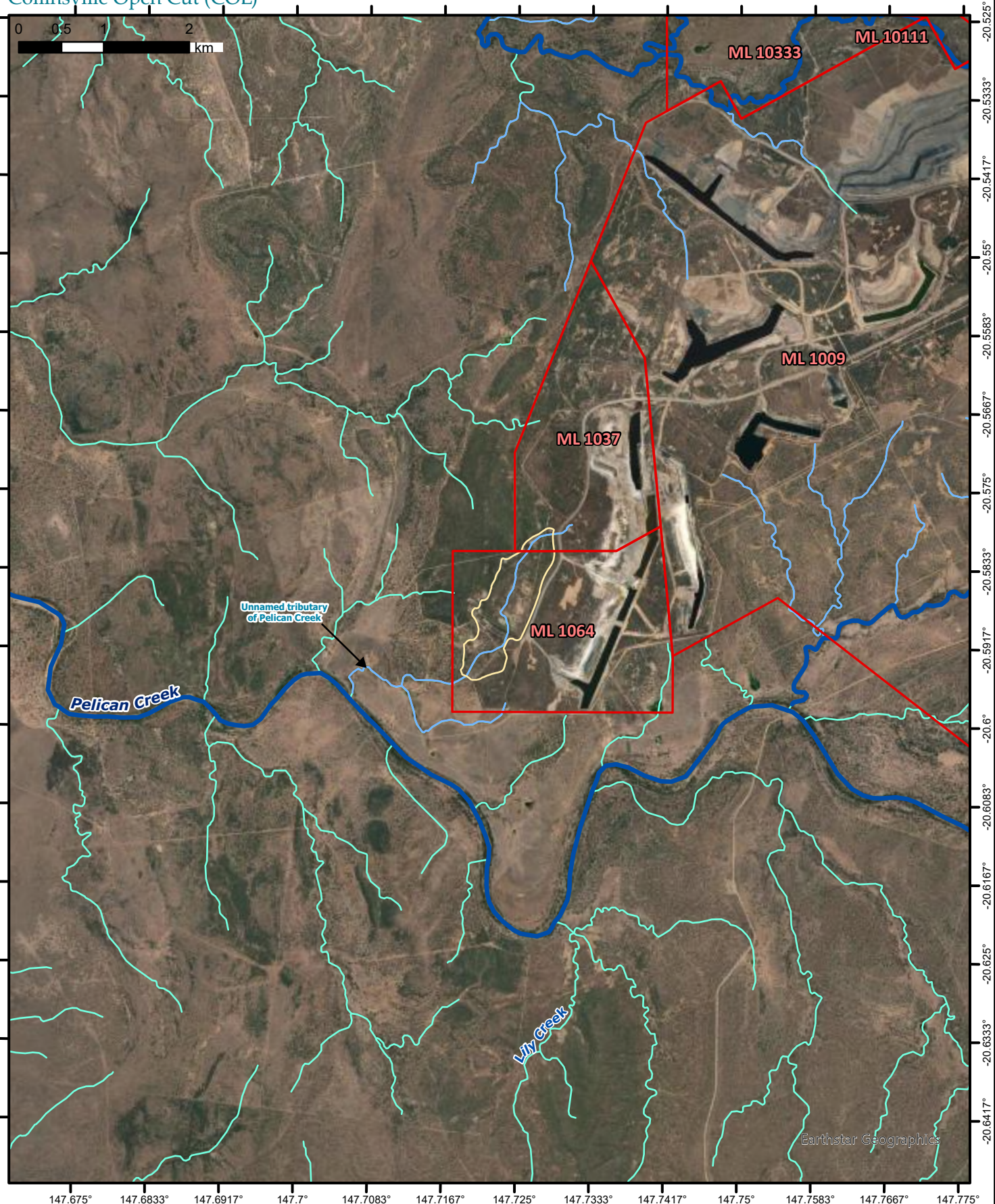
Analyte	Units	Low flow ¹	High flow ²
pH	pH units	6.5-8.5	6.5-8.5
EC	µS/cm	340	200
Sulfate	mg/l	8	9
Total Suspended Solids	mg/l	10	120
Turbidity	NTU	8	75
Dissolved Oxygen	% sat	85-110	85-110
Ammonia Nitrogen	µg/l	10	10
Oxidised Nitrogen	µg/l	10	90
Total Nitrogen	µg/l	530	960
Filterable Reactive Phosphorus	µg/l	10	50
Total Phosphorus	µg/l	60	180
Chlorophyll-a	µg/l	5	n/a
Source: (Department of Environment and Science, 2022) Note: ¹ <1.1 m³/s at gauge 120220A – Pelican Creek at Kerale (Closed) ² ≥1.1 m³/s at gauge 120220A – Pelican Creek at Kerale (Closed)			

As per Condition F25 of the EA, surface water quality in the receiving environment must not, as a result of mining activities, exceed the surface water quality objectives in *Table F4 – Surface water quality objectives*. No changes to *Table F4 – Surface water quality objectives* of the EA are proposed as part of this EA amendment application.

Figure 6-1 - Watercourse Identification Map

Collinsville Open Cut (COL)

GLENCORE



Legend

- Mining Lease Boundary
- Proposed Kerale Area Domain

Watercourse Identification Map

- Watercourse (defined by Water Act 2000)
- Drainage feature (defined by Water Act 2000)
- Unmapped

Date Created: 5/21/2026 Coordinate System: GDA2020 MGA Zone 55
 1:60,000
 Map Size: A4 Portrait

DISCLAIMER
 Subject To Survey

Glencore makes every effort to ensure the quality of the information available on this map. Before relying on the information on this map, users should carefully evaluate its accuracy, currency, completeness and relevance for their purposes, and should obtain any appropriate professional advice relevant to their particular circumstances. Glencore cannot guarantee and assumes no responsibility for the accuracy, currency or completeness of the information and by using this map you accept that Glencore has no liability for any loss or damage in any form whatsoever caused directly or indirectly from the use of this map.

© State of Queensland 2021
 - Dept of Natural Resources Mines and Energy
 - Dept of Environment and Science
 © Glencore 2021

6.1.2 Groundwater

The Kerale Area Domain is situated on Quaternary-age sediments (Qhh/m) overlying Permian-age units, including the Collinsville Coal Measures (Pbc). In the southern part of the Kerale Area Domain, higher permeability alluvial deposits (Qa), associated with Pelican Creek and its minor tributaries are mapped. The Quaternary-age sediments represent the shallow geological units most relevant to potential seepage migration beyond the dam footprint (KCB, 2026).

Alluvium (Qa and Qhh/m) are typically described as clay, silt, sand and gravel; flood-plain alluvium. Collinsville Coal Measures (Pbc) comprise Quartzose sandstone, conglomerate, siltstone, and coal (KCB, 2026).

Specifically in the vicinity of Kerale Dam, the hydrostratigraphic units of interest are:

- Quaternary Alluvium, Colluvium and Regolith; and
- Underlying weathered Permian overburden.

The construction of the Kerale Dam and underlying subsurface material provide the opportunity for stored water within Kerale Dam to migrate through higher permeability sandy materials at the base of the embankment and into the weathered material or into the higher permeability alluvials associated with the ephemeral tributary of Pelican Creek.

Contributions from groundwater into Kerale Dam are predicted to be relatively small (11%) when compared against other inputs (runoff accounts for 46% and direct rainfall 43%). Due to the seasonality of rainfall around COL, the stored groundwater volumes and elevations follow a seasonal pattern (KCB, 2026). As outlined in section 6.1.3, there are no State-mapped terrestrial groundwater dependent ecosystems (GDEs) within the Kerale Area Domain.

Groundwater receptors are as follows:

- Groundwater within alluvial deposits and by proximity, the ephemeral tributary of Pelican Creek (both within and beyond the Kerale Area Domain boundary);
- Groundwater within the deeper hydrostratigraphic units (Permian overburden); and
- Pelican Creek.

The EPP Water outlines the EVs for groundwater within the broader region of the Kerale Area Domain. Groundwater EVs for the region are listed in Table 6-2. WQOs for the EVs in Table 6-2 are outlined in the Burdekin, Don and Haughton River Basins Groundwater Environmental Values and Water Quality Objectives (Department of Environment and Science, 2022).

