APPENDIX Y
Contamination preliminary site investigation

Evolution MINING

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Cowal Gold Operations Open Pit Continuation Project

Contamination Preliminary Site Investigation

Prepared for Evolution Mining (Cowal) Pty Limited

April 2023

Cowal Gold Operations Open Pit Continuation Project

Contamination Preliminary Site Investigation

Evolution Mining (Cowal) Pty Limited

J190417 RP39

April 2023

Version	Date	Prepared by	Approved by	Comments
1	18 November 2022	Simony Sakamoto	Anthony Davis	
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26 April 2023

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Executive Summary

ES1 Introduction

Evolution Mining (Cowal) Pty Limited (Evolution) is the owner and operator of the Cowal Gold Operations (CGO), an existing open pit and underground gold mine approximately 38 kilometres (km) north-east of West Wyalong, in the central west region of New South Wales (NSW). Evolution is seeking approval for further open pit mining operations at CGO through the Open Pit Continuation Project (the Project). The Project primarily seeks to continue the open pit operations by approximately 10 years to 2036 and extend the total mine life by approximately two years to 2042.

The expansion project will involve further development of the existing E42 pit and the development of open pit mining in three adjacent orebodies, known as the 'E46', 'GR' and 'E41'. No change to the approved ore processing rate of 9.8 Mt per annum is proposed and all activities that are currently approved under the existing Ministerial development consents are intended to continue.

EMM Consulting Pty Limited (EMM) was commissioned by Evolution to undertake a preliminary site investigation (PSI) to assess potential contamination risks for the Project. The objective of the PSI was to assess whether historical or present activities have the potential to cause, or have caused, contamination that may impact on the land use suitability for the study area. This was undertaken by reviewing site history, the physical setting and general conditions of the study area and surrounding land.

ES2 Scope of work

EMM's scope of services for this PSI comprised:

- a review of available information regarding the soils, geology and hydrogeology in the vicinity of the study area
- research and review of available historical and current records including aerial photographs, topographic maps a of the study area
- research and review of available data regarding land zoning and dangerous good records relevant to the study area
- an inspection of the study area
- preparation of this report presenting the findings of the PSI through the development of a conceptual site model and appropriate recommendations in accordance with relevant legislative guidelines.

ES3 Findings

A review of the environmental setting of the Project area was completed based on available information sources. Furthermore, detailed database searches were undertaken for the entire study area, along with site inspections and subsequent report.

Potential areas of contamination were identified by reviewing historical information, the environmental setting and conditions encountered during the inspections undertaken. This information was used to assess potential contaminants, exposure mechanisms, pathways and potentially affected media as outlined in the conceptual site model. With the exception of the existing and approved disturbance area, the Project area is predominantly used for agricultural and/or pastoral purposes.

One previous investigation was reviewed as part of this PSI, which encompassed a portion of land located on a small part of the study area. The report identified the presence of asbestos containing material (ACM) in the remains of a dwelling destroyed by fire in the mid 1990's within the north-west boundary of the study area. Data from the environmental monitoring performed by CGO were also evaluated, which identified no widespread contamination associated with current mining activity.

No identified history of significant widespread contaminating activities was identified within the study area, with the exception of CGO operations and occurrence of ACM in demolished buildings. The agricultural activities observed in general across the study area and surrounds appeared non-intensive and thus frequent and widespread application of pesticides/herbicides and/or fill material causing widespread contamination is considered unlikely to be present at concentrations above the relevant assessment criteria throughout the study area. There are also two historical mining operation based on a record of titles, however the scale of the former mine can be considered small in comparison with the current CGO mine operations and therefore considered a low risk of widespread contamination.

ES4 Recommendations

The key contamination related management recommendations for the construction and/or ongoing operation of the Project include:

- development of appropriate Project documentation to manage contamination (including any residual ACM) identified during the construction the Project
- implementation of an unexpected finds procedure along the Project
- incorporate potential impacts outlined in this report in an updated version of the CGO Environmental Management System (EMS).

Abbreviations

Abbreviation	Term
ACM	Asbestos containing materials
ANZG	Australian and New Zealand Governments
ASC NEPM	National Environment Protection (Assessment of Site Contamination) Measure 2013
ASS	Acid sulfate soils
BCP	Bland Creek Palaeochannel
BTEX	Benzene, toluene, ethylbenzene, xylene
CoPC	Contaminants of Potential Concern
CGO	Cowal Gold Operations
CSM	Conceptual Site model
EC	Electrical conductivity
EIS	Environmental impact statement
EMM	EMM Consulting Pty Limited
EPA	NSW Environmental Protection Authority
EPL	Environmental Protection Licence
ESB	Eastern Saline Borefield
DO	Dissolved oxygen
GDE	Groundwater dependant ecosystems
IWL	Integrated waste landform
m	Meters
m2	Square meters
m AHD	metres Australian Height Datum
mg/kg	Milligram per kilogram
ML	Mining lease
NOA	Naturally occurring asbestos
NPI	National Pollutant Inventory
NSW	New South Wales
LPB	Lake protection bund
OCP	Organochlorine pesticides
OPP	Organophosphate pesticides
PAH	Polynuclear aromatic hydrocarbons
PASS	Potential acid sulfate soils

Abbreviation	Term
PFAS	Per- and polyfluoroalkyl substances
PSI	Preliminary Site Investigation
SEARs	Secretary's Environmental Assessment Requirements
SEPP	State Environmental Planning Policy
SWL	Standing water level
TDS	Total dissolved solids
TRH	Total recoverable hydrocarbons
TSF	Tailing storage facilities
UPSS	Underground petroleum storage system
UXO	Unexploded Ordnance
VOCs	Volatile organic compounds
WAD	Weak acid dissociable.
WRE	Waste rock emplacement

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1 Introduction

1.1 Background

Evolution Mining (Cowal) Pty Limited (Evolution) is the owner and operator of the Cowal Gold Operations (CGO), an existing open pit and underground gold mine approximately 38 kilometres (km) north-east of West Wyalong, in the central west region of New South Wales (NSW).

The CGO is located on the traditional lands of the Wiradjuri People and is immediately adjacent to the western foreshore of Lake Cowal, which is an ephemeral waterbody. The existing CGO mine is shown at a regional scale in Figure 1.1 and a local setting in Figure 1.2.

The CGO was first approved in 1999, and open pit mining operations commenced in 2005. Underground mining operations were approved in 2021 and development works to enable underground mining are underway.

This contamination preliminary site investigation (PSI) report forms part of the Open Pit Continuation Project Environmental Impact Statement (EIS). It documents the assessment methods, results and the initiatives built into the Project design to avoid and minimise possible contamination impacts, and the additional mitigation and management measures proposed to address residual impacts which cannot be avoided.

1.2 Project overview

Evolution is seeking approval for further open pit mining operations at the CGO through the Open Pit Continuation Project (the Project).

This will involve further development of the existing E42 pit and the development of open pit mining of three adjacent orebodies, known as 'E46', 'GR' and 'E41'. It is noted that the three adjacent open pits will be within the existing mining lease (ML 1535). No change to the approved ore processing rate of 9.8 Mt per annum is proposed.

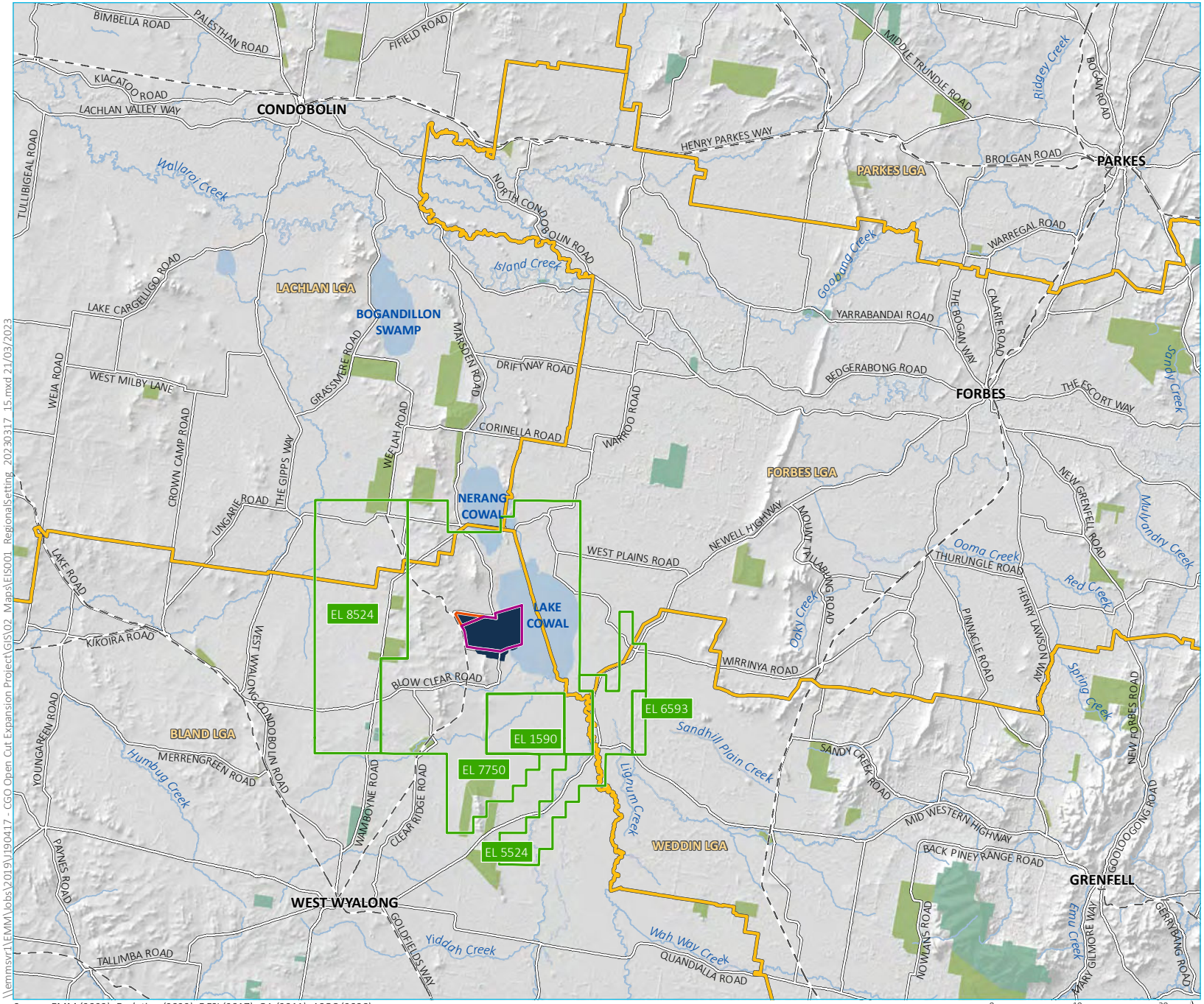
A conceptual Project layout is shown in Figure 1.3. The Project comprises the following key components:

- the continued operation of activities as approved under DA14/98 and SSD 10367
- development of three new open pits (the 'E46', 'GR' and 'E41' pits) to the north and south of the existing open pit, within the current approved mining lease
- extending the existing open pit to the east and south via a 'cutback' within the current approved mine lease
- extending open pit mining operations by approximately 10 years to 2036 and total mine life by approximately 2 years to 2042
- expansion of the integrated waste landform (IWL) to accommodate life of mine tailings
- extension of the lake protection bund (LPB) system to provide continued separation and mutual protection between Lake Cowal and the mine
- backfilling of the proposed E46 pit with waste rock and establishment of a new waste rock emplacement on the backfilled pit to minimise the additional area required for waste rock disposal
- expansion of the footprint of the existing waste rock emplacement (WRE) areas to accommodate additional waste rock
- development of additional topsoil and subsoil stockpiles to accommodate materials from pre-stripping, with materials to be reused during progressive mine rehabilitation

- upgrades to the existing surface water drainage system, to assist with on-site water management and maximise on-site water conservation
- modification of internal site access and haul roads
- development of new water storages and relocation of some components of the surface water drainage system
- construction and operation of a secondary site access off Lake Cowal Road to the north of the existing ML
- modification and relocation of some existing auxiliary mining infrastructure.

Other than the changes to existing approved activities as set out above, all activities that are currently approved under the existing Ministerial development consents are intended to continue. The existing activities approved under the consents are described in Chapter 3 of the EIS.

The Project will not change existing ore processing rates or methods, tailings disposal methods, main site access, water supply sources or hours of operation. The Project will also retain the existing open pit mining workforce.