Table 6-2 Burdekin, Don and Haughton River Basins Groundwater Environmental Values and Water Quality Objectives

Aquifer/Hydrogeological Unit*	Environmental Values
Alluvium – Lower Burdekin with Bowen	Aquatic ecosystem; Irrigation; Farm supply/use; Stock water; Drinking water; Industrial use; Cultural and spiritual values
Fractured Rock – Ravenswood Granites and Volcanics	Aquatic ecosystem; Irrigation; Farm supply/use; Stock water; Drinking water; Industrial use; Cultural and spiritual values
Cainozoic Deposits – Eastern Weathered Cainozoic Remnants	Aquatic ecosystem; Cultural and spiritual values
Basins Partially Underlying the Great Artesian Basin – Eastern Bowen Coal Measures	Aquatic ecosystem; Irrigation; Stock water; Drinking water; Industrial use; Cultural and spiritual values
<i>Note</i> ¹Aquifer/hydrogeological unit determined based on location of the Kerale Area Domain in GWQ1201, GWQ1202, GWQ1203, GWQ1204, GWQ1207, GWQ1208, and GWQ1209 (Department of the Environment, Tourism, Science and Innovation, 2022).	

As per Condition F16 of the EA, “when water quality characteristics outlined in *Table F3 – Seepage monitoring water quality objectives* are within the corresponding water quality objectives at the monitoring locations identified in *Table F2 – Location of seepage monitoring and seepage collection devices*, seepage is allowed to pass into the receiving waters”. No changes to *Table F3 – Seepage monitoring water quality objectives*, or *Table F2 – Location of seepage monitoring devices* are proposed as part of this amendment of the EA.

6.1.3 Wetlands and GDEs

There are no wetlands of international importance associated with Kerale Area Domain, with the nearest Ramsar Wetlands of Australia located more than 125 km downstream (measured in a straight line) of the Kerale Area Domain (Department of Climate Change, Energy, the Environment and Water, 2024). There are also no high ecological value (HEV) wetlands, nor high ecological significance (HES) wetlands that occur within a 10 km radius of the Kerale Area Domain.

As per the Queensland Wetland Mapping Program (Wetland Maps), there are no riverine wetlands present within the Kerale Area Domain. The downstream Pelican Creek is classified as a Riverine Wetland (hydrologically natural). There are three areas within the Kerale Area Domain which are classified as a non-riverine Lacustrine Wetlands (hydrologically modified or artificial). The most prominent of these features is the Kerale Dam itself, with two smaller non-riverine Lacustrine Wetlands mapped near the historical lime dosing area in the north of the Kerale Area Domain. There are several other non-riverine Lacustrine Wetlands (hydrologically modified or artificial) mapped as

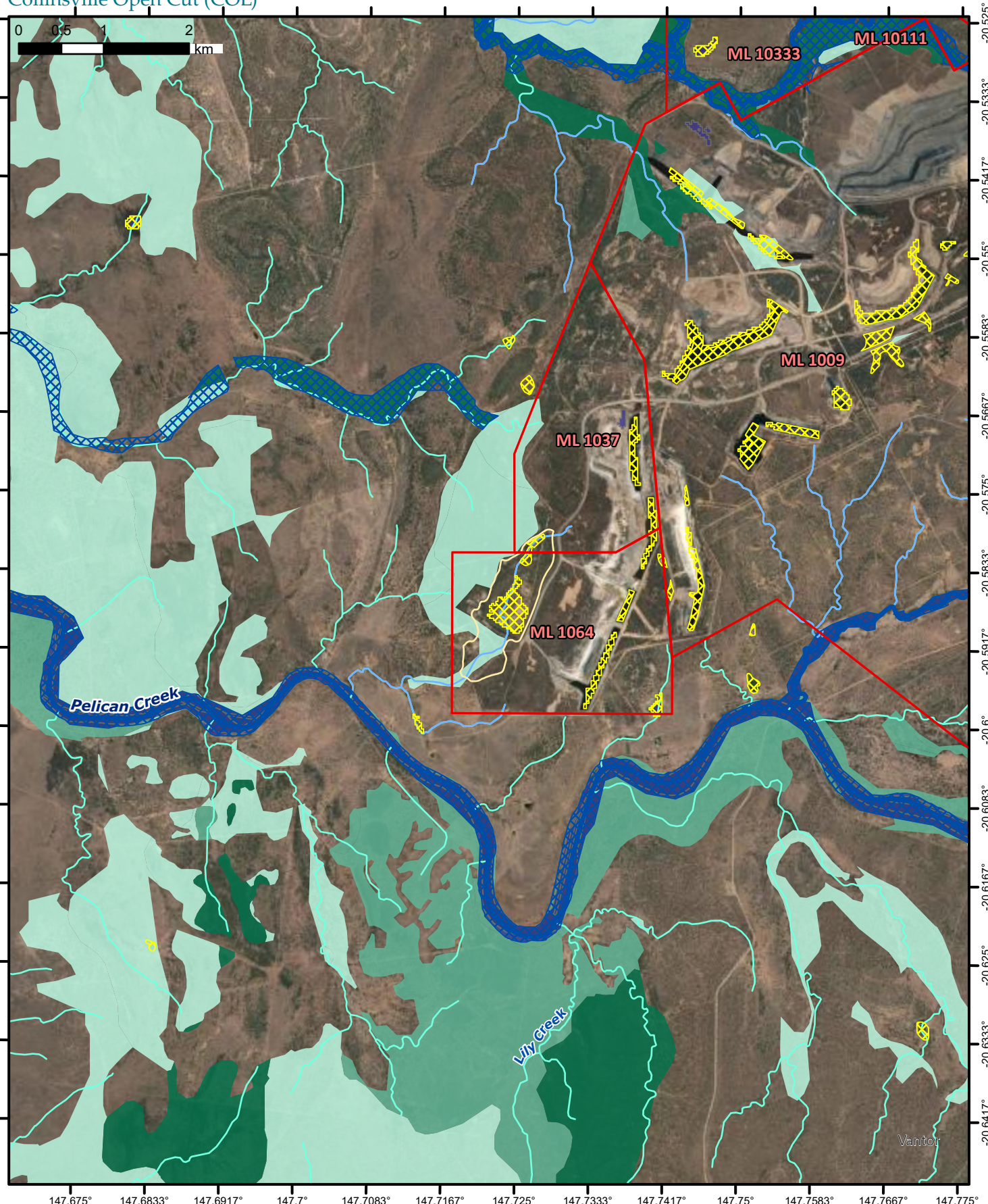
present within the vicinity of the Kerale Area Domain, with these features predominantly associated with the broader COL mining operations (Figure 6-2).

As per the Queensland (Qld) State “Groundwater dependent ecosystems and potential aquifer mapping” (DETSI, 2021), there are no mapped terrestrial GDEs within the Kerale Area Domain. The Australian Government’s Groundwater Dependent Atlas (Bureau of Meteorology, 2026) indicates a “Low potential GDE” associated with the Kerale Area non-dam along the unnamed ephemeral tributary of Pelican Creek.

Figure 6-2 - Wetlands and Groundwater Dependent Ecosystems

Collinsville Open Cut (COL)

GLENCORE



- Legend**
- Mining Lease Boundary
 - Queensland Wetland Mapping Program**
 - Lacustrine Wetlands (hydrologically modified or artificial)
 - Riverine Wetlands (hydrologically modified or artificial)
 - Proposed Kerale Area Domain
 - Groundwater Dependent Ecosystem Atlas**
 - Low potential GDE - from national assessment
 - Moderate potential GDE - from national assessment
 - High potential GDE - from national assessment
 - Aquatic GDE
 - Subterranean GDE
 - Watercourse Identification Map**
 - Watercourse (defined by Water Act 2000)
 - Drainage feature (defined by Water Act 2000)
 - Unmapped

Date Created: 5/21/2026 Coordinate System: GDA2020 MGA Zone 55
 1:60,000
 Map Size: A4 Portrait

DISCLAIMER
 Subject To Survey
 Glencore makes every effort to ensure the quality of the information available on this map. Before relying on the information on this map, users should carefully evaluate its accuracy, currency, completeness and relevance for their purposes, and should obtain any appropriate professional advice relevant to their particular circumstances. Glencore cannot guarantee and assumes no responsibility for the accuracy, currency or completeness of the information and by using this map you accept that Glencore has no liability for any loss or damage in any form whatsoever caused directly or indirectly from the use of this map.
 © State of Queensland 2021
 - Dept of Natural Resources Mines and Energy
 - Dept of Environment and Science
 © Glencore 2021

6.2 Land

6.2.1 Land Use

The COL mine has been operational since the early 1900s, including disturbance related to exploration of coal deposits from 1865. As such, no pre-mining land use information specific to the Kerale Area Domain is available. The pre-mining land use of the broader COL mine however was dominated by open woodlands, consisting of Regional Ecosystems (REs) 11.3.25, 11.3.1, 11.11.9, 11.11.1. Additionally, grazing by sheep and cattle occurred over the area.