KEY

- Project area
- Mining lease (ML1535)
- Mining lease (ML1791)
- Exploration licence (EL)
- Rail line
- Main road
- Named watercourse
- Named waterbody
- Local government area
- NPWS reserve
- State forest

Source: EMM (2023); Evolution (2023); DFSI (2017); GA (2011); ASGC (2006)

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Regional setting

Evolution Mining
Cowal Gold Operations
Open Pit Continuation Project
Contamination Preliminary Site Investigation
Figure 1.1

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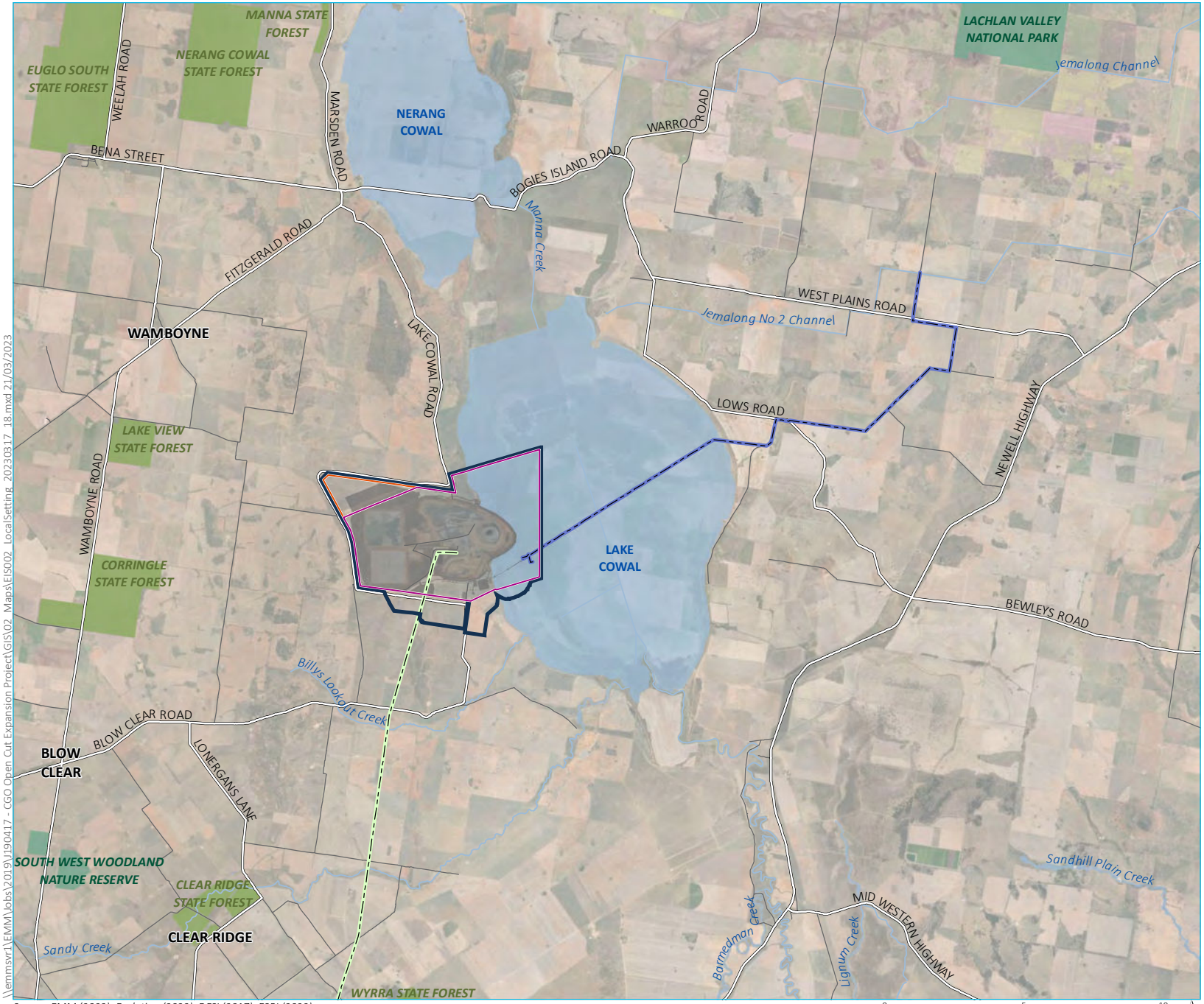

KEY

- Project area
- DA14/98 approved surface disturbance
- Mining lease (ML1535)
- Mining lease (ML1791)
- Water supply pipeline
- Electricity transmission line
- Major road
- Minor road
- Named watercourse
- Named waterbody
- NPWS reserve
- State forest

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Source: EMM (2023); Evolution (2023); DFSI (2017); ESRI (2023)

0 5 10 km

GDA 1994 MGA Zone 55

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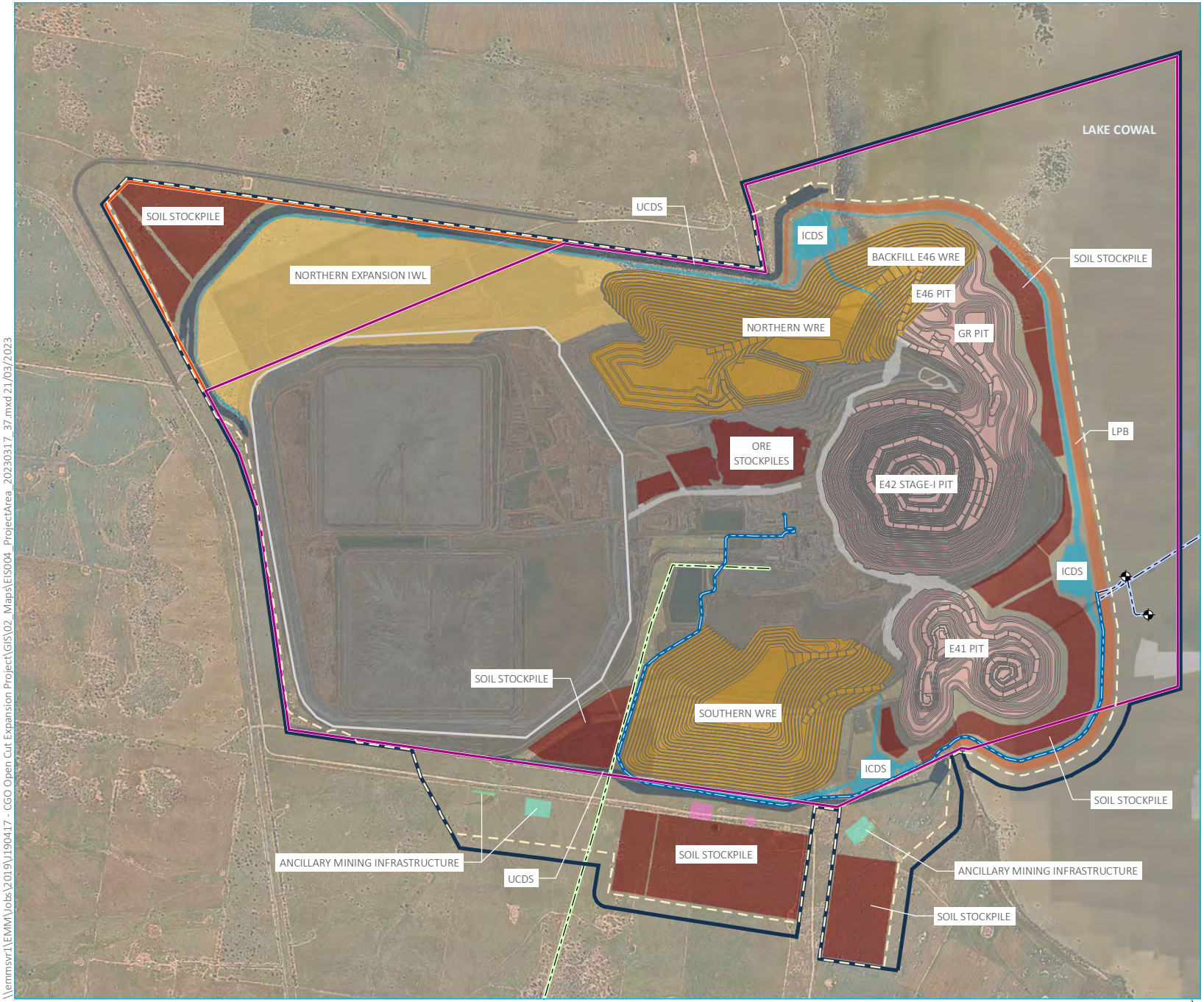
Local setting

Evolution Mining
Cowal Gold Operations
Open Pit Continuation Project
Contamination Preliminary Site Investigation
Figure 1.2

EMM creating opportunities



KEY

- Project area
- Proposed disturbance footprint
- DA14/98 approved surface disturbance
- Approved IWL footprint
- Mining lease (ML1535) (offset for clarity)
- Mining lease (ML1791) (offset for clarity)
- Saline groundwater supply bore
- Water supply pipeline
- Electricity transmission line

Conceptual project infrastructure

- Open cut pit footprint
- Northern expansion IWL
- Waste rock emplacement (WRE)
- Lake protection bund (LPB)
- Stockpile
- Up catchment diversion system (UCDS)
- Internal Catchment Drainage System (ICDS)
- Ancillary mining infrastructure
- Magazine
- Road
- Water supply pipeline realignment

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Source: EMM (2023); Evolution (2023); DFSI (2017); Nearmap (2021)

0 1 2 km

GDA 1994 MGA Zone 55

N

Project overview

Evolution Mining
Cowal Gold Operations
Open Pit Continuation Project
Contamination Preliminary Site Investigation
Figure 1.3

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1.3 Assessment guidelines and requirements

This PSI has been prepared in general accordance with the appropriate guidelines, policies and industry requirements, and following consultation with stakeholders and relevant government agencies. The purpose and key objectives of the PSI are described in Section 1.6.

This assessment has been prepared in accordance with requirements set out in the Secretary's Environmental Assessment Requirements (SEARs) and NSW Environment Protection Authority (EPA) Environmental Assessment Requirements for the Project.

The SEARs identify matters which must be addressed in the EIS and essentially form its terms of reference. The SEARs required that potential land contamination should be considered in agreement with the State Environmental Planning Policy (Resilience and Hazards) 2021 (Chapter 4 – Remediation of Land).

Table 1.1 lists the matters relevant to this assessment made by EPA and where they are addressed in this report.

Table 1.1 Relevant requirements from EPA assessment

Requirement	Chapter/Section addressed
5. Soil Contamination Issues Provide details of site history.	Section 3.2
5. Soils and contamination <u>Describe baseline conditions</u> Provide any details (in addition to those provided in the location description - Section C) that are needed to describe the existing situation in terms of soil types and properties and soil contamination. <u>Assess impacts</u> Identify any likely impacts resulting from the construction or operation of the proposal, including the likelihood of: a) disturbing any existing contaminated soil b) contamination of soil by operation of the activity c) subsidence or instability d) soil erosion e) disturbing acid sulfate or potential acid sulfate soils. Reference should be made to Contaminated Sites – Guidelines for Consultants Reporting on Contaminated Sites (OEH, 2011); Guidelines on the Duty to Report Contamination under the *Contaminated Land Management Act 1997* (EPA, 2015). <u>Describe management and mitigation measures</u> Describe and assess the effectiveness or adequacy of any soil management and mitigation measures during construction and operation of the proposal including: a) not applicable b) proposals for site remediation – see Managing Land Contamination, Planning Guidelines SEPP 55 – Remediation of Land (Department of Urban Affairs and Planning and Environment Protection Authority, 1998)[1] c) proposals for the management of these soils – see Acid Sulfate Soil Manual (Acid Sulfate Soil Advisory Committee 1998) and Acid Sulfate Soils Assessment Guidelines (Acid Sulfate Soil Advisory Committee 1998).	Chapter 3 Chapter 4 b) is addressed in Appendix E.2 of the EIS. c), d) and e) are addressed in Appendix V and Appendix T of the EIS respectively. Chapter 5

[1] Replaced by the State Environmental Planning Policy (Resilience and Hazards) 2021

1.4 Other relevant reports

This PSI has been prepared with reference to other technical reports that were compiled as part of the Open Pit Continuation Project EIS. The other relevant reports considered during the preparation of this PSI are listed below:

- *Cowal Gold Operation Open Pit Continuation Project Soils and Land Impact Assessment* (Minesoils 2023) (SLIA) – appended to the EIS
- *Cowal Gold Operations Open Cut Expansion Project Environmental Geochemistry Assessment* (GEM 2023) – appended to the EIS
- *Cowal Gold Operations Open Pit Continuation Project Groundwater Impact Assessment* (EMM 2022) – appended to the EIS
- *Cowal Gold Operations Open Pit Continuation Environmental Impact Statement Surface Water Assessment* (ATC Williams 2023) – appended to the EIS.

1.5 Project terminology

A summary of the key terminology used throughout this assessment is provided in below. A full list of abbreviated terms is provided in the Abbreviations of this report.

- **The Cowal Gold Operations (CGO)** – comprises the existing open pit mine, underground mine, processing facility, IWL, waste rock emplacement areas, ore stockpiles and ancillary infrastructure.
- **The Project** – Evolution is seeking approval to further open pit mining operations at the CGO through the Open Pit Continuation Project, from hereon in referred to as 'the Project' and as briefly described in Section 1.2.
- **The Project area** – the area at the CGO mine site that is the subject of the development application as shown in Figure 1.3.
- **Existing and approved disturbance area** – areas that are disturbed and/or approved to be disturbed under the current development consents that apply to the CGO.
- **Project disturbance area** – this area is a combination of the additional disturbance area and the existing and approved disturbance area.
- **Study area** – outlines the area that is the subject of the PSI, as shown in Figure 1.4 excluding the existing and approved disturbance area.