The current land use in the vicinity of the Kerale Area Domain is predominantly grazing (including agistment areas under land access licences and Kerale Station, managed by Colinta Holdings). Most agistment areas are currently occupied.

Kerale Dam was previously used to store neutralised water from the lime dosing facility. A lime dosing facility was constructed in the early-mid 1990s to neutralise AMD water from evaporation ponds. The lime dosing facility was in the upper portion of the Kerale Dam catchment.

Kerale Dam is no longer actively used for water storage and is not part of the operational mine water management system. There is no transfer of water between Kerale Dam and the other water storages at COL. Water that accumulates in Kerale Dam is derived from local catchment runoff only and is not used for any purpose. The water level within the dam is routinely low, which is a function of high annual average evaporation relative to rainfall. The quality of water held within Kerale Dam is acidic and brackish.

Topography in the Kerale Area Domain is generally between 125 to 150 mAHD, with topography falling in a south-westerly direction toward Pelican Creek. The predominant feature of the landscape is the Kerale Dam embankment, which has a crest elevation of 142.5 mAHD. The embankment is an earthen structure approximately 11 m high above the natural surface and exhibits steep slopes on the upstream and downstream faces.

6.2.2 Soils

The Australian Soil Classification mapping for the Kerale Area Domain defines the soils of the area as Dermosol with a dominant entity of “Disturbed land – mines”. The Kerale Area Domain is located just outside of historical soils mapping undertaken in the late 1970s and reported in DNRME (1982), however the data collected provides useful context in understanding the characteristics of soils in the vicinity of the Kerale Area Domain.

DNRME (1982) described three soil profile classes within the survey area:

- Soils with strongly acid subsoils;
 - Soils derived from sandstone (Axehead, Central, Denison, Endi, Francis, Garrick, Hay)
 - Soils derived from carbonaceous sandstone, shale or coal (Reid)
- Soils with slightly acid to neutral subsoils; and
 - Soils derived from sandstone (Blake, Ixeter, Jeff)
 - Soils derived from scarp colluvial (Kestrel)

- Soils derived from local alluvia (Quambo).
- Soils with alkaline subsoils.
 - Soils derived from old alluvia (Lundar)
 - Soils derived from sandstone (Marton, Oxton, Peace)
 - Soils derived from old alluvia and sandstone (Nodule)
 - Soils derived from calcareous sandstones and carbonaceous material (Sibson, Tanbrok).

Soil variability is extremely high over much of the survey area. Soil pH for several soil profile classes (Axehead, Central, Endi, Franci, Garrick, Hay and Reid) were pH <5.5 (1:5 soil:water) at most depths in the profile. Soil profile classes Blake, Ixeter, Jeff, Quambo and Kestrel have pH in the weakly acid to neutral range. The strongly acid and weakly acid to neutral soil profile classes are non-saline throughout the profile, whereas the alkaline soil profile classes have increasing salinity levels with depth (DNRME, 1982).

Data is available for several soil survey sites (15 in total) in proximity to the Kerale Area Domain (between approximately 400 m and 1,100 m from the northern extent of the Kerale Area Domain). These historical soil survey sites are shown spatially in Figure 6-3. The survey records for these soil sites (CCS 1054 to CCS 1068 obtained from State of Queensland (2026)) identified eight soil profile classes ranging from soils with strongly acid subsoils (Axehead, Central and Garrick), to soils with slightly acid to neutral subsoils (Blake and Jeff) and soils with alkaline subsoils (Nodule, Oxton and Peace).

Geochemical results from soil samples collected from test pits in March 2026 within and surrounding the Kerale Dam identified the following:

- The area is characterised by widespread stored acidity, derived from secondary sulfate minerals principally located in the former lime dosing facility footprint;
- Residual sulfide is negligible and the acidity budget is dominated by titratable actual acidity rather than chromium-reducible sulfur (CRS); and
- The former lime dosing facility footprint represents the most significant localised source of secondary sulfate minerals.

The location of the test pits where soil samples were collected for laboratory analysis is shown in Figure 6-3.

6.2.3 Flora and Fauna

The Kerale Area Domain consists of rocky sloping terrain, dominated by Rosewood (*Acacia rhodoxylon*), becoming co-dominant with Eucalypt species towards the north of the Kerale Area Domain. Within the broader surrounding area, remnant vegetation generally consists of riparian vegetation along Pelican Creek and its drainage lines, and reed and sedge species within permanent waterbodies, including Kerale Dam. Open Eucalypt forest and cleared pasture are the dominant vegetation communities.

Ecological surveys were conducted in 2025 within the Kerale Area Domain and in the surrounding environment outside of the ML1064, including downstream to Pelican Creek, to the south and west (refer to study area in Figure 6-4). This area is currently utilised for grazing and agricultural purposes.

During the surveys, 66 plant species (including 24 introduced species), 71 species of birds, three species of amphibian, 13 mammals and 1 reptile species were observed. The area surveyed was found to support a relatively broad range of species, despite the moderate to poor habitat quality. Impacts from previous clearing for tracks, infrastructure, and grazing were readily observed, as shown by areas of bare ground and invasive species. These disturbances were particularly evident in areas adjacent to permanent water sources (such as farm dams) and pasture areas.

One *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) (Commonwealth) and one *Nature Conservation Act 1992* (NC Act) (Qld) listed threatened species were observed downstream of Kerale Dam. Southern Squatter Pigeon was recorded at two locations between Kerale Dam and Pelican Creek, with each sighting in close proximity to permanent water (farm dams).

Seven REs were ground-truthed as occurring in the area, with a small portion of the Of Concern RE 11.3.4, *Eucalyptus tereticornis* and/or *Eucalyptus* spp. woodland on alluvial plains, recorded alongside Pelican Creek.

Prominent introduced fauna species observed across the survey period were cattle, pigs, chital deer and cane toads.

6.3 Air

No changes to air quality are expected. No changes to Schedule B (Air) of the EA are proposed.

6.4 Acoustic

No changes to the acoustic environment are expected. No changes to Schedule D (Noise and Vibration) of the EA are proposed.

6.5 Waste

No changes to Schedule C (Waste) or Schedule G (Water Treatment Plant) of the EA are proposed.

Figure 6-3 - Soil survey locations (historical and contemporary)

Collinsville Open Cut (COL)