1.6 Purpose of this report

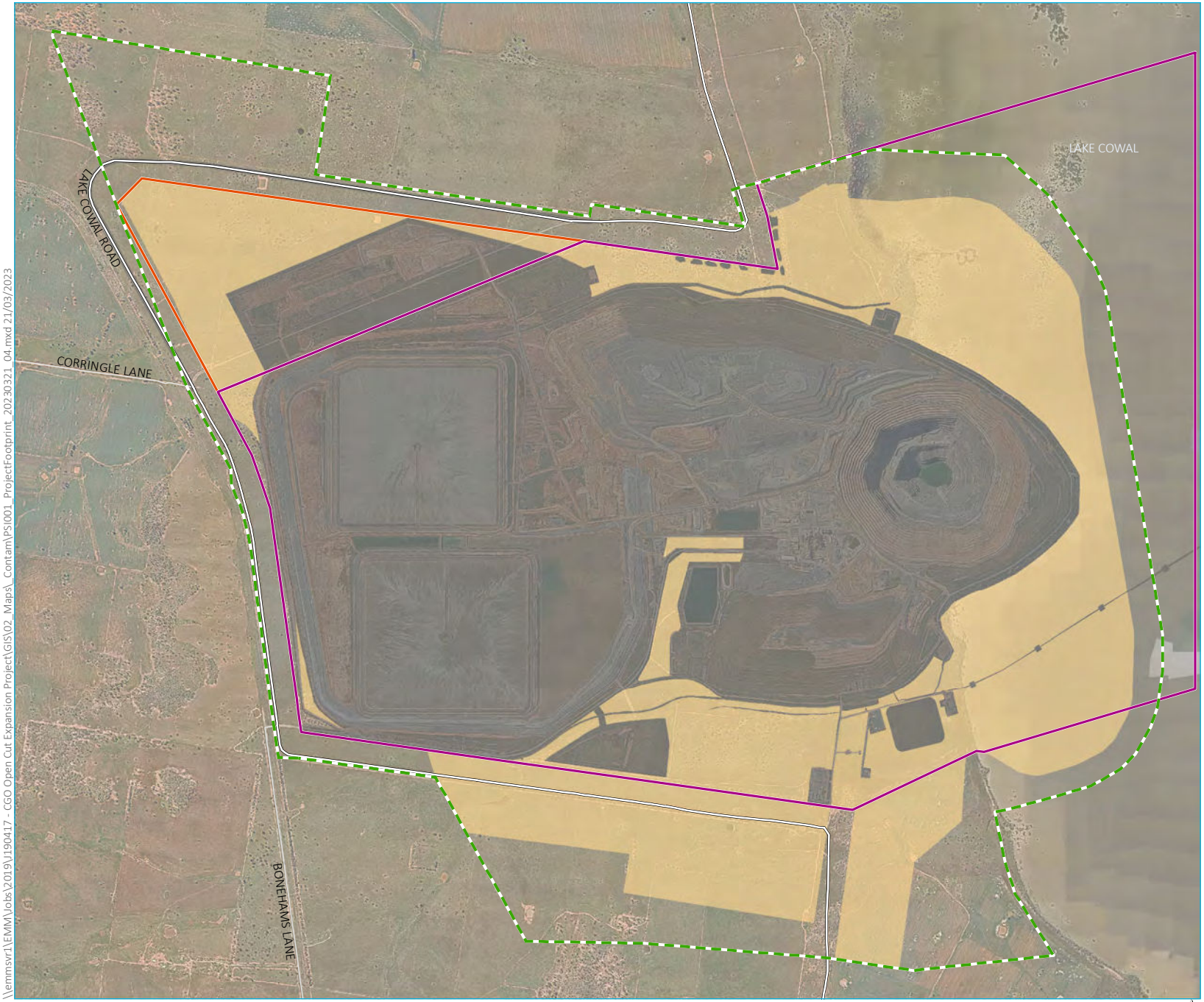
In NSW, the EPA provides a suite of guidelines and a framework for investigating, assessing and reporting on contamination, to ensure consistency in the level of information provided to regulators and other stakeholders (EPA 2020). This framework includes a list of reporting stages and requirements for reporting on contamination associated with project sites.

The PSI is the first level of investigation, assessment and reporting within this framework, which serves to assess whether contamination has the potential to exist, the nature and location of likely contamination sources and receptors, and whether further investigation is warranted. Other reporting stages are outlined in EPA's Consultants reporting on contaminated land: Contaminated Land Guidelines (EPA 2020).

This PSI supports the EIS for the Project. The specific objectives of this assessment are to inform the EIS, address the Secretary's Environment Assessment Requirements (SEARs), EPA Environmental Assessment Requirements by:

- completing desktop PSI works to inform the understanding of contamination conditions within the additional disturbance area
- identifying potential areas and potential contaminants of concern (PCoC) within the additional disturbance area
- assessing the potential for contamination to be present within the additional disturbance area
- providing a preliminary qualitative assessment, and desktop review of available quantitative data, in relation to contamination risk posed during construction and operation of the Project
- assessing where further investigation should be undertaken, or appropriate management procedures should be implemented for the construction and operational phases of the Project
- assessing whether the land may be contaminated and if so, whether remediation may be required, including confirmation that future assessment and/or remediation would be undertaken in accordance with the current guidelines.

This PSI assessment focuses on those areas that have not been yet developed by the CGO, meaning the study area shown in Figure 1.4.



KEY

- EIS study area
- Additional disturbance area
- DA14/98 approved surface disturbance
- Mining lease (ML1535)
- Mining lease (ML1791)
- Major road
- Minor road

INSET KEY

- Major road
- NPWS reserve
- State forest

PSI study area

Evolution Mining
Cowal Gold Operations
Open pit continuation project
Contamination Preliminary Site Investigation
Figure 1.4

Source: EMM (2023); Evolution (2023); DFSI (2017)

0 1 2 km
GDA 1994 MGA Zone 55

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2 Methods

2.1 Statutory context, policy and guidelines

The relevant legislation and policies for contaminated land that have been considered during the preparation of this report include Commonwealth and NSW legislation detailed below.

2.1.1 Commonwealth regulatory and policy framework

The following Commonwealth legislation, policies and guidelines have been considered during the preparation of this report:

- *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act)
- National Environment Protection Council (NEPC) 1999. National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended 2013 (ASC NEPM, 2013)
- *Workplace Health and Safety Act 2011*.

2.1.2 New South Wales regulatory and policy framework

The following NSW legislation, policies and guidelines have been considered during the preparation of this report:

- *Protection of the Environment Operations Act 1997* (NSW) (POEO Act)
- *Contaminated Land Management Act 1997* (NSW) (CLM Act)
- *Environmentally Hazardous Chemicals Act 1985* (NSW) (EHC Act)
- State Environmental Planning Policy (Resilience and Hazards) 2021
- Guidelines on the Duty to Report Contamination under the *Contaminated Land Management Act 1997* (EPA 2015)
- Contaminated Land Management Guidelines for the Site Auditor Scheme (3rd Edition) (EPA 2017)
- Guidelines for the Consultants Reporting on Contaminated Land (EPA 2020)
- Guidelines for the Assessment and Management of Groundwater Contamination (DEC 2007).

2.2 Site Assessment Methodology

The construction and operation of the Project would result in the disturbance and excavation of surface and subsurface soils and rock.

Surface disturbance would occur as a result of the excavation and expansion of the mine pits (E41/GR/E46), expansion of the WRE, IWL and LPB, as well as the construction activities associated with the development of new ancillary surface features, temporary and permanent access roads, transport and storage of excavated soil and rock.

Groundwater will be encountered during operations. Surface water related to the ephemeral Lake Cowal will be impacted as the Project will advance outward with the construction of a new LPB.

The methodologies for evaluating the contamination status of the Project are summarised in the following sections:

- desktop review encompassing:
  - database searches to assess elements of environmental inputs, including historical use, land zoning, known contaminated sites, geology, hydrogeology, soil, topography, and dangerous goods records
  - a review of aerial imagery changes over time
  - a review of other relevant Project design documents made available
- site inspection:
  - physical walk-over of the site
  - photography of the general site setting and features of interest.

To achieve the desired objectives, which are to ensure that risks related to soil, water and groundwater contamination arising from the construction and operation of the Project are avoided or reduced, including disturbance to potential site contamination, the following methodology has been adopted:

- Identification of potential contamination within the study area (and defined buffer areas) by assessing the existing environment through the desktop review and site inspection. Buffer areas refer to the distance between the study area boundary and surrounding area that has been applied to each background search that has been conducted (i.e. applied to database searches for background information).
- Assessment of the location of former mines and other potential contamination sources were undertaken by reviewing background information including records of prior investigations, aerial imagery and undertaking a site inspection.
- Assessment of the potential contamination impacts of the Project during construction and operation.
- Preliminary qualitative risk assessment encompassing potential construction/operational impacts including existing contamination sources.

  Identification and description of mitigation measures to manage potential or known soil and groundwater contamination during construction and operation.

2.3 Information sources

A search of the following databases was undertaken by Land Insight and Resources Ltd as presented in Table 2.1 and Attachment A.

Table 2.1 List of database searches

Information	Sources
Sensitive receptors	© Department of Finance, Services & Innovation Licenced, Google, Nearmap.
Zoning, Planning Controls and Topography	© State of New South Wales, Planning and Environment Information Management Unit licenced under Creative Commons CC-BY (https://creativecommons.org/licenses/by/4.0/deed.en)

Table 2.1 List of database searches

Information	Sources
Soil, Acid Sulfate Soil & Salinity	© State Government of New South Wales and Office of Environment and Heritage (OEH) (Creative Commons Attribution 4.0 https://creativecommons.org/licenses/by/4.0/deed.en) and Commonwealth Scientific and Industrial Research Organisation (CSIRO) Australian Soil Resource Information System (ASRIS). Hydrogeological Landscapes of New South Wales and the Australian Capital Territory, Department of Planning, Industry & Environment & Environmental Planning Instrument, Department of Planning, Industry & Environment.
Geology	NSW Planning & Environment – Resources & Energy: © State of New South Wales through NSW Department of Industry.
Coal Seam Gas Wells	NSW Planning & Environment – Resources & Energy: © State of New South Wales and Office of Environment and Heritage licenced under Creative Commons CC-BY (https://creativecommons.org/licenses/by/4.0/deed.en).
Petroleum Wells and Boreholes	© Commonwealth of Australia (Geoscience Australia) licenced under Creative Commons CC-BY (https://creativecommons.org/licenses/by/4.0/deed.en).
Aquifer Type	National Groundwater Information System © Commonwealth of Australia (Bureau of Meteorology) licenced under Creative Commons CC-BY (https://creativecommons.org/licenses/by/3.0/deed.en).
Drinking Water Catchments	© State of New South Wales, Planning and Environment Information Management Unit licenced under Creative Commons CC-BY (https://creativecommons.org/licenses/by/3.0/deed.en).
Protected Riparian Corridor	© State of New South Wales and Office of Environment and Heritage licenced under Creative Commons CC-BY (https://creativecommons.org/licenses/by/3.0/deed.en).
Underground Petroleum Storage System (UPSS) Environmentally Sensitive Zone	© State of NSW Environment Protection Authority.
Wetlands	State of New South Wales, Planning and Environment Information Management Unit licenced under Creative Commons CC-BY (https://creativecommons.org/licenses/by/3.0/deed.en). © State of New South Wales and Office of Environment and Heritage licenced under Creative Commons CC-BY (https://creativecommons.org/licenses/by/3.0/deed.en). RAMSAR Wetlands © State of New South Wales and Office of Environment and Heritage licenced under Creative Commons CC-BY (https://creativecommons.org/licenses/by/3.0/deed.en).
Groundwater Bores	NSW Department of Primary Industries – Office of Water © State of NSW (DPI Water) licenced under Creative Commons CC-BY (https://creativecommons.org/licenses/by/3.0/au/. © Commonwealth of Australia (Bureau of Meteorology) licenced under Creative Commons CC-BY (https://creativecommons.org/licenses/by/3.0/deed.en).
Groundwater Vulnerability	© State of New South Wales, Planning and Environment Information Management Unit licenced under Creative Commons CC-BY (https://creativecommons.org/licenses/by/3.0/deed.en).
Groundwater Exclusion Zones	© Department of Trade and Investment, Regional Infrastructure and Services – Office of Water (Botany Groundwater Exclusion Zones) and © State of NSW Environment Protection Authority (RAAF Base Williamtown Management Areas).
Hydrogeologic Unit	© Commonwealth of Australia (Bureau of Meteorology) 2018 licenced under Creative Commons CCBY (https://creativecommons.org/licenses/by/3.0/deed.en).

Table 2.1 List of database searches

Information	Sources
Groundwater Dependent Ecosystems (GDE) (National and Regional)	© Commonwealth of Australia (Bureau of Meteorology) 2018 licenced under Creative Commons CC-BY (https://creativecommons.org/licenses/by/3.0/deed.en).
Other Known Borehole Investigations	© Land Insight & Resources.
The NSW Government Perfluoroalkyl and Polyfluoroalkyl Substances (PFAS) Investigation Program	© State of NSW Environment Protection Authority.
Contaminated Land Record of Notices, Sites Notified as Contaminated to the EPA, Former Gasworks and PFAS investigation program	© State of NSW Environment Protection Authority.
Licensing Under the POEO Act 1997	State of New South Wales through the EPA.
National Pollutant Inventory (NPI)	© Commonwealth of Australia licenced under Creative Commons CC-BY (https://creativecommons.org/licenses/by/4.0/deed.en). The data includes facilities from 1998 to 2021.
Waste Management Facilities; Aviation Rescue Fire Fighting Service (ARFF); Liquid Fuel & Aviation Fuel Depots/Terminals; Power Stations; Telephone Exchanges; Wastewater Treatment Facilities	© Commonwealth of Australia (Geoscience Australia) 2017 licenced under Creative Commons CC-BY (https://creativecommons.org/licenses/by/4.0/deed.en).
Unexploded Ordnance (UXO) and Military Facilities	Australian Government – Various sources and Department of Defence © Commonwealth of Australia, 2017-2019. The data supplied is based on Defence's assessment of information obtained from a variety of sources. It does not reflect any UXO remediation conducted on behalf of any person or organisation other than Defence.
Derelict Mines and Quarries	© State of New South Wales through NSW Department of Industry.
State and Local Heritage	© State of New South Wales licenced under Creative Commons CC-BY (https://creativecommons.org/licenses/by/3.0/deed.en).
World Heritage Areas	© Australian Government Australian Government Department of Sustainability, Environment, Water, Population and Communities.
National Heritage Areas	© Australian Government Australian Government Department of Sustainability, Environment, Water, Population and Communities.
Commonwealth Heritage Areas	© Australian Government Australian Government Department of Sustainability, Environment, Water, Population and Communities.
Bushfire Prone Land	NSW Rural Fire Service ©.
NSW National Parks and Wildlife Service (Fire History, Wildfires and Prescribed Burns	© State of New South Wales, National Parks and Wildlife Management Unit licenced under Creative Commons CC-BY (https://creativecommons.org/licenses/by/4.0/deed.en).
Flood Hazard Area	© State of New South Wales, Planning and Environment Information Management Unit licenced under Creative Commons CC-BY (https://creativecommons.org/licenses/by/4.0/deed.en), 2020 and LI Resources proprietary dataset – datasets are digitised from verified local government records/published reports.

Table 2.1 List of database searches

Information	Sources
Legacy Landfills	LI Resources proprietary dataset. Dataset is derived from verified Council Records, Aerial Photography Interpretation, Historic Zoning Maps, Historic Topographic Maps, Historic Parish Maps and Derelict Mines and Quarries Information - © State of New South Wales through NSW Department of Industry.
Naturally Occurring Asbestos	© State of New South Wales and Department of Planning and Environment licenced under Creative Commons CC-BY (https://creativecommons.org/licenses/by/4.0/deed.en).
Historic Aerial Photography	© State of New South Wales, Department of Finance, Services & Innovation licenced under Creative Commons CC-BY (https://creativecommons.org/licenses/by/4.0/deed.en), Google Earth Professional, Nearmap, Jacobs (formerly SKM), AeroMetrex, AAMHatch, Fugro Spatial Solutions, Wheelans Insites, Aerial Acquisitions, Geo-Spectrum (Australia) Pty Ltd.
Historical Commercial & Trade Directory Data – Regional NSW	1971, 1981 & 1991 Telecom Australia Yellow Pages Country NSW Directories – Permission for use Sensis, 2017.

2.4 Conceptual site model and qualitative risk assessment

Potentially contaminated material (i.e. soil, rock, sediment) has the potential to adversely impact human health and ecological receptors if not managed appropriately. A conceptual site model (CSM) is used to present and assess the linkage between potential contamination sources, exposure pathways, and receptors. As detailed in the ASC NEPM (2013), the development of a CSM is a key component of contaminated site assessments and provides the framework for identifying how potential receptors may be exposed to contamination.

A risk is considered to be posed to a receptor when the pathway between the receptor and a contamination source is 'complete' and the contamination is present at concentrations that could have a negative impact on the health of the receptor. Where there is no or insufficient quantitative analytical data to assess whether concentrations of contamination pose a risk, a qualitative risk assessment is used.

To assess the relative risk of existing and potential contamination during Project construction and operation, a qualitative risk assessment was undertaken for the study area (detailed in Section 4.2). The methodology for the risk assessment is detailed in Table 2.2

Table 2.2 Preliminary qualitative risk assessment methodology

Identification of areas and contaminants of concern	
Identified using the methodology outlined in Section 2.2.	
Likelihood of contamination to be present and likely extent of impacts	
Identified by review of information presented in Chapter 3.	
Potential migration pathways	
Construction	**Operation**
• Dust generation. • Excavation and disposal or reuse of spoil. • Surface water erosion. • Management of wastewater. • Storage, use and management of fuels, chemicals etc.	• Dust generation. • Topsoil and subsoil reuse in rehabilitation activities. • Mineralised material stockpiling. • Tailing deposit in two tailing storage facilities (TSFs). • Extraction and disposal or reuse of groundwater from dewatering or drainage. • Migration of groundwater via preferential pathways. • Surface water erosion. • Management of wastewater. • Storage, use and management of fuels, chemicals etc.
Potential receptors	
Construction	**Operation**
• Project construction workers and visitors. • Surrounding land users such as the general public and nearby residents and commercial workers. • Receiving surface water bodies and groundwater. • Ecological receptors.	• Mine workers and visitors. • Surrounding land users such as the general public and nearby residents and commercial workers. • Receiving surface water bodies and groundwater. • Ecological receptors.
Potential exposure pathways	
Construction	**Operation**
• Direct contact, ingestion or inhalation by human receptors and fauna. • Uptake by terrestrial and aquatic flora and intake by aquatic fauna.	• Direct contact, ingestion or inhalation by human receptors and fauna. • Uptake by terrestrial and aquatic flora and intake by aquatic fauna.

To identify the risk rating, the preliminary qualitative contamination risk assessment matrix in Table 2.3 was used. The matrix was used to assign the risk in assuming the absence of appropriate controls and mitigation measures. This site conceptual model and risk assessment is included in Table 4.4.

Table 2.3 Preliminary qualitative risk assessment matrix

Consequence	Likelihood of soil or groundwater contamination to be present				
	Very unlikely to be present at concentrations above the relevant assessment criteria and limited in extent	**Potentially present at concentrations above the relevant assessment criteria and limited in extent**	**Potentially present at concentrations above the relevant assessment criteria and widespread**	**Most likely present at concentrations above the relevant assessment criteria and widespread**	**Known to be present at concentrations above the relevant assessment criteria and widespread**
No or unlikely exposure pathway for human or ecological receptors either now, during construction or operation.*	Low	Low	Low	Medium	Medium
Exposure pathway for human or ecological receptors likely to be present and complete either n now, during construction or operation.*	Low	Medium	Medium	High	High
Exposure pathway for human or ecological receptors present and are complete either now, during construction or operation.*	Medium	Medium	High	High	High

Notes: * without implementation of appropriate controls or remediation as recommended in the management of construction and operational impacts – Chapter 6.

3 Existing environment

3.1 Site identification

A description of the study area is provided in Table 3.1.

The approved disturbance area has been excluded from the study area.

Table 3.1 Study area description

Study area description	The study area is approximately 1,746 ha and occupies areas surrounding the existing CGO site, with the majority of changes occurring at the north, east and south directions of the existing and approved disturbance footprint. In the north direction it will accommodate the northern IWL expansion, northern WRE and stockpiles (topsoil and subsoil). To the east, additional disturbances area will be associated with the expansion of open pit mining areas, LPB expansion and placement of soil stockpiles. To the south, additional disturbance will be associated with the southern WRE expansion, relocation of ancillary mining infrastructure and soil stockpiles. Modification of the Upstream Catchment Diversion System (UCDS) and Internal Catchment Drainage System (ICDS) are also proposed within the study area.	
Study area location	Address: Lake Cowal Road – Lake Cowal – NSW 2671. Located west of Lake Cowal, approximately 38 kilometres (km) north-east of West Wyalong, NSW.	
Study area layout	Refer to Figure 1.2.	
Title identification details (in some instances only the boundary or a part of the lot is covered within the study area)	Lot number 100/DP1059150	Lot number 37/DP 39733
	Lot number 101/DP1059150	Lot number 38/DP39733
	Lot number 102/DP1059150	Lot number 2/DP530299
	Lot number 103/DP1059150	Lot number 2/DP549106
	Lot number 104/DP1059150	Lot number 7/DP753083
	Lot number 105/DP1059150	Lot number 64/DP753083
	Lot number 106/DP1059150	Lot number 7323/DP 1157291
	Lot number 107/DP1059150	Lot number 22/DP753083
	Lot number 1/DP1060709	Lot number 23/DP753097
	Lot number 2/DP1060709	Lot number 24/DP753097
	Lot number 36/DP39733	Lot number 25/DP753097
	Lot number 2/DP 1060907	Lot number 7303/DP 1143731
Study area features	The study area surrounds land already occupied by the existing and approved disturbance area. Present operations are based on ore extraction from one open pit and one underground operation (currently under development), removal and placement of waste rock, ore processing and ancillary activities. Key features are outlined in Section 1.1 and detailed on Figure 1.2.	
Local government area	Bland Shire Council	
Land use and zoning	RU1 Primary Production, except for a linear area of SP2 located immediately west from the study area associated with the disused West Wyalong Burcher Railway.	
Surrounding land use	Mix of agricultural land (mostly grazing) and undeveloped bushland, all zoned primary production. Other features include Lake Cowal.	

3.2 Site history

A review of previous investigations, historical aerial photographs, topographic maps and other readily available information (where relevant) to the study area was undertaken for this report.

As part of the PSI, the CGO provided the documents discussed in Chapter 4 below.

3.2.1 Previous investigations

i Ground Doctor Pty Ltd (Ground Doctor) 2018, Stage 1 Contamination Assessment – Part of Lot 100, Lot 101 and Lot 102 DP 1059150 Lake Cowal NSW

This report was provided as part of the environmental assessment prepared to inform the CGO's MOD 14 processing rate modification.

The assessed area of this report included primarily parts of Lot 102 and smaller parcels of Lot 100 and Lot 101 of DP 1059150 and comprised an area of approximately 5.4 km^2, located north-west of the tailing storage facilities (TSFs).

Part of the area assessed in Ground Doctor (2018) is now within the existing and approved disturbance area and are currently occupied by soil stockpiles. Relevant to the Project, the assessed area encompasses the IWL northern expansion and soil stockpiles.

An inspection was conducted in September 2017, which identified the following land uses and structures:

- the majority of the study area consisted of open grassed spaces, with indications of formal cropping areas and pastoral use (paddock fencing and gates)
- paddock fencing and gates
- cultural features in the vicinity of the former "Thornton" homestead, including: a dwelling, a grain silo, a grain shed, the remains of a blacksmiths forge, the remains of a hay shed, and the remains of a part sealed floor of a former machinery shed
- five farm dams were identified along drainages in various parts of the area
- former gold mining shafts and old equipment isolated by fences.

The surrounding areas were occupied by agricultural properties (grazing and cropping), the CGO mining and the disused West Wyalong – Burcher Railway corridor.

Information obtained from photo aerial images, database research and an interview with former local resident Mal Carnegie (1979 to 2002) indicated that the land use did not change over the evaluated period (1980s–2018).

The following information was provided relating to contamination:

- the former dwelling was made with fibre cement sheeting clad
- chemical treatment of livestock was not undertaken in the area
- common pesticides were used for grain storage in the silo
- historical small-scale gold mining in the northern portion did not involve chemical processing of ore.

The mining area was inspected, finding the entrances to the mine shafts were fenced with a few old mining equipment visible in the vicinity. There were no obvious stockpiles of mining debris in the vicinity of the shafts.

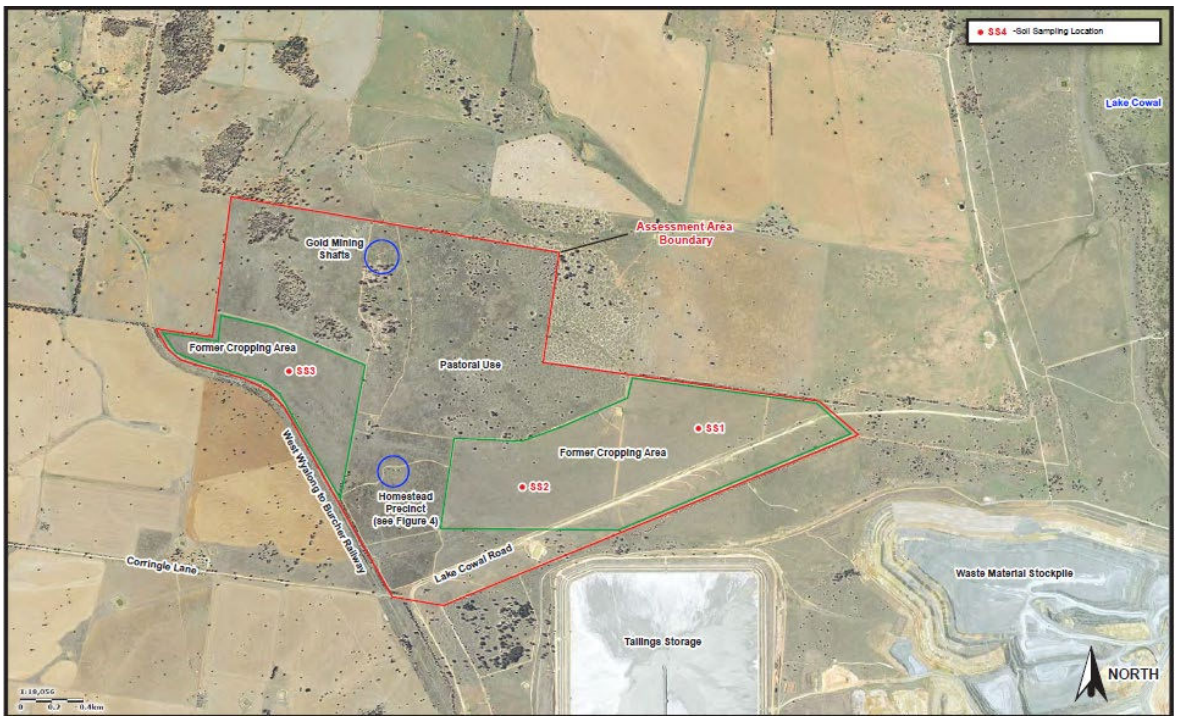
Reviewed data indicated agricultural use of the area since its first permanent settlement, with land titles dating back to the 1880s. Agricultural activities seemed limited to grazing of livestock and annual cereal crops. In 2015 the area was purchased by Evolution, at the same time as the CGO mining area was purchased.

Ground Doctor performed a database search and found that there are no known contaminated sites within a 500 m buffer in the EPA list of contaminated sites notified under Section 60 of the *Contaminated Land Management Act 1997* and other databases maintained by EPA relating to potential contaminated land. A search of the EPA register of licences made under the *Protection of the Environment Operations Act 1997* did not point to the existence of licensed activities within the assessment area. In the 2018 database search, no record was obtained from NSW SafeWork and Section 149 Certificates searches did not indicated record for contamination, management, maintenance and audits.

Five potential areas of environmental concern were defined by Ground Doctor, Table 3.2 presents their summary and Figure 3.1 and Figure 3.2 presents their location along with the main structures observed on the area. Based on the report findings a conceptual model was developed and a preliminary sampling was performed according to the data in Table 3.3.