GLENCORE

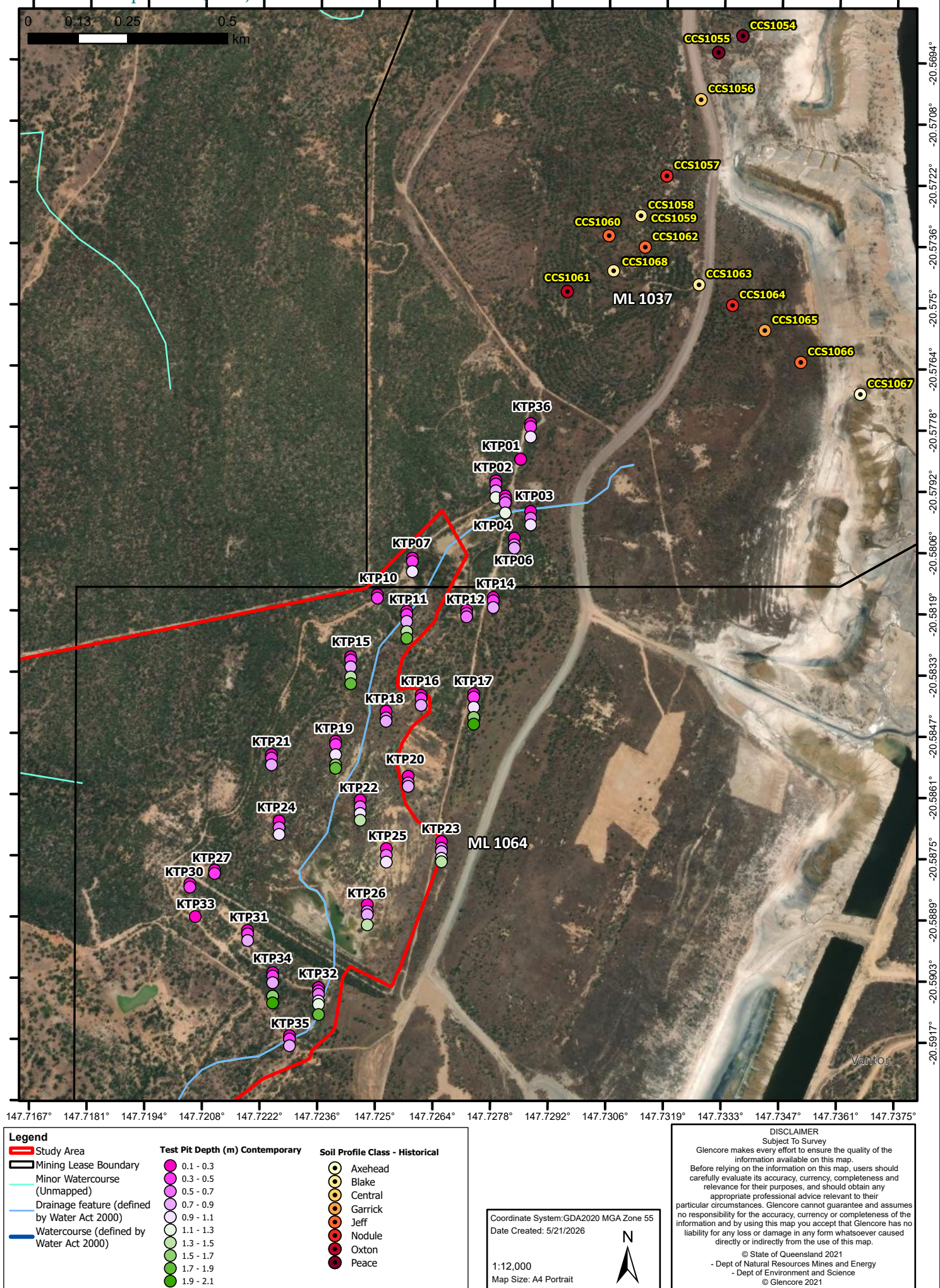
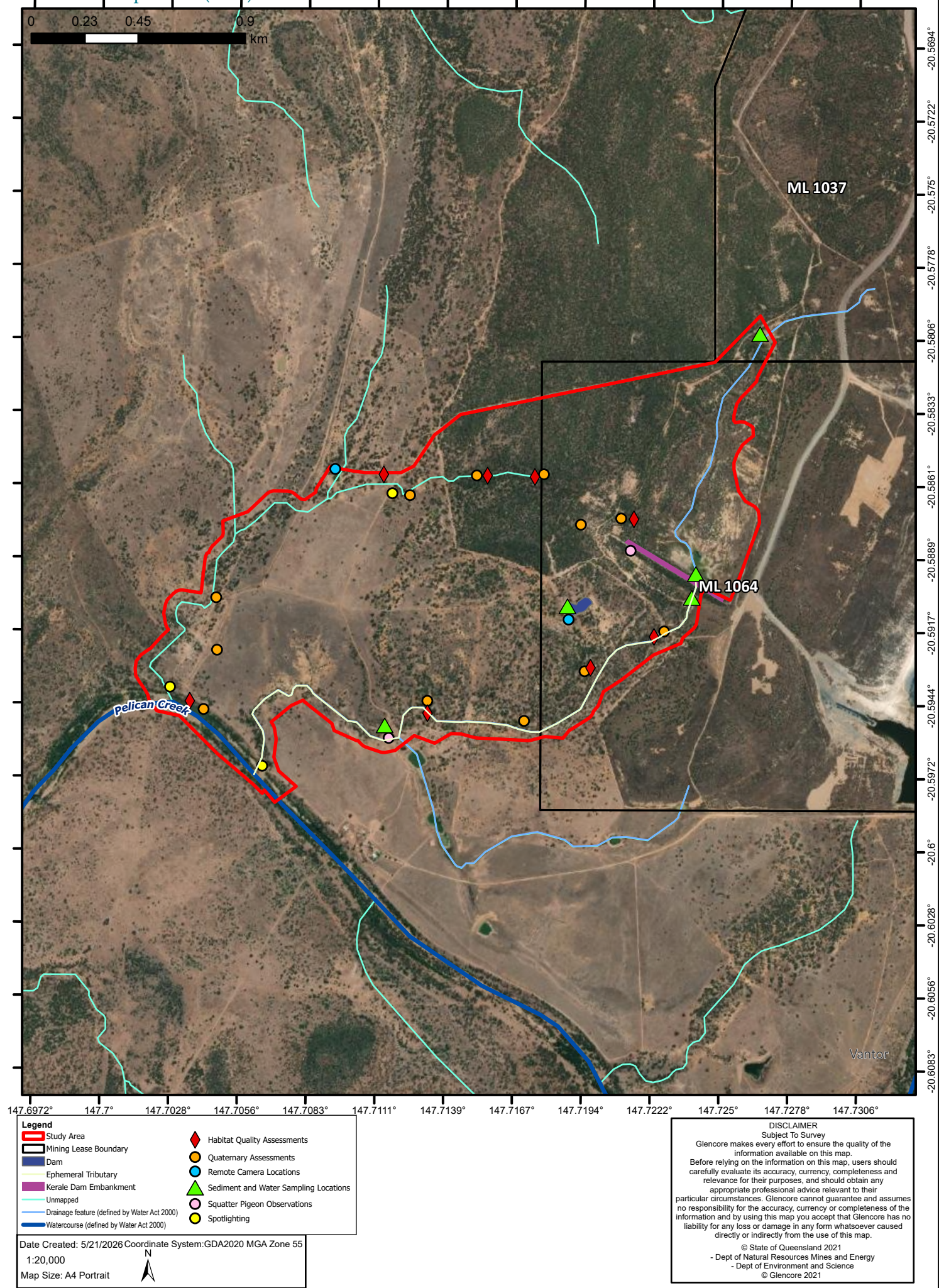


Figure 6-4 - Ecology survey locations and species observations

Collinsville Open Cut (COL)

GLENCORE



7. Likely Impacts on Environmental Values

7.1 Details of Emissions or Releases Likely to be Generated

This section addresses the requirements of Section 226A(f)(ii) of the EP Act in providing details of the emissions or releases likely to be generated by the proposed amendment, outlining the mechanisms (overtopping, flooding, groundwater) that may result in the release of water from the Kerale Area Domain.

7.1.1 Kerale Dam Water Balance

The water balance assessment of Kerale Dam (WSP Australia Pty Limited, 2026) (refer Appendix B) was prepared to estimate the long-term hydrological risks associated with the Kerale Dam. The assessment, which was based on the final closure state landform of Kerale Dam, examined the potential for overtopping of the Kerale Dam embankment to occur into the tributary of Pelican Creek via the bywash (shown in Figure 2-2).

The input mechanisms identified for the water balance comprise direct rainfall (on the ponded area within the dam footprint), catchment runoff (limited to the small catchment as the diversion landforms route runoff away from the dam), and net inflow from groundwater. The outflow considered in the model was evaporation from the ponded area.

The model considered the impact of climate change on rainfall and evaporation by adjusting these inputs consistent with industry guidance. Climate projections derived from the Queensland Future Climate Portal (Queensland Government, 2023) were used. The adopted methodology uses representative concentration pathway (RCP) 4.5 and RCP 8.5 projections across multiple climate model, global warming sensitivities, and pivotal years (2030, 2050 and 2070). This approach captures a broad range of plausible future climates. Rainfall was modelled stochastically using Monte Carlo simulation (reflecting its high variability, event-driven nature and its dominance as the primary source of uncertainty in the water balance model) with evaporation adjusted using monthly percentage changes relative to historical conditions. This approach is consistent with industry guidance.

Three synthetic climate projections were considered in the water balance model:

- RCP: projections of greenhouse gas concentrations adopted by the Intergovernmental Panel on Climate Change;
- Climate Warning Sensitivity (CWS): estimates the sensitivity of the global temperature in response to carbon dioxide concentrations and are grouped into three ranges (low, medium, high); and
- Global Climate Models (GCMs): grouped into four Representative Future Climate (RFC) categories according to the global warming sensitivity and East Indian x West Pacific Ocean temperatures responses.

A single representative climate scenario (calculated from the 24 scenarios analysed) for each pivotal year (2030, 2050 and 2070) was identified using a data-driven automated approach. For each representative climate scenario, the annual average rainfall is lower (by 3 mm, 6 mm and 7 mm for

pivotal years 2030, 2050 and 2070 respectively) than the long term annual average. Average monthly evaporation for each pivotal year is projected to be higher than the historical data across all months.

Outputs from the water balance model indicate that the water level within the Kerale Dam is expected to stabilise at an elevation of 134 mAHD, which is 7.5 m below the bywash invert (141.5 mAHD) (Figure 7-1).