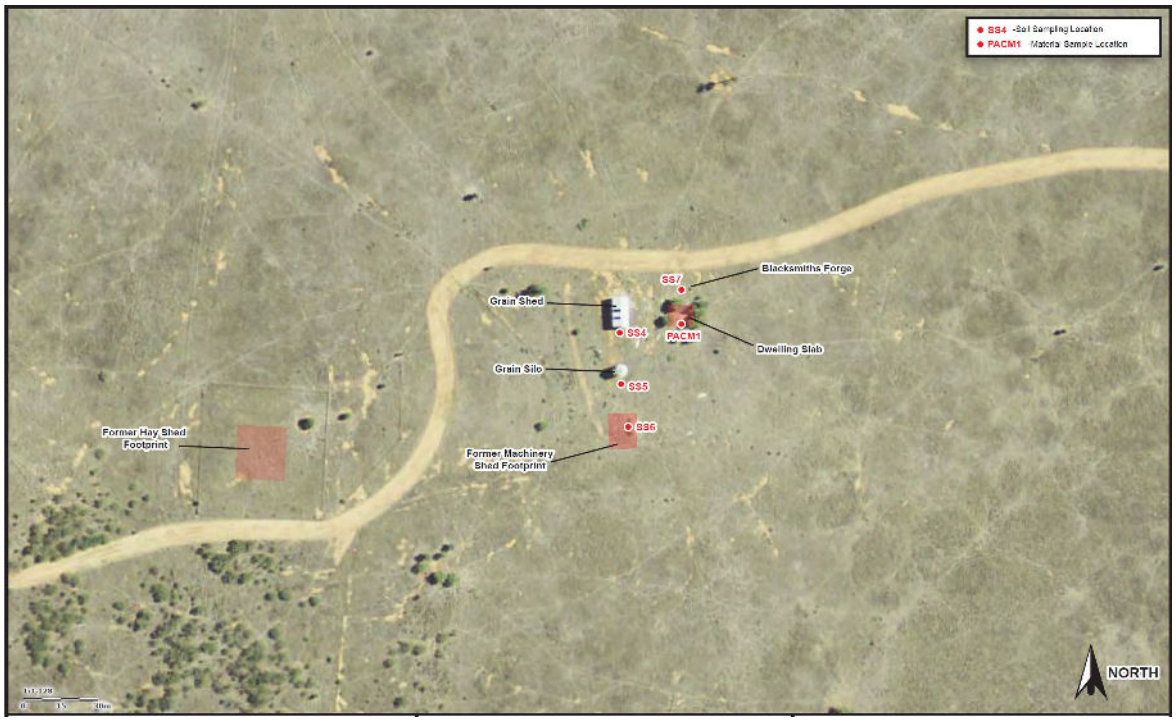
Table 3.2 Potential areas of environmental concern summary

Potential areas of concern	Summary of issue	Potential contaminants of concern/hazards	Level of risk
Asbestos Containing Material	Remains of destroyed by fire dwelling constructed with fibre cement sheeting in mid 1990s. Asbestos was detected in a sample of fibre cement sheeting collected from the ground surface in the footprint of the former dwelling. The result indicates that the fibro cladding on the former dwelling contained asbestos and that other fragments of the fibro material would also contain asbestos. There were many small pieces of broken fibre cement sheeting on the ground surface close to the former dwelling and many were less than 2 centimetres in size. Based on the number and small size of the fragments observed it is possible that friable asbestos exists in near surface soil in the vicinity of the former dwelling (Ground Doctor 2018).	Asbestos	Not specified
Cropping areas	Possible use of pesticides, herbicides and fertilisers within cropping areas.	Organochlorine pesticides (OCPs), Organophosphate pesticides (OPPs), metals	Low (small scale operations)
Grain storage	Indication of pesticide use for grain treatment.	OCPs, OPPs, metals	Low (small scale operations)
Machinery shed	Farm machinery maintenance at the shed, with possible use of petroleum hydrocarbons and potential ground surface impact due to handling and leakage.	Total recoverable hydrocarbons (TRH), benzene, toluene, ethylbenzene, xylene (BTEX), polycyclic aromatic compounds (PAHs), metals	Low (small scale operations)
Blacksmiths Forge	Small blacksmith forge for local farm demand.	TRH, PAHs, metals	Low (small scale operations)



Source: Stage 1 Contamination Assessment – Part of Lot 100, Lot 101 and Lot 102 DP 1059150 Lake Cowal NSW (Ground Doctor 2018)

Figure 3.1 Potential areas of environmental concern (including asbestos containing material) defined by Ground Doctor 2018.



Source: Stage 1 Contamination Assessment – Part of Lot 100, Lot 101 and Lot 102 DP 1059150 Lake Cowal NSW (Ground Doctor 2018)

Figure 3.2 Potential areas of environmental concern detailing structures from the former dwelling

The potential for contamination associated with the presence of the railway corridor and Lake Cowal Road in the surrounding area was considered low with no need for further assessment. Railway impacts would likely be limited to the possible use herbicides along the track, and road construction conducted circa 2004 would most likely made using controlled fill material.

Table 3.3 Conceptual model and preliminary sampling scope (Ground Doctor 2018)

Potential areas of concern	Exposure pathways	Potential risks	Preliminary assessment scope	Analytes
Asbestos Containing Material	Direct contact with soil and inhalation of dust.	**Human health risks** Future commercial/industrial workers. **Environmental risk** Moderately sensitive to future use as agricultural purposes, ancillary mining activities (i.e. soil stockpiling) or as an environmental buffer around the CGO.	Collection of one sample consisting of a piece of fibro collected from the ground surface.	Asbestos
Cropping areas			Collection of three soil samples from the upper 0.2 m.	OCPs, OPPs and heavy metals
Grain storage			Collection of two soil samples from the upper 0.2 m immediately south to the former storage.	OCPs, OPPs and heavy metals
Machinery shed			Collection of one soil sample from the upper 0.2 m of the footprint of the shed.	TRH. BTEX, PAH and heavy metals
Blacksmiths Forge			Collection of one soil sample from the upper 0.2 m immediately adjacent to the former forge.	TRH, PAHs and heavy metals

All the identified potential sources were related to above ground services, therefore, if significant impacts were not observed in near surface soil close to the potential sources, then it was unlikely that significant contamination existed within the assessment area.

The analyte results pointed to the following concentration above the adopted screening threshold:

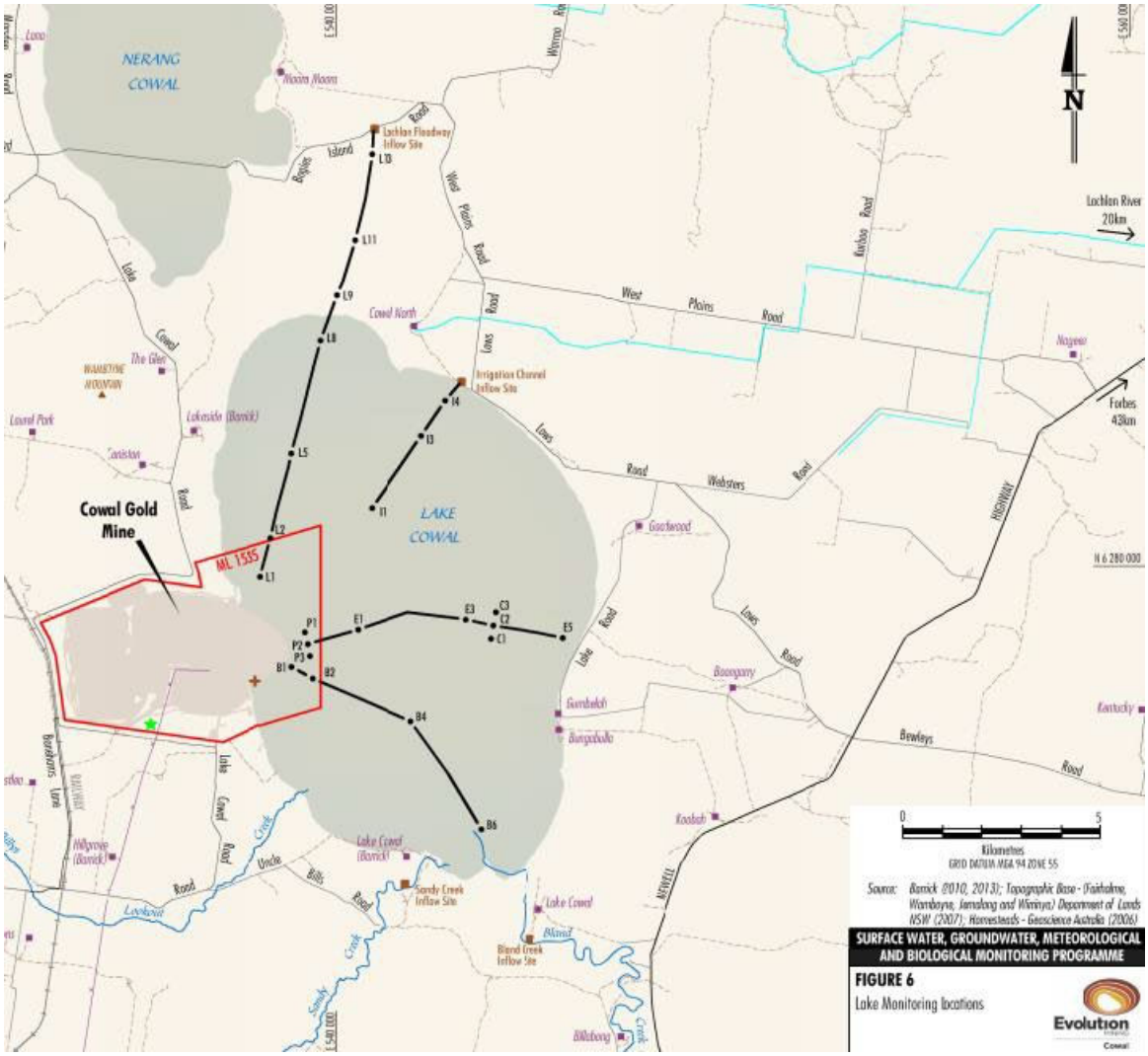
- asbestos was detected from the fibro cladding material, indicating that the surface soil around the former dwelling might contain asbestos
- zinc was observed above the Ecological Investigation Levels (EILs) outlined in the NEPM (2013) of 70 mg/kg but were less than the human health threshold. These concentrations were not considered significant.

Based on the results, despite the presence of fragments of asbestos in part of the assessed area, the report concluded that its presence did not impact the proposed development. Land modifications would not occur near the former dwelling, and human health risk could be managed by material removal or control measures.

ii DM McMahon Pty Ltd (McMahon) 2018, Surface Water and Sediment Sampling and Analysis – Lake Cowal NSW

Lake water and sediments samples from Lake Cowal were collected and analysed in 2018, as part of Evolution's annual surface water monitoring program. The goal was to compare the 2018 results to baseline data from 1991/1992, historical monitoring results from 2010 and 2017 and the Australian & New Zealand Guidelines for Fresh & Marine Water Quality 2018 (ANZG 2018) surface water and sediment default trigger values.

The complete scope of this monitoring involved 36 locations for lake water, inflows (Lachlan Floodway Inflow Site, Irrigation Channel Inflow Site, Bland Creek Inflow Site and Sandy Creek) and sediment sampling that follow four main transects in Lake Cowal. Figure 3.3 presents the sample locations.



Source: Cowal Gold Operation – Surface Water, Groundwater, Meteorological and Biological Monitoring Programme (Evolution, 2018)

Figure 3.3 Lake Cowal water and sediment monitoring locations

Of the 36 samples areas, only 16 were accessible for sampling of lake water and analysis, including alkalinity, suspended solids, acidity, EC, turbidity, dissolved oxygen (DO), cations (total iron, calcium, magnesium, potassium and sodium), anions (chloride and sulphate) and total metals (arsenic, cadmium, molybdenum, nickel, lead, antimony and zinc). During sampling a multi parameter in situ water quality meter measured field data (pH, electrical conductivity [EC], dissolved oxygen [DO], turbidity [NTU] and temperature).

Sixteen (16) samples of sediment were collected and analysed for arsenic, cadmium, lead, antimony, and zinc.

Water results indicated concentrations below or marginally above the ANZG 2018 default trigger values. A comparison with the historical water quality pointed to coherence of results, with heavy metals concentration similar to past readings, and pH and EC within the range of observed values.

Sediments results indicated concentrations above the ANZG 2018 trigger values for antimony and cadmium. Antimony behaviour was similar to historical concentrations; however, cadmium concentrations were higher and should be monitored.

iii DM McMahon Pty Ltd (McMahon) 2021, Surface Water and Sediment Sampling and Analysis – Lake Cowal NSW

Surface water and sediment quality monitoring were also performed in 2021. From the presented data trend series, it was understood that no sampling occurred in 2019 or 2020 while the lake was dry.

The sampling event design was the same as the 2018 event. Lake water and sediments being analysed for the same analyte scope: alkalinity, suspended solids, acidity, EC, turbidity, DO, cations, anions and total metals for surface water; and arsenic, cadmium, lead, antimony, and zinc for sediment.

In 2021, 32 monitoring locations were accessible for sampling across Lake Cowal. Samples were collected along four main transects. All lake transects locations apart from L11, L12 and L13 (low water level) were able to be sampled. Sediment sampling from Sandy Creek, Bland Creek, Lachlan Inflow and Irrigation Inflow also did not occur as they were too shallow for safe collection.

The results pointed to similar levels of the monitored parameters when comparing to past events.

Lake water results indicated concentrations below or marginally above the ANZG 2018 default trigger values. A comparison with the historical water quality pointed to coherence of results, with heavy metals concentration similar to past readings, and pH and EC within the range of observed values.

Sediments results indicated concentrations below the ANZG 2018 trigger values.

iv Tetra Tech Coffey Pty Ltd (Coffey), 2021, Groundwater Monitoring Annual Review 2020 – Cowal Gold Operations

The 2020 groundwater monitoring annual review was performed by Tetra Tech Coffey Pty Ltd (Coffey) for Evolution Mining (Cowal) Pty Limited (Evolution). The scope of this assessment encompassed:

- data review and compilation of groundwater monitoring results since GCO operations began
- data review of previous CGO groundwater monitoring results
- evaluation of observed trend in the groundwater monitoring data, specifically water level and groundwater quality data compared to relevant baseline data, during operations and projected in the EIS
- data review and compilation of pit dewatering extraction volumes, as well as extraction volumes from the Bland Creek Palaeochannel borefield, eastern saline groundwater supply borefield and saline groundwater supply borefield within ML 1535
- groundwater extraction volume from the Bland Creek Palaeochannel supply borefield comparison with the water licence limit
- discussion around groundwater monitoring results, management measures and overall performance of the monitoring program.

The Bland Creek Palaeochannel (BCP) of the Lachlan River catchment is located approximately 12 km north-east of the mine site. The Eastern Saline Borefield (ESB) is located approximately 10 km east of Lake Cowal's eastern shoreline. Lastly, the borefield within ML 1535 is located within the south-east corner of the mine lease, however, since April 2010 no extraction has occurred due to access restrictions.

Evolution's 2020 groundwater monitoring network consisted of 49 active monitoring bores and is presented on Figure 3.4. At the time, most the bores were paired monitoring bores characterised as deep bores (suffix A) or shallow bores (suffix B). In general, the shallow bores are screened within the transported aquifer (alluvial deposits of variable thickness) and the deeper bores were screened within the saprolitic (extremely weathered rock – mudstone, sandstone or diorite) or saprock hydrogeological units (weathered rock – mudstone, sandstone or diorite).

Since 2020, the groundwater monitoring program has been updated and many of these bores have been decommissioned. The updated groundwater monitoring locations are presented in the *Cowal Gold Operations Open Pit Continuation Project Groundwater Impact Assessment* (EMM 2023a), which is appended to the EIS (Appendix H).

The adopted monitoring programme was proposed in the *Cowal Gold Operation – Surface Water, Groundwater, Meteorological and Biological Monitoring Programme* (Evolution, 2018), as presented on Table 3.4.

Table 3.4 Groundwater Monitoring Programme

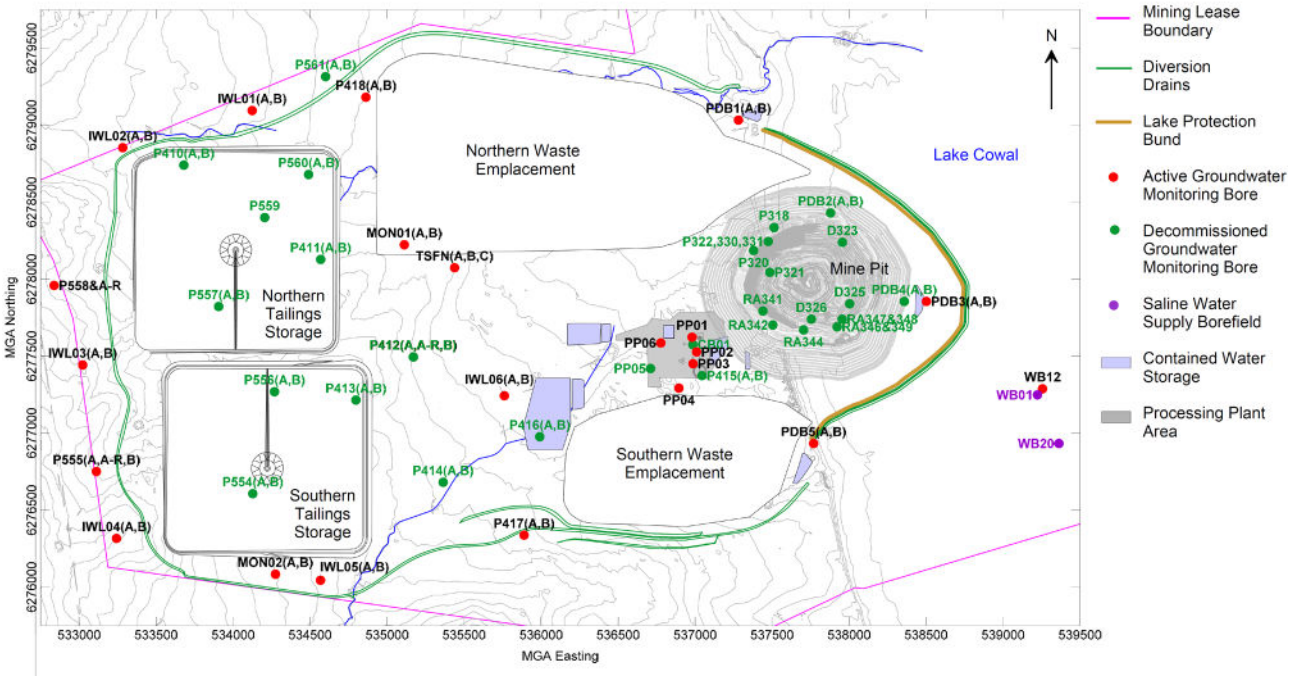
Project Component	Site	Monitoring Frequency	Parameter
Mine licensed area	Open pit area (PDB1A and PDB1B, PBD3A and PDB3B, and PDB5A and PDB5B).	Monthly	SWL[1], EC[2], pH[3].
		Quarterly	Total hardness, alkalinity, TDS[4]. Chloride, sulphate, Ca, Mg, K and Na. Dissolved metals – As, Cd, Cu, Fe, Mn, Mo, Ni, Pb, Sb, Se and Zn.
	Processing plant area (PP01 to PP06).	Monthly	SWL[1], EC[2], pH[3].
		Quarterly	Total hardness, alkalinity, TDS[4]. WAD and total cyanide. Chloride, sulphate, Ca, Mg, K and Na. Dissolved metals – As, Cd, Cu, Fe, Mn, Mo, Ni, Pb, Sb, Se and Zn.
	Northern Tailings Storage Facility Area (P418A and P418B, MON01A and MON01B, TSFNA, TSFNB and TSFNC).	Monthly	SWL[1], EC[2], pH[3].
		Quarterly	Total hardness, alkalinity, TDS[4]. WAD and total cyanide. Chloride, sulphate, Ca, Mg, K and Na. Dissolved metals – As, Cd, Cu, Fe, Mn, Mo, Ni, Pb, Sb, Se and Zn.
	Southern Tailings Storage Facility Area (P412A, P412A-R, P414A and P414B, P417A and P417B, MON02A and MON02B)	Monthly	SWL[1], EC[2], pH[3].
		Quarterly	Total hardness, alkalinity, TDS[4]. WAD and total cyanide. Chloride, sulphate, Ca, Mg, K and Na. Dissolved metals – As, Cd, Cu, Fe, Mn, Mo, Ni, Pb, Sb, Se and Zn.
		Monthly	SWL[1], EC[2], pH[3].

Table 3.4 Groundwater Monitoring Programme

Project Component	Site	Monitoring Frequency	Parameter
	Up-gradient of the northern and southern tailings storage facilities (P558A-R and P555A-R).	Quarterly	Total hardness, alkalinity, TDS[4]. WAD and total cyanide. Chloride, sulphate, Ca, Mg, K and Na. Dissolved metals – As, Cd, Cu, Fe, Mn, Mo, Ni, Pb, Sb, Se and Zn.
	Northern, Southern and Perimeter Waste Rock Emplacement (External toe drain).	Monthly	SWL[1], EC[2], pH[3].
		Quarterly	Total hardness, alkalinity, TDS[4]. Chloride, sulphate, Ca, Mg, K and Na. Dissolved metals – As, Cd, Cu, Fe, Mn, Mo, Ni, Pb, Sb, Se and Zn.
BCPC	BLPR1, BLPR2, BLPR3, BLPR4, BLPR5, BLPR6 and BLPR7.	Monthly	SWL[1], EC[2], pH[3].
		Quarterly	Total hardness, alkalinity, TDS[4]. Chloride, sulphate, Ca, Mg, K and Na. Dissolved metals: Fe and Mn.
	Private registered bores 29094, 57974, 702230, 29574, 31341, 702306, 703460 and 30636.	As provided by private groundwater users	Bore water level.
	DPE Water piezometers 36551, 36552, 36553, 36523, 36524, 36528, 36594, 36595, 36596, 36597, 36609, 36610, 36611, 36613, 36700, and 90093.	Monthly	Bore water level.
Water Supply Pipeline from BCPC Borefield	Above ground sections of the pipeline.	Monthly	Visual inspection.
Saline Groundwater Supply Borefields	WB12 (saline borefield within ML 1535) PZ09, PZ10 and PZ11 (Eastern Saline Borefield)	Monthly.	SWL[1], EC[2], pH[3].
		Quarterly.	Total hardness, alkalinity, TDS[4]. Chloride, sulphate, Ca, Mg, K, Na Dissolved metals: Fe and Mn.
Water Supply Pipelines from Saline Groundwater Supply Borefields	Above ground sections of the pipeline.	Monthly.	Visual Inspection (where available).

Source: Cowal Gold Operation - Surface Water, Groundwater, Meteorological and Biological Monitoring Programme (Evolution, 2018)

Notes: 1. SWL denotes standing water level
2. EC denotes electrical conductivity
3. WAD denotes weak acid dissociable.
4. TDS denotes total dissolved solids



Source: Groundwater Monitoring Annual Review 2020 – Cowal Gold Operations (Coffey, 2020)

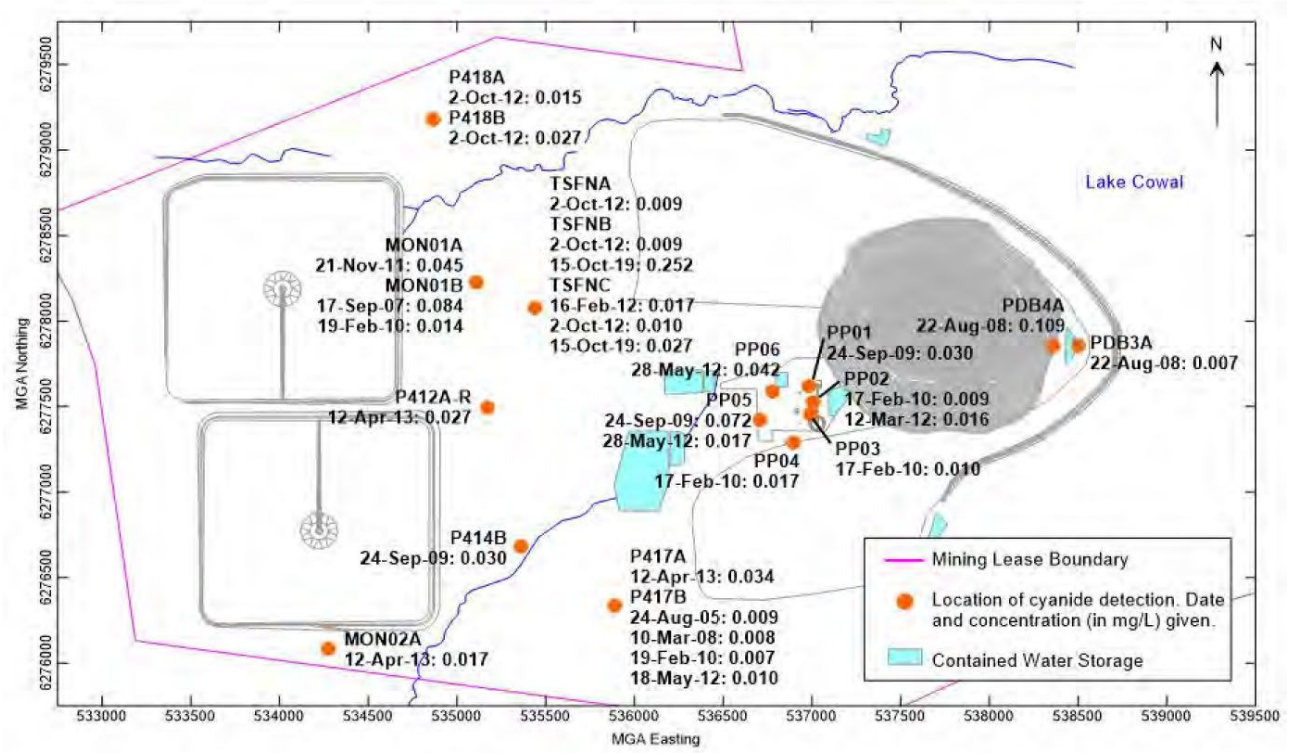
Figure 3.4 Groundwater monitoring wells location (Coffey 2020)

The pit dewatering zone of influence after 15 years of mine operation is small (around 2 km in radius), indicating low lateral permeability.

A localised increase on the water table south of the southern TSF was observed, linked to the water seepage movement from the TSF. To monitor any water quality alteration bore MON02A and MON02B were evaluated indicating a relatively stable trend. Groundwater flow in this region is towards the E42 open pit, consistent with the seepage flow direction predicted in the EIS and previous hydrogeological assessments.

It was concluded that the water management control measures appear to have prevented groundwater contamination.

Cyanide is used in the gold extraction process and can potentially leach into groundwater at the existing IWL. There were no cyanide detections in the groundwater monitoring network from 2013 to 2018. During 2019 total cyanide was detected above the ANZG 2018 default guideline value of 0.007 mg/L at two bores east of the northern TSF. These bores were resampled, and results were below the laboratory detection limit. During the 2020 reporting period there were no cyanide detections in the groundwater monitoring network. Figure 3.5 presents the locations of historical concentrations of total cyanide.