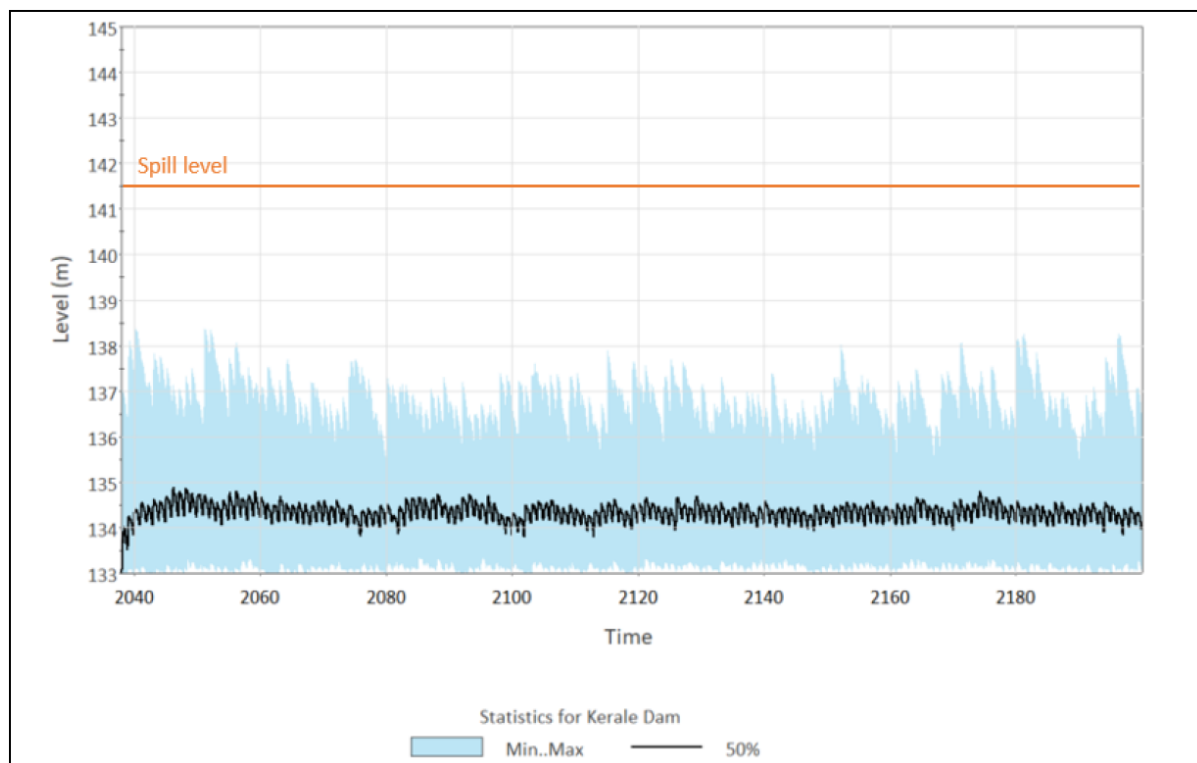


Figure 7-1 Modelled water level and interpreted spill level for the Kerale Dam (WSP Australia Pty Limited, 2026)

At the steady-state water level, the mean annual inflow to the Kerale Dam was modelled at 62 megalitres per year, with the mean annual outflow modelled at 63 megalitres per year, indicating that inflows and outflows for the Kerale Dam start to stabilise by year 2180, with equilibrium reached from year 2240 (Figure 7-2).

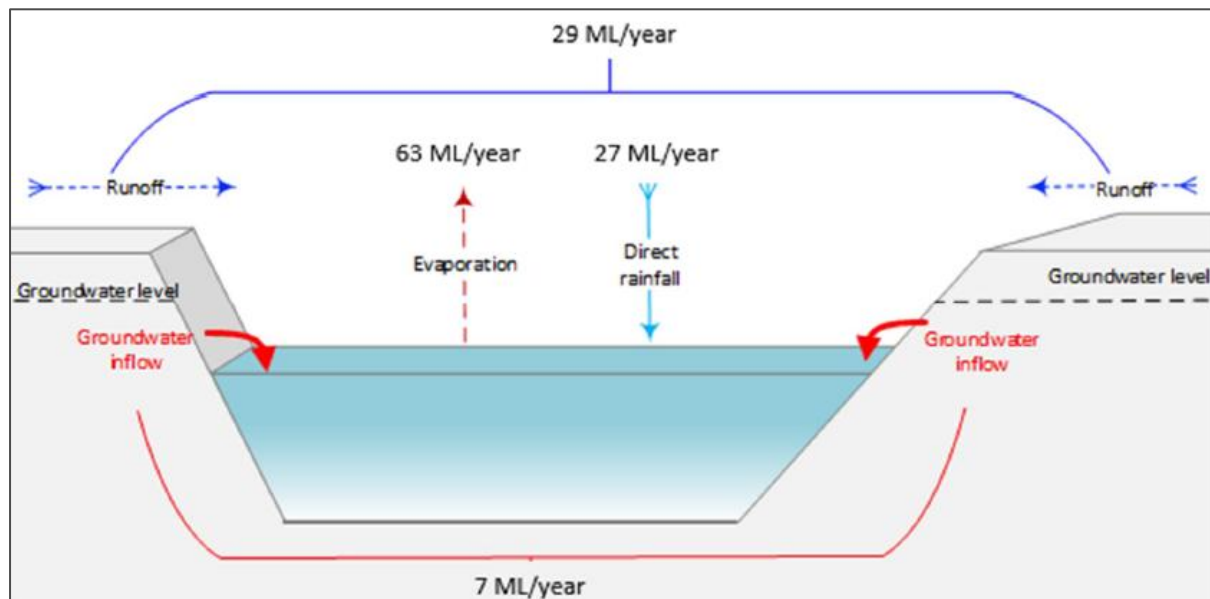


Figure 7-2 Average inflows/outflows simulated for the period from 2240 to 2259 (WSP Australia Pty Limited, 2026)

Based on the outcomes of the water balance model, the water level in Kerale Dam is predicted to stabilise well below (approximately 7.5 m) the bywash invert. The results for all realisations and the applied climate change scenarios did not result in any instance of water being released via the Kerale Dam bywash. All water held in Kerale Dam is predicted to be contained and not released as surface water outflows via the bywash.

7.1.2 Flood Assessment

A hydraulic assessment of the Kerale Dam and surrounding features (i.e. western and eastern diversion landforms and the tributary Pelican Creek) (Engeny Australia Pty Ltd, 2026) (refer Appendix C) was undertaken to characterise the containment performance of the eastern and western diversion landforms that divert external catchment flows around the perimeter of the Kerale Dam. The assessment also sought to characterise the containment performance of the Kerale Dam itself.