Source: Groundwater Monitoring Annual Review 2020 – Cowal Gold Operations (Coffey, 2020)

Figure 3.5 Recorded total cyanide concentrations at or above the ANZG 2018 default guideline value of 0.007 mg/L.

Limited data is currently available for bore WB12 due to the inundation of Lake Cowal. Monitoring of groundwater levels and quality in the saline borefield will recommence as soon as the lake waters recede.

v Environmental Geochemistry International (EGi), 2021, Groundwater Monitoring Annual Review 2021 – Cowal Gold Operations

This report was conducted by Environmental Geochemistry International (EGi) using data supplied by the CGO.

This assessment concluded:

- The water supply borefields continue to operate within guidelines agreed with DPE Water.
- The drawdown cone from the pit dewatering is the greatest hydrogeological impact of the mine.
- Even after the mine closure, groundwater flow directions at the mine site will still be towards the pit and the greater part of any groundwater contamination, including all the groundwater between the IWL and the pit, will eventually flow towards and into the pit.
- Groundwater levels have increased south of the southern TSF and IWL. Water levels are not expected to reach the surface. Groundwater chemistry continues to remain relatively stable at the representative monitoring bores.
- Physicochemical parameters and major ions have generally remained stable behaviour.
- Variations in metal concentrations, particularly iron and manganese, are assessed to reflect the natural heterogeneity in ground conditions, rather than direct impacts from mining.

- There were no cyanide detections in the groundwater monitoring network from 2013 to 2018 or in 2021. Cyanide concentrations were found to have a possible link to raising TSF walls and subsequent increase in tailings depth.
- The direction of seepage flow towards the open pit is consistent with the seepage flow direction predicted in the EIS and previous hydrogeological assessments.
- Despite the use of potentially hazardous reagents on site, water management and process control measures appear to have prevented significant groundwater contamination.

EGi recommended for the 2021 assessment the continuation of the monitoring program, especially to gain more insight regarding cyanide (total and WAD) concentrations between the IWL and pit.

3.2.2 Historical imagery review

A summary of the aerial photograph review is presented in Table 3.5. Refer to Attachment A for the historical aerials.

Table 3.5 Historical imagery review

Image details	Review of additional disturbance area and surrounds (500 m radius)
1958 aerial imagery, black and white	The additional disturbance area and surrounds are dominated by cropping areas and/or pastoral use including the area currently occupied by the CGO. Several clusters of remnant vegetated land can be seen sparsely through the region. Farm dams can also be identified, some even connected to smalls streams. Lake Cowal forms a visible waterbody to the east. Four settlements were observed, one within the additional disturbance area and three within the 500 m boundary. Inside the additional disturbance area at the south limit a few buildings can be seen near a farm dam. Outside of the additional disturbance area, a few structures could be observed at the centre of the GCO current mine operation, at the south-west limit a possible farm can be seen, which is delineated by a square vegetation setting. Several buildings are visible to the north-west. It may be possible that other settlements existed at this time, however the scale of the image did not provide enough detail for their identification. Lake Cowal road, Bonehams lane and several dirt roads can be identified on the surface.
1967 aerial imagery, black and white	In 1967 land use remained similar to 1958. From this imagery another smaller settlement was identified to the south-east, within the additional disturbance area and near a farm dam. The evaluation of the north portion of the map was limited by the low contrast of the image.
1973 aerial imagery, black and white	Land use appears consistent with past images, nevertheless the resolution of the image was lower, and the settlements details could not be clearly distinguished.
1983 aerial imagery, black and white	Land use continues to be predominately cropping areas and/or pastoral use. All settlements remained except for the smaller building located at the south-east limit of the 1967 image that no longer appears visible. At the north-west boundary another settlement became evident, this location seems to be related to the former “Thornton” homestead mentioned on the 2018 Stage 1 Contaminant Assessment (Ground Doctor 2018). Data from this year is missing for a parcel of the buffer area at the north boundary.
1989 aerial imagery, black and white	In 1989 land use remained similar to that visible in the 1983 image.
1993 aerial imagery, colour	Generally consistent with the previous aerial imagery (1983/89). No significant development has been identified across the additional disturbance area.

Table 3.5 Historical imagery review

Image details	Review of additional disturbance area and surrounds (500 m radius)
1997 aerial imagery, colour	Generally consistent with the previous aerial image (1993). A small structure was also observed near the lake shore, east of the centre dwellings, however, it not possible to identify if this building already existed or nor due to the poor resolution of previous images.
2002 aerial imagery, colour	The image quality is poor within the additional disturbance area and surrounding, but overall appears to be generally consistent with the previous aerial image (1993/1997).
2020 aerial imagery, colour	The 2020 aerial imagery already displays the full development of mining operations of the CGO. The open pit, tailing tanks, soil stocking and other ancillary infrastructure that supports mining operations can be identified. From the former settlements only two can still be observed: one north outside the additional disturbance area but within the 500 m buffer and one in the additional disturbance area at north-west of a soil stockpile area.
1969–1991 topographic map, colour	The map displays Lake Cowal, roads, possible land lot division and other key features prior to the mine operation. The map notes a flat area with no existing cut mines.

3.2.3 Mining activity

The 2018 contamination assessment (Ground Doctor 2018) identified former gold mining shafts and old mining equipment surrounded by fences in the north-west portion of the additional disturbance area. The former mine location is presented on Figure 3.1. The report noted that mine activity at this location did not involve chemical processing of ore.

An updated review of the NSW licenced activities database identified the existence of two former mines north-west of the additional disturbance area known as the Former Wamboyne Mine and Former Wamboyne Gold Mine. These mines appear to be located in an areas similar to the mining infrastructure identified in the 2018 assessment (Ground Doctor 2018).

The main mining activity occurring in the region refers to the CGO itself. No other operational mine is observed within the proximity of the additional disturbance area.

3.2.4 Asbestos containing material

ACM was identified within the remains of the dwelling destroyed by fire at the north-west boundary of the additional disturbance area (Ground Doctor, 2018). Fragments were observed on the ground surface in the vicinity of a former dwelling.

From the historical imagery review, two other settlements were identified within the additional disturbance area: from 1958 to 2002 buildings on the south limit can be seen near a farm dam and from 1967 to 1973 a smaller settlement at south-east also near a farm dam. These structures were not observed on the 2021 aerial imagery, being assumed that there were demobilised. As the data from the demobilisation was not found, there are uncertainties whether ACM could still occur or not on these sites.

No potential NOA was identified in the additional disturbance area or surrounding lands.

3.3 Heritage

A heritage database search (refer to Attachment A, Section 1.3 and map 1.3) indicated that the following locally listed heritage item is present within a 500 m radius of the additional disturbance area:

- Environmental heritage – Cowal West Group comprising homestead, quarters, sheds and stable, listing I11 on Bland Local Environmental Plan 2011, within the area currently occupied by the CGO in Lot 7, DP 753083 within the existing and approved disturbance area.

Notwithstanding the current local heritage listing, it is noted that the homestead and stable components of the Cowal West Group were approved for removal as part of the original Cowal Gold approval. The remaining components (wool shed and shearing quarters) were approved for removal in MOD 6 (known as the E42 Modification) in 2010.

3.4 Geology, soils and topography

The geological map shown in Attachment A (Section 1.5 and map 1.5) indicates that the additional disturbance area features:

- Primarily Quaternary aged mixed colluvial, alluvial and aeolian deposits, comprised of clastic sediments.
- Some areas of Quaternary aged alluvium, consisting of clastic sediment of unconsolidated micaceous silty clay, quartz lithic silt, fine to medium quartz-lithic sand with sporadic lenses of polymictic pebble to cobble gravel and sporadic palaeosol horizons.
- In the north-west and west boundary, Lancefieldian to Darriwilian aged sandstone from the Girilambone Group (deformed and metamorphosed, micaceous, quartzose and quartz-lithic sandstone, metamudstone chert with minor intercalation of polymictic conglomerate, siltstone, quartzite and mafic and intermediate volcanic rocks) and Quaternary to Pleistocene aged colluvium (undifferentiated colluvial and residual deposits) occur.
- Locally to the south and centre of the Project area Ludlow to Lochkovian aged conglomerate of the Ootha Group can be distinguished, with very thick bedded polymict pebble-boulder conglomerate fining to pebble lithic sandstone and laminated sandstone/siltstone.
- Lake Cowal's geology is Quaternary aged clay and lacustrine deposits, consisted of friable to plastic, finely laminated clay, silty clay, humic clay, grey paleosols that locally includes medium to fine sands.

Elevation across the Project area ranges between 220 and 240 m Australian Height Datum (AHD).

The soil landscape shown in Attachment A (Section 1.4, map 1.4a) indicated the Project area is mainly composed by alluvial plain soils from the Wah Way landscape, with Self-mulching and Epipedal Black Vertosols (upper plain areas), Epipedal Grey and Brown Vertosols (mid to upper plain areas) and Self-mulching Brown Vertosols (lower plain areas). The cited vertosols are mainly clays with high plasticity, high shrinking-swell potential, generally low permeability, salinity hazard and localised sodicity, high alkalinity and high fertility.

Gilgai soil have also a high occurrence within the Project area, composed by moderate deep (more than 100 cm) well-drained prairie soils and chocolate soil/prairie soil integrates on depositional areas. Lake Cowal's landscape is composed by swamp Yellow Solodic, Yellow Soloths, Red Podlzolic, Non-calcic Brown soils and Siliceous Sands.

Alluvial soil from the Barmedman Creek (well-drained stratified alluvial soils and gravels) and colluvial soils from the Manna Mountain (slowly drained Bleached-Mottled Kurosols and Sodosols in drainage lines) can also be observed on the centre-south portions. To the south transferral Boxalls soils can distinguished, with Yellow Soloths occurring in lower slopes and in drainage systems.

Stagnant alluvial soils can be seen on the north-west portion with Grey and Brown Kurosols and Kandosols (Gleyed and Yellow Podzolic soils) on hillslope and crest or Chernic Tenosols (siliceous sands) on areas of gravel. Erosional soils from the Reefton landscape can also be identified at north-west and locally at the centre of the Project area, this landscape is characterized by well drained Yellow and Red Podzolic soils and Yellow Earths on summit surfaces or slopes. Erosional soil form the Weelah landscape formed by very poorly drained estuarine sands over clayey sand occur at the west boundary.

No Acid sulfate soils (ASS) or dryland salinity were identified within the additional disturbance area from the database search and mapping as described in Section 2.3. There is a provisional classification of high probability of occurrence of potential ASS within Lake Cowal's area and a low to extremely low probability of occurrence of potential ASS on the land adjacent to the lake (Attachment A, Section 1.4, map 1.4b) all related to inland lakes, waterways, wetlands and riparian zones. However the Soil and Land Impact Assessment Report prepared for the Project (Minesoils 2023, refer to Appendix T of the EIS), did not identify any ASS indicators such as soil gleying, odour or organic materials recorded as part of the soils survey and laboratory results for this assessment displayed consistently alkaline soils throughout the study area.

3.5 Hydrology, hydrogeology and groundwater bore search

The CGO is located within the Bland Creek catchment which falls steadily from west to east and drains into Lake Cowal, an ephemeral freshwater lake. The CGO is located on the western edge of Lake Cowal, which is located in the alluvial fan of the Lachlan River known as the Jemalong Plains, part of the Riverina landform.

Lake Cowal is the largest inland lake in NSW. When full, Lake Cowal covers an area of approximately 16,150 ha with an additional 4,355 ha when the adjacent Nerang Cowal also floods, and a total wetland area of approximately 20,500 ha (DAWE, 2019). Nerang Cowal, which lies immediately to the north, fills less frequently from overflow of Lake Cowal.

Lake Cowal is filled predominantly by Bland Creek from the south; however, it is also fed by the Lachlan River during major flood events. Historically, Lake Cowal contains at least some water around 50% of the time; however, prolonged dry periods of up to 30 years have occurred since the early 20th century. In more recent years, Lake Cowal has experienced a prolonged dry period. The lake was completely dry from 2001 to 2010, and again in December 2014. Lake Cowal partially filled in July to December 2015, until rainfall across the region in June, July and September 2016 saw its capacity reach and exceed 100% later in 2016. Rainfall in December of 2017 saw the lake retain water into 2018; however, with limited rainfall across 2018 and 2019 the lake was dry in 2019 as the region experienced drought. More recently, rain events in October 2020 through to March 2021 and during late 2021 and into 2022 saw the lake inundated with water.

The hydrogeological units intersecting the Project area inland are Surficial Sediment (unconsolidated porous media) and Palaeozoic and Pre-Cambrian Fractured rock (low permeability), composed of extensive aquifers of low to moderate productivity. For Lake Cowal the aquifer is porous with extensive highly productivity. There are over 120 registered groundwater bores within 2 km of the Project area, mostly within the centre portion, with the following characteristics:

- the authorised purposes of the groundwater bores are predominately for monitoring purposes, with other uses being mining activities, drainage of groundwater or unknown
- all groundwater bores were constructed from 1994 to 2009, most likely related to the Cowal Gold mine development and operations
- the final installed depth of the groundwater bores ranged from 9 to 120.5 m, majorly with depth above 20 m
- the standing water level within the groundwater bores ranged from 0.11 to 21.81 m.

Available information on these monitoring wells is provided in Attachment A (Section 2.1, map 2.1).

Over 70 test pits and 47 boreholes related to Cowal Gold project were also identified in the Project area.

Areas of high, moderate and low potential groundwater dependant ecosystems (GDE) were identified within a 500 m radius of the additional disturbance area (Attachment A, Section 2.2, map 2.2) These include Lake Cowal related ecosystems from the national assessment, and ecosystems that rely on subsurface presence of groundwater from regional studies.