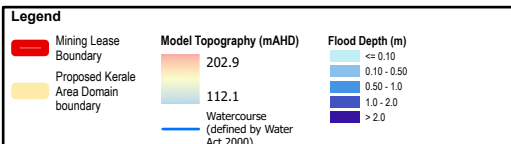
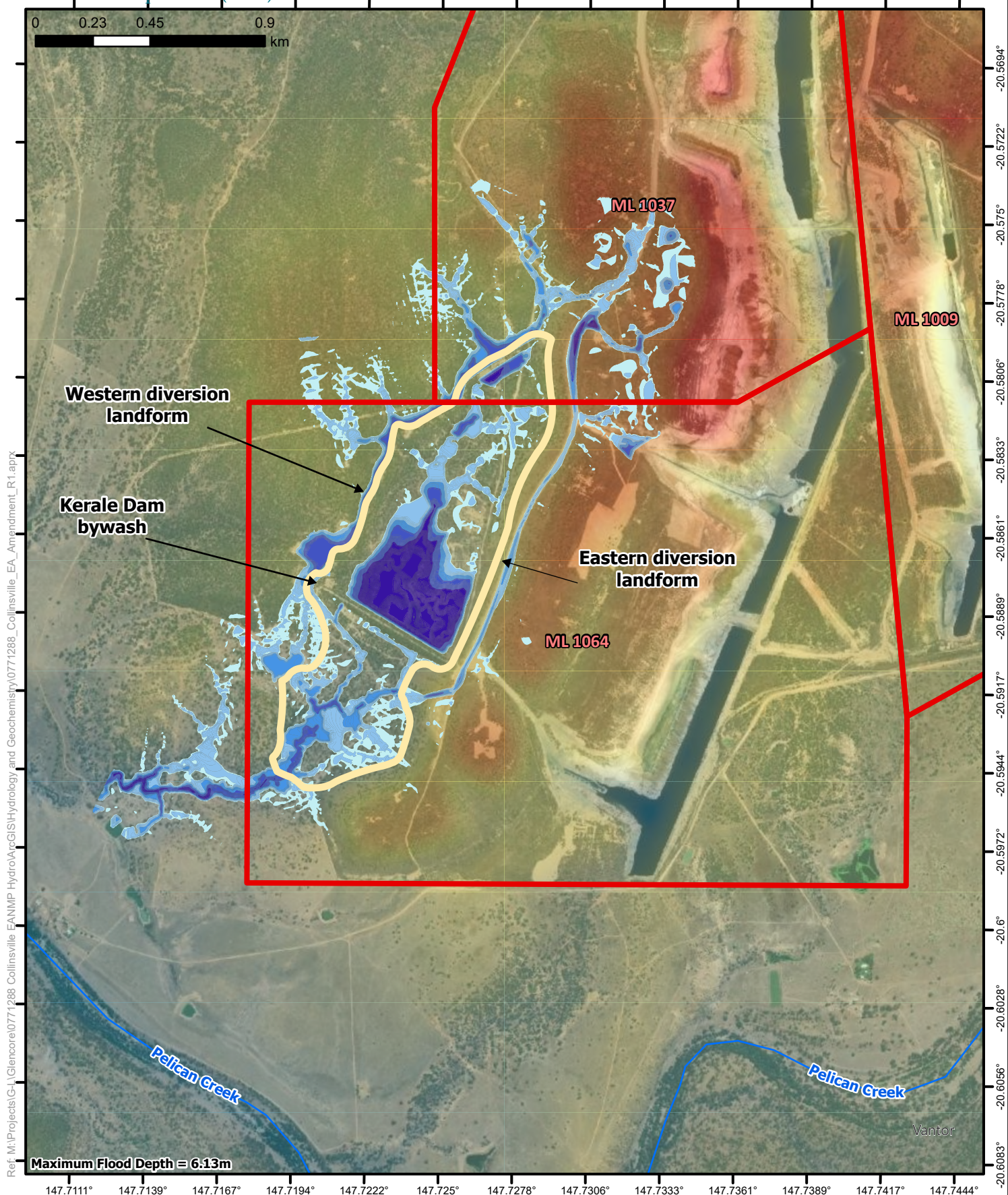
Design event simulations were undertaken for the 50 %, 2 %, 1 % and 0.1 % AEP events. The flood depth map for the 0.1 % AEP event is shown in Figure 7-3. The 0.1 % AEP event represents the greatest flood depth of the simulated events. Key findings from the hydraulic assessment identified that runoff generated in the external catchment is effectively conveyed by the eastern and western diversion landforms, directing flows around the Kerale Dam and into the tributary of Pelican Creek in all events up to and including the 0.1 % AEP (Engeny Australia Pty Ltd, 2026).

In all simulated events, floodwaters remained contained within the drainage network and floodplain areas, with Kerale Dam not over-topping (Engeny Australia Pty Ltd, 2026). Furthermore, Figure 7-3 indicates that the tributary of Pelican Creek within the Kerale Area non-dam is expected to effectively convey flows to Pelican Creek during the 0.1 % AEP event.

Figure 7-3 - 0.1% AEP Flood Depth (S1)

Collinsville Open Cut (COL)

GLENCORE



Date Created: 5/21/2026 Coordinate System: GDA2020 MGA Zone 55
1:20,000
Map Size: A4 Portrait

DISCLAIMER
Subject To Survey
Glencore makes every effort to ensure the quality of the information available on this map. Before relying on the information on this map, users should carefully evaluate its accuracy, currency, completeness and relevance for their purposes, and should obtain any appropriate professional advice relevant to their particular circumstances. Glencore cannot guarantee and assumes no responsibility for the accuracy, currency or completeness of the information and by using this map you accept that Glencore has no liability for any loss or damage in any form whatsoever caused directly or indirectly from the use of this map.

© State of Queensland 2021
- Dept of Natural Resources Mines and Energy
- Dept of Environment and Science
© Glencore 2021

7.1.3 Geochemical assessment

The geochemical investigation of the Kerale Area (Environmental Resources Management Australia Pty Ltd. 2026a) (refer Appendix D) (Environmental Resources Management Australia Pty Ltd. 2026b) (refer Appendix E) identifies that acidity within the Kerale Area is primarily derived from soils associated with the former lime dosing facility. Residual materials from historical neutralisation of AMD water have resulted in the formation of secondary sulfate minerals, which represent the dominant source of stored acidity. These materials are concentrated within the former lime dosing footprint and have also formed along adjacent drainage pathways leading to Kerale Dam. They form a persistent solid-phase reservoir of acidity and associated metals.

The geochemical conceptual site model identifies the former lime dosing facility as the primary source of stored acidity within the Kerale Area, with Kerale Dam functioning as an intermediate accumulation zone for acidity transported from upgradient soils, rather than as a primary source. Soils along the central drainage pathway extending from the former lime dosing facility toward the dam embankment act as a secondary source area where stored acidity and metals are mobilised.

Acidity is mobilised from soils containing secondary sulfate minerals through dissolution and subsequent transport via surface runoff and shallow subsurface pathways. This is pronounced during wet conditions. However, transport is not uniform and is predominantly focused along the central drainage line, with migration limited by the shallow and low-velocity nature of groundwater flow and the ephemeral nature of surface drainage pathways.

During periods of elevated water level in Kerale Dam following rainfall, increased hydraulic gradients may promote seepage into underlying and downgradient alluvial sediments, providing a potential pathway for groundwater transport.

The following summarises the mechanisms described above:

- Soils associated with the historical lime dosing facility are the dominant source of stored acidity;
- Intermediate accumulation of acidity occurs within the central drainage pathway and dam impoundment; and
- Mobilisation of acidity occurs through surface runoff (within the dam impoundment) and lateral seepage migration occurs through the dam embankment and downstream into the surficial alluvium associated with the tributary of Pelican Creek.

The movement of acidity and associated contaminants is spatially limited and controlled by localised processes. Attenuation processes, including dilution, mixing, evapoconcentration and episodic recharge within the shallow alluvial system and ephemeral tributary, would further reduce concentrations along the flow path toward downstream receptors. This is described further in Section 7.1.4.

7.1.4 Groundwater

Potential groundwater flow pathways within the Kerale Area Domain include the following (refer Appendix A):

- A hydraulic connection between the unlined Kerale Dam and underlying weathered and unconsolidated Quaternary deposits. This connection and the increased permeability of the

sands and alluvials may allow lateral seepage migration to the surficial alluvium associated with the ephemeral tributary of Pelican Creek; and

- Groundwater flow towards the natural topographic low and along the drainage line.

The hydrogeological conceptualisation and seepage assessment (Klohn Crippen Berger, 2026) indicates that groundwater movement associated with Kerale Dam is predominantly shallow, slow, and controlled by local topography and surficial alluvial materials. Predicted seepage rates and transport modelling results suggest that any downgradient migration along the ephemeral tributary of Pelican Creek would occur over extended timeframes with substantial seasonal dilution from runoff and surface water despite the conservative assumptions adopted in the seepage and transport assessments (Klohn Crippen Berger, 2026). The vertical movement of groundwater into the deeper hydrostratigraphic units is unlikely due to the low hydraulic conductivity of these units (Klohn Crippen Berger, 2026).

Rates of seepage migration are predicted to be slow along the alluvial deposits associated with the tributary of Pelican Creek, which continues for approximately 2.7 km from the Kerale Dam embankment before discharging into Pelican Creek. A Monte Carlo stochastic analysis using the Domenico approach was performed to assess solute concentration profiles at selected time points (1 year, 2 years, 100 years, 200 years and 500 years).

A location 500 m downgradient of the Kerale Dam embankment (representing a point approximately halfway between the dam embankment and where the tributary crosses the western boundary of ML1064) was chosen as an appropriate point to predict solute concentration. The analysis represented the source at the dam embankment with a normalised value of “100”, allowing the predicted concentration at the assessment point to be expressed as a percentage of the source concentration (Klohn Crippen Berger, 2026).

The solute transport calculations indicate that, even under conservative conditions where the plume could migrate significant distances, the rate of mass transfer remains low. The stochastic assessment predicts a significant reduction in concentrations to between approximately 10 % to 30 % of the source (with a peak mean concentration of approximately 19 %) at the observation point 500 m downstream of the Kerale Dam embankment .

Monitoring data collected at alluvial bores approximately 65 m and 160 m downstream of the Kerale Dam embankment shows that groundwater chemistry is different (refer Appendix E), consistent with progressive attenuation along the flow path and indicating that the solute front may not have reached the more distant bore. Applying the modelled reduction to the monitoring data, the median sulfate concentration of 2,420 mg/l observed at groundwater bore K01 located approximately 65 m downstream of the Kerale Dam embankment (refer Appendix E) is calculated to reduce to 460 mg/l (using the peak mean concentration of 19 %) at a location 500 m downstream of the dam embankment.

The downstream boundary of the Kerale Area Domain is approximately 750 m from the dam embankment (i.e. an additional 250 m downstream of the solute concentration assessment point). Attenuation and dilution within the alluvial system would continue to reduce plume concentration as it moves beyond the 500 m assessment point and toward the Kerale Area Domain boundary. Beyond the Kerale Area Domain boundary, there is a further approximately 200 m of surficial alluvial network

to the western boundary of ML1064, and an additional approximately 1,750 m (following the tributary flow path) between the boundary of ML1064 and Pelican Creek.

The receiving environment of Pelican Creek where the solute plume is predicted to discharge has variable water quality. Contributions of solute associated with the acidity identified in connection with the lime dosing facility would be negligible when compared against existing variability.

The solute transport calculations indicate that solute migrating from Kerale Dam would be significantly reduced before solute migrates beyond the Kerale Area Domain. The travel path from the boundary of the Kerale Area Domain to Pelican Creek is approximately 2,000 m. Along this flow path, solute would undergo significant attenuation and dilution (in local groundwater and in surface water during overland flow events), significantly reducing concentrations to background levels. Therefore, impacts on EVs in the receiving environment of Pelican Creek at this location are not predicted to occur.

7.2 Description of Risk and Likely Magnitude of Impacts

This section addresses the requirements of Section 226A(f)(iii) of the EP Act in providing a description of the risks and likely magnitude of impacts on the EVs.

7.2.1 Water

7.2.1.1 Surface Water

As detailed in Section 7.1, no surface water releases from the Kerale Dam via the bywash or from overtopping of the dam embankment are predicted to occur over the long-term (i.e., 0.1% AEP). The water balance model (WSP Australia Pty Limited, 2026) demonstrates that the water level within Kerale Dam will stabilise well below the bywash invert (RL 141.5 mAHD), representing 47 ML of stored water, of an available storage capacity of 1,447 megalitres. The hydraulic assessment illustrates that the western and eastern diversion landforms remain effective in diverting catchment runoff around Kerale Dam up to the 0.1 % AEP flood event, and that Kerale Dam is projected to contain floodwaters under the same design flood conditions (refer Appendix C).

As described in Section 7.1.4, the only mechanism of outflow from the Kerale Dam is through seepage, which is subject to natural attenuation processes and dilution with local groundwater. As such, no impacts to surface water EVs (as outlined in the EPP Water) or downstream receptors (including Pelican Creek and the ephemeral tributary) are proposed to occur as a result of the proposed amendment.

7.2.1.2 Groundwater

There is potential for the lateral movement of seepage from the Kerale Dam through the dam embankment and into the alluvial deposits associated with the tributary of Pelican Creek downstream of the dam embankment. Seepage is projected to occur at low rates, with groundwater migration in the order of a few metres per year (refer Appendix A). As a result of this slow rate of movement, near surface seepage will be subject to evaporative losses, and dilution in mixing with the local groundwater and further dilution from surface water and runoff during wet periods. These factors are expected to result in no impacts on groundwater EVs at the boundary of the Kerale Area Domain.

7.2.1.3 Wetlands and GDEs

As identified in Section 6.1.3, the Kerale Area Domain contains no wetlands of international importance, HEV wetlands, or HES wetlands, and is in part State-mapped as a low potential GDE. As discussed in Section 7.2.1.1 and Section 7.2.1.2, there are no surface or groundwater emissions or releases predicted outside of the Kerale Area Domain that may impact downstream wetlands or GDEs located beyond the Kerale Area Domain boundary.

7.2.2 Land and Biodiversity

As noted in Section 6.2.2, the acidity of soils observed throughout the Kerale Area Domain is understood to result from stored secondary sulfate minerals. The magnitude of risk to land EVs relates to the ability of these minerals to mobilise within the soil and migrate beyond the boundary of the Kerale Area Domain. As detailed in Section 7.1, no surface water releases are proposed, and migration of groundwater (through seepage from the dam) is projected to be low due to slow seepage rates, evaporation and dilution. As such, mobilisation of solutes at concentrations exceeding relevant water quality criteria beyond the boundary of the Kerale Area Domain is not predicted. No impacts to soil related EVs are proposed to occur as a result of the proposed amendment outside of the Kerale Area Domain.

The ecology assessment for the Kerale Area Domain (Environmental Resources Management Australia Pty Ltd, 2026c) (refer Appendix F) concluded that no significant evidence of mine-related impacts to flora and fauna were observed in the surrounding environment within the ML. Impacts to vegetation and habitat are predominantly caused by an abundance of invasive ground cover species, and bare ground where cattle/fauna tracks have formed. These activities are unrelated to the soil characteristics and water quality associated with the Kerale Area Domain.

The amendment does not propose any activities that would result in the introduction or further spread of invasive ground cover species, nor induce an increase in cattle/fauna activity leading to an increase in areas bare ground. Impacts to flora and fauna are not anticipated as a result of the proposed amendment.

7.2.3 Air, Acoustic, and Waste

No impacts to air quality, acoustics, or waste are expected. No changes to Schedule B (Air), Schedule D (Noise and Vibration), Schedule C (Waste) or Schedule G (Water Treatment Plant) of the EA are requested.

7.3 Rehabilitation

There are no rehabilitation activities proposed for the Kerale Area Domain. The Progressive Rehabilitation Closure Plan (PRC Plan) schedule will identify the specific management milestones applicable to the Kerale Area Domain. These management milestones and associated criteria will be aligned with the objective of achieving sufficient improvement of the land in accordance with the Statutory Guideline 'Progressive rehabilitation and closure plan' (Environmental Services and Regulation, Department of Environment, Science and Innovation, 2024). Specifically, each of the following will be minimised:

- The risk of the area collapsing, eroding or subsiding;
- The need to actively manage the area; and
- Access to the area by an animal or person.

A monitoring program will be developed to determine whether the management milestone criteria have been achieved.

8. Management Practices

This section addresses the requirements of s226A(f)(iv) of the EP Act in providing details of the management practices to be implemented to prevent or minimise adverse impacts that may arise as a result of the proposed amendment.

The EA outlines a range of management practices to be employed to prevent and minimise impacts as a result of mining activities at COL. COL is a spatially extensive operation with a long operational history. Accordingly, COL is able to demonstrate a strong practice of applying management practices and controls to ensure compliance with its regulatory requirements. This EA amendment will not alter the implementation of current management practices for other domains at COL.

Stability of the Kerale Area non-dam mine feature will be managed in accordance with the COL Erosion and Sediment Control Plan (ESCP). The ESCP has been developed in accordance with Condition F10 of the EA and outlines controls to minimise erosion and the release of sediment to receiving waterways. In accordance with Condition F10 of the EA, the ESCP has been developed by an appropriately qualified person for implementation across all stages of the mining activities and is considered suitable for management of the release of sediment to receiving waterways from the Kerale Area non-dam mine feature.

In addition to the use of the management practices outlined in the EA, the goals and objectives of the proposed amendments include measures designed to appropriately manage human and livestock access to ponded water in the Kerale Dam mine feature, potential surface and groundwater impacts of the Keral Area Domain and geotechnical stability of the Keral Dam mine feature.

The goals and objectives in proposed EA Table H2 (safe for humans and livestock) include bunding and/or fencing to the Kerale Dam mine feature to ensure no uncontrolled access to poor quality water. Other measures proposed include risk assessment for slopes to reduce the probability of geotechnical instability, and compliance with the ESCP, as per condition F10 of the EA, which will reduce the occurrence of gully and rill erosion.

The goals and objectives in proposed EA Table H2 (non-polluting and surface water quality and groundwater quality met downstream of Kerale Area Domain) are considered appropriate representations of the surface water impact pathways and potential groundwater source-receptor pathways for the Kerale Area Domain. Seepage is anticipated to meet the water quality objectives as specified in Table F3 of the EA and groundwater quality and level limits as specified in Table E2 of the EA. This is reflected in the proposed management criteria which refers to meeting existing requirements pertaining to seepage monitoring, water quality and groundwater quality and level.

To appropriately monitor compliance with the goals and objectives proposed EA Table H2 (non-polluting and surface water quality and groundwater quality met downstream of Kerale Area Domain) a monitoring network will be developed in the downstream alluvial system to collect additional data. The monitoring system will target seepage from the Kerale Area Domain and will include the development of a bespoke trigger action response plan that will identify specific actions to be undertaken if conditions deviate from prescribed bounds.

The goals and objectives in proposed EA Table H2 (stable and low probability of slumping of dam/wall embankment or inert material loss) for the Kerale Area Domain will be achieved through a combination of physical measures to prevent access by humans/livestock and managed via risk assessment for slopes >30% and 10 m vertical, which is consistent with the approach for other domains at COL. Geotechnical stability will be achieved through compliance with the ESCP plan as required under Condition F10 of the EA.

In accordance with s226A(f)(iv) of the EP Act, the use of the existing management practices at COL in accordance with the EA, in conjunction with proposed amendment have been designed to prevent or minimise adverse impacts that may arise as a result of the proposed amendment.

9. Conclusion

This document has been prepared to support an amendment application for EA EPML00332013 in relation to legacy contamination issues in the Kerale Area Domain, located on ML1064 and ML037 at COL. The EA amendment application seeks to include in the EA, appropriate management measures to address the environmental impact associated with the Kerale Area Domain whilst mining activities are being carried out and to nominate a final land outcome for the Kerale Area Domain following the cessation of mining activities.

Due to its age and history, COL is a complex site that presents a range of challenges in facilitating ongoing operations and planning for closure. Various historical mining-related activities have occurred within the Kerale Area, including the construction of Kerale Dam in the early 1990s and the historical operation of the lime dosing facility used to neutralise AMD water. These activities have resulted in legacy contamination issues, with constituents from the lime dosing process remaining present in soils and water. The conceptual site model shows that constituents from legacy activities are contributing to acidic conditions observed in water and land within and in the vicinity of Kerale Dam.

The Kerale Area Domain cannot satisfy the threshold for 'stable condition' in that it cannot achieve a PMLU. As such, this EA amendment seeks to nominate a final land outcome for the Kerale Area Domain to reflect the impact of the historical activities and resultant contamination issues at this location.

The Kerale Dam is known to contain acidic waters, likely to be attributable to the migration of constituents from the historical lime dosing facility. Contribution from other sources, such as naturally occurring acid sulfate soils disturbed by dam construction in the early 1990s cannot be precluded at this time and are subject to further investigation.

The acidic surface waters contained within the Kerale Dam mean that the stock water drinking guidelines (ANZG, 2023) cannot be met. As such, for the Kerale Dam portion of the Kerale Area Domain, grazing PMLU cannot be achieved. A PMLU of aquatic ecosystems cannot be met either as surface water quality exceeds the Australian New Zealand Guidelines (ANZG) for the protection of aquatic ecosystems.

The soils of the Kerale Dam are acidic and downgradient of the dam embankment; acidic conditions have been observed in the surficial alluvial groundwater system which follows the ephemeral tributary of Pelican Creek. These conditions in the shallow aquifer near the embankment do not meet the ANZG water quality objectives for aquatic ecosystem protection (ANZG, 2023), meaning that the EV of aquatic ecosystem protection would not be supported.

Surface water modelling and assessment shows that water within Kerale Dam is contained with no outflow via the bywash. Additionally, the diversion landforms are effective in preventing ingress from external catchments into Kerale Dam and routing overland flow into the tributary of Pelican Creek downstream of the Kerale Dam embankment. Water held in Kerale Dam represents only a small proportion (<5 %) of the dam's volumetric storage capacity. This is a function of the small contributing catchment relative to the dam's storage capacity, and the high annual average evaporative losses compared with precipitation. The only mechanism for water outflow is via evaporation and seepage to underlying weathered and unconsolidated Quaternary deposits associated with the tributary of Pelican Creek.

Seepage through the Kerale Dam embankment to the surficial alluvial system is predicted to be slow moving, with attenuation and dilution processes (enhanced during high rainfall periods through interactions with surface water) significantly reducing the likelihood of exceeding seepage monitoring water quality objectives downgradient of the Kerale Area Domain.

This EA amendment application is seeking to recognise that, as a result of historical activities at COL, the Kerale Area Domain cannot meet the definition of 'stable condition' under s111A EP Act in achieving a PMLU on the basis of the quality characteristics of surface water held within the Kerale Dam and the chemistry of the soils and groundwater in the Kerale Area Domain.

Proposed management requirements align with the current approach to the management of other domains at COL, providing consistency and continuity with the existing frameworks for environmental management. Management requirements are centred around the management goals of safe, stable and non-polluting. These goals will be achieved by managing access by humans/ livestock to the Kerale Dam, assessment to provide geotechnical and erosional stability, and monitoring of seepage and groundwater.

10. References

- ANZG. (2023). *Australian & New Zealand Guidelines for Fresh & Marine Water Quality. Livestock drinking water guidelines*. Canberra: Australian and New Zealand Governments and Australian state and territory governments.
- Bureau of Meteorology. (2026). *Groundwater Dependent Ecosystems Atlas*. Retrieved from <https://www.bom.gov.au/water/groundwater/gde/map.shtml>
- Department of Climate Change, Energy, the Environment & Water. (2025). *Australia's bioregions (IBRA)*.
- Department of Climate Change, Energy, the Environment and Water. (2024, June 20). *Ramsar Wetlands of Australia*. Retrieved from <https://www.arcgis.com/home/item.html?id=db623e2aba86410e9c02906d1f59ac4d>
- Department of Environment and Science. (2022). *Environmental Protection (Water and Wetland Biodiversity) Policy 2019. Burdekin River (lower) and Bowen River Sub-basins. Environmental Values and Water Quality Objectives*. Queensland Government.
- Department of Environment and Science. (2022). *Environmental Protection (Water and Wetland Biodiversity) Policy 2019. Burdekin, Don and Haughton River Basins Groundwater Environmental Values and Water Quality Objectives*. Queensland Government.
- Department of Resources. (2024). Watercourses and bodies: Stream order [Vector Tile Service]. Queensland Government.
- Department of the Environment, Tourism, Science and Innovation. (2013). *Burdekin drainage basin*. Retrieved February 2026, from WetlandInfo: <https://wetlandinfo.detsi.qld.gov.au/wetlands/facts-maps/basin-burdekin/>
- Department of the Environment, Tourism, Science and Innovation. (2013). *Pelican Creek (Burdekin) Water Quality Improvement Plan catchment*. Retrieved February 2026, from WetlandInfo: <https://wetlandinfo.detsi.qld.gov.au/wetlands/facts-maps/wqip-pelican-creek-burdekin/>
- Department of the Environment, Tourism, Science and Innovation. (2022, September 09). *Burdekin, Haughton and Don basins*. Retrieved from <https://environment.qld.gov.au/management/water/policy/burdekin-basins>
- Department of Natural Resources, Mines and Energy (DNRME). (1982). Soils and Special Land Use Assessment of a Mining Lease Area, Collinsville, North Queensland. Agricultural Chemistry Branch Technical Report No. 19.
- Engeny Australia Pty Ltd. (2026). *Kerale Dam Hydraulic Assessment to Support EA Amendment Application*.
- Environmental Resources Management Australia Pty Ltd. (2026a). *Geochemical Investigation of Kerale Area Factual Report*.
- Environmental Resources Management Australia Pty Ltd. (2026b). *Geochemical Investigation of Kerale Area Interpretive Report*.
- Environmental Resources Management Australia Pty Ltd. (2026c). *Kerale Study Area - Ecology, Sediment and Water Quality Assessment*.
- GHD. (2023). *Collinsville Coal Terrestrial Ecological Assessment Report*.
- Klohn Crippen Berger (KCB). (2026). *Kerale Dam Seepage Assessment*.
- Queensland Government. (2017). *Reef 2050 Water Quality Improvement Plan 2017 - 2022*.
- Queensland Government (2023). *Biophysical Modelling (CCS): The State of Queensland*.
- Queensland Government. (2026). *120220A Pelican Creek at Kerale*. Retrieved from Water Monitoring Information Portal.
- Queensland Herbarium, DETSI. (2024). *Regional Ecosystem Description Database (REDD). Version 13.1*.
- State of Queensland. (2026). *Queensland Government Soil and Land Information Soil Listing Report*.

RGS Environmental Consultants Pty Ltd. (2025). *Spoil Geochemistry Review Assessment. Collinsville Open Cut Coal Mine.*

WSP Australia Pty Limited. (2026). *Water Balance Update Report - Kerale Dam. Collinsville Mine.*

Appendix A – Kerale Dam Seepage Assessment

Appendix B – Water Balance Report – Kerale Dam

Appendix C – Kerale Area Hydraulic Assessment

Appendix D – Geochemical Investigation of Kerale Area Factual Report

Appendix E – Geochemical Investigation of the Kerale Area Interpretive Report

Appendix F – Kerale Study Area Ecology, Sediment and Water Quality Assessment

GLENCORE