Lake Cowal and lakeshore region are also classified as groundwater vulnerable areas; however, no groundwater exclusion zone was identified.

3.6 Ecology and natural hazards

The study area and surrounds are dominated by cropping areas and/or pastoral use. Lake Cowal is listed as a Nationally Important Wetland (DECCEW 2022).

No protected riparian corridor was identified within a 500 m radius of the additional disturbance area.

The study area and surrounds within a 500 m radius are classified as minor to moderate for soil erosion hazards. There are no areas mapped as flood prone or bush fire prone hazards.

3.7 Climate

Based on the information available from the nearest Bureau of Meteorology data source (Wyalong Post Office – 073054 located approximately 35 km south-west of the Project area), the region experiences warm to hot summers and cold winters with an average maximum temperature in the summer (January) of 32.9°C and an average minimum temperature in winter (July) of 3.0°C. The region experiences an annual average rainfall of 481.5 mm. October experiences the highest median rainfall of 44.6 mm whereas April experiences the lowest with 34.9 mm.

3.8 EPA records and other potential regulatory contamination issues

There were no identified records within a minimum 1000 m radius of the study area for the following searches undertaken (refer to Attachment A, Section 3.1, map 3.1):

- contaminated land record of notices issued under the CLM Act
- contaminated sites notified to the EPA
- per- and poly-fluoroalkyl substances (PFAS) site investigations
- naturally occurring asbestos potential (NOA)
- military facilities
- former gasworks
- fuel depots/terminals and service stations
- aviation fire fighting facilities
- dry cleaners
- landfills/waste management facilities

- power stations
- telephone exchanges.

Additionally, there were no records for Underground Storage Tanks (UST) within the study area.

3.8.1 Mining activities

The mining activities at the CGO are authorised under two mining leases, which are ML 1535 and ML 1791. ML 1535 is bordered by Evolution's Exploration Licence (EL) 7750. Other ELs held by Evolution in the local area include EL 1590, EL 8524, EL 5524, EL 8781 and EL 6593. Mining tenements are shown in Figure 3.1 of the EIS.

The only active mining operation for the study area is the CGO, which as previously presented encompasses gold mining and processing.

The CGO is listed on the 2020/2021 National Pollutant Inventory (NPI) report, with primary AZSIC class related to gold mining and processing.

The CGO (formerly owned by Barrick Gold) is also listed as a potentially contaminating activity in the extractive industries (mineral and mining) category.

The CGO operations are approved until the end of 2040. The main processes and structures of the CGO mine are listed below:

- Open pit mining:
  - Conventional open pit mining methods are used to break, excavate and haul waste rock and ore. The open pit has been developed in stages by progressively widening and deepening the open pit.
- Underground mining:
  - Underground mining is currently in the development stage with extraction expected to commence in 2023.
- Ore processing:
  - Ore from the open-pit operations is trucked directly from the pit to either the primary crusher, ROM pads or low-grade ore (primarily the oxide or weathered ore) stockpile before it is processed at the processing facility. Waste rock is transported by truck directly to the waste rock emplacements.
  - Gold extraction is undertaken using a conventional carbon-in-leach (CIL) cyanide leaching circuit in the ore processing facility. This process consists of crushing and grinding the ore, follow up with cyanidation and gold recovery. The facility has an operating capacity of approximately 890 tonnes per hour (tph) of oxide ore and 950 tph of primary ore. Sodium cyanide and other reagents used during the gold recovery process are stored and mixed in a dedicated storage facility and mixing tank. Other reagents include hydrated lime for pH control and activated carbon for gold capture. Use of the cyanide leaching circuit is carried out in accordance with the approved cyanide management plan for the CGO.
  - The gold product is recovered and poured as gold bars or doré (semi-pure alloy of gold and silver) and transported from the site to a refinery for further purification before being sold on the open market as gold bullion.

- Integrated waste landform and tailings management:
    - The IWL is designed to facilitate life-of-mine tailings storage. The IWL combines the current Northern TSF, the Southern TSF with the northern waste rock emplacement. A key design objective of the IWL is to provide optimum return of water from the facility for re-use in ore processing.
    - Tailings are delivered from the processing facility via a pipeline to the Integrated Waste Landform, which contains two tailings storage facilities (Northern TSF and Southern TSF). A number of seepage control measures have been incorporated into the TSFs, which are progressively implemented and informed by investigations such as geophysical testwork, piezometer installation and monitoring and geotechnical drilling.
- Soil stockpiles:
    - There are around 20 areas where soil and clay are temporarily stockpiled for future rehabilitation at the site.

i Historical mining and exploration titles/applications

Table 3.6 Historical mining and exploration titles/applications

Site name	Description	Distance (m)	Direction
Former Wamboyne Gold Mine	Thin auriferous quartz veins in sediments. Vein varies from 0.15 to 0.6 m in width and consists of a series of quartz stringers. Vein is parallel to cleavage. Approximate location.	0	Onsite
Former Wamboyne Mine	Numerous quartz stringers in wall. Vein parallel cleavage in host rock. Approximate location.	0	Onsite

In the north-west of the study area, the Former Wamboyne Mine and Former Wamboyne Gold Mine are present. Considering the similarity of names, location and descriptions it may be inferred that they were the same enterprise. From the previous information, it can also be estimated that the Former Wamboyne Gold Mine is the same mentioned on the *Stage 1 Contamination Assessment – Part of Lot 100, Lot 101 and Lot 102 DP 1059150 Lake Cowal NSW* report (Ground Doctor 2018) - small-scale gold mining in the northern portion that did not involve chemical processing of ore.

Through a review of past information regarding the Wamboyne Gold Mine, a previous EIS report for Lake Cowal region portrayed the Wamboyne Gold Mine as a mine operation around Trig Hill, Kaiser's Hill and Wamboyne Hill from early 1900s. It was first worked in 1907, with average grades of 3 grams/ton of gold were found but total production is unknown (NSR Environmental Consultants, 1995).

3.8.2 Licenced activities under the POEO Act 1997

The CGO operated under Environment Protection Licence (EPL) 11912 for all operations. The activities covered by EPL 11912 are detailed in Table 3.7.

Delicensed activities still regulated by the EPA in the vicinity of the Study Area include logging operations held under Licence no 13419 by Forestry Corporation of NSW on the Integrated Forestry Operations Approval (IFOA) South-Western Cypress Region that area no longer in force.

Table 3.7 Licenced activities under the POEO Act 1997

Licence number	Licence holder	Location name	Premise Address	Fee basis activity	Status	Distance (m)	Direction
11912	Evolution Mining (Cowal) Pty Limited	Cowal Gold Project, 38 km North East of West Wyalong	Lake Cowal Road, West Wyalong NSW	Land based extractive activity. Mining for minerals. Mineral processing. Concrete works. Crushing, grinding or separating.	Active	**Onsite**	N/A
13419	Forestry Corporation of New South Wales	IFOA Area "South-Western Cypress Region"	State forest and other Crown timber lands within the South-Western area.	Logging operations.	No longer in force	Nearest state forests are Corringle and Lake View State forests	~5 km west

3.9 SafeWork NSW

A site search for dangerous goods records on premises was carried out through SafeWork NSW.

The search identified hazardous chemicals stored in lots related to the study area. All chemicals were related to the current CGO operations, presented in Table 3.8. There are no dangerous goods records within the additional disturbance area.

Table 3.8 SafeWork NSW - Dangerous goods records

Depot number	Storage type	Capacity	Contents
1	Above ground tank	450,000 litres	Diesel fuel
2 and 3	Above ground tank	26,000 litres each	Hydrogen Peroxide
4	Above ground tank	102,000 litres	Sulfuric acid
5	Above ground tank	36,000 litres	Hydrochioric acid
6 and 7	Above ground tank	168,000 litres each	Sodium Cyanide
8	Above ground tank	33,000 litres	Sodium Hydroxide
9	Above ground tank	62,000 litres	Liquid petroleun gas
10 and 11	Roofed store	22,000 kg each	Sodium Cyanide
12	Roofed store	40,000 kg	Xanthate
13	Roofed store	10,000 litres	Flammable liquid NOS
14	Roofed store	20,025 litres	Corrosive liquid NOS

Table 3.8 SafeWork NSW - Dangerous goods records

Depot number	Storage type	Capacity	Contents
15	Roofed store	2,000 kg	Potasium nitrate
16	Above ground tank	45,000 litres	Oxygen refrigerated liquid
17	Above ground tank	5,800 litres	Xanthate solution
18	Above ground tank	11,000 litres	Xanthate solution
19	Above ground tank	45,000 litres	Oxygen refrigerated liquid
20	Roofed store	90,000 kg	Sodium Cyanide
21	Roofed store	110,000 kg	Sodium Cyanide

3.10 Site inspection

Site inspections were undertaken by EMM between 11–18 August 2022 to evaluate the site condition. These inspections were performed along with the site heritage surveys. Field photos from 2020 taken during the Underground EIS surveys (EMM 2020) were also used for this assessment. The key outcomes of the site inspections are summarised below. A photographic log is provided in Attachment B.

The study area soil use is generally cropping and/or pastoral with the most notable features related to the existing CGO operations. The area is scattered with farm dams, generally with low vegetation and a few clusters of more developed vegetation.

The inspections confirmed that the structures once existent in the south portion of the study area within the additional disturbance area have been demolished, and no sign of residual construction debris was observed.

4 Preliminary conceptual site model

4.1 Potential impacts

4.1.1 Existing sources

There are potential contamination impacts from existing sources from the CGO mining operations, as well as potential contamination impact identified in previous studies (refer to Figure 3.1 and Figure 3.2). These are described in Table 4.1 below.

Table 4.1 Potential existing source areas and Contaminant of Potential Concern (CoPC)

Source type and CoPC	Identified source area
Demolished buildings – asbestos	ACM was found in the remains of the dwelling destroyed by fire in mid 1990s at the north-west boundary of the additional disturbance area (Ground Doctor 2018). ACM fragments were observed on the ground surface in the vicinity of a former dwelling. From the historical imagery review other dwellings were identified around 1990 and could have been constructed using ACM.
Historical application of herbicides and pesticides on agricultural land – OCP/OPP	Land used for agricultural and/or pastoral purposes, which comprise most of the additional disturbance area.
Current mining exploration - acid mine drainage – heavy metals, cyanide and petroleum hydrocarbons	The CGO mining services conduct activities around the additional disturbance area, that could potentially result in: • Possible leaks and spills of hydrocarbons from machinery storage and equipment use. • Possible leaks and spills of raw materials/chemicals used at the CGO. • Possible leaks and spills of tailing tanks containing heavy metals and cyanide. • Minor heavy metal leaching from stockpiles. Waste rock has been classified as either oxide waste rock which is non-acid forming (NAF) and saline or primary waste rock which is also NAF and non-saline. Therefore, no management measures for acid mine drainage are required at the waste rock emplacement sites.
Historical mineral exploration	Two former mining sites were recorded in the additional disturbance area. Historical data indicated that they did not process ore on site.

The CGO operations are managed under an Environmental Management System (EMS) which incorporates 22 management plans to facilitate compliance with environmental standards and legislative requirements. The EMS forms a framework for managing all environmental and community aspects, impacts and performance of the mining operations.

There is a well-established and sophisticated surface water management system at the CGO, which amongst other goals, aims contain potentially polluted water within the site.

The water management plan for the CGO establishes a surface water, groundwater, meteorological and biological monitoring programme, which contributes to the assessment of the effectiveness of environmental impact mitigation measures, as presented on the monitoring reports from Section 3.2.1.

A hazardous materials management plan for the CGO addresses the potential impacts from dangerous goods, hazardous waste or chemicals during transport, storage, use and disposal.

Site-generated hydrocarbon impacted material (general solid [putrescible] waste) is treated in the on-site Bioremediation Facility, prior to being disposed of in the waste rock emplacements.

4.1.2 Impacts to the environment from the Project

For the purposes of this contamination assessment, operational impacts relate to the potential for contamination of soil, surface water and groundwater from maintenance incidents, leaks or spills, as well as possible leaching from waste rock or soil disturbed by the Project.

The impacts of the new or expanded mine pits (E41/E42/GR/E46), expanded WREs and IWL operations will be similar to the impacts of the operation of the current layout of the CGO mine operations.

Potential environmental impacts involve the possible leakage and spill of hydrocarbon from machinery, and equipment and leaching of heavy metals from stockpiles of waste rock. Potential geochemical risks from Project waste rock, ore and tailings are considered in the Geochemistry Assessment (GEM 2023, refer to Appendix E.2 of the EIS) and the Surface Water Assessment (ATC Williams 2023, refer to Appendix G of the EIS).

Surface disturbance would occur as a result of the expansion of the LPB, realignment of the UCDS and excavation and expansion of the mine pits (E41/E42/GR/E46), development of the new WREs and northern IWL expansion, as well as activities associated with the development of new ancillary surface features, temporary and permanent access roads, transport and storage of excavated soil and rock. Activities, which require consideration of potential contamination are primarily related to excavation works, and may include the following:

- stripping of soil resources for future rehabilitation
- temporary and permanent stockpiling of soil and waste rock on land
- cut and fill and embankment construction for the IWL northern expansion
- laydown and storage of materials (including dangerous goods)
- excavating, filling and rehabilitation of disturbed areas to the final approved landform.

The Project has the potential to disturb existing contamination (where present) through the exposure pathways and receptors enabled by various activities; in particular, the potential disturbance of possible asbestos-containing surface soils.

There is potential for exposure of human and ecological receptors to contamination arising from the inadequate management of waste or potential contaminants. Typical examples would include spills of hydrocarbons while refuelling or lubricants used by machinery, and generation of construction waste. However, these impacts can be managed with the implementation of suitable management measures.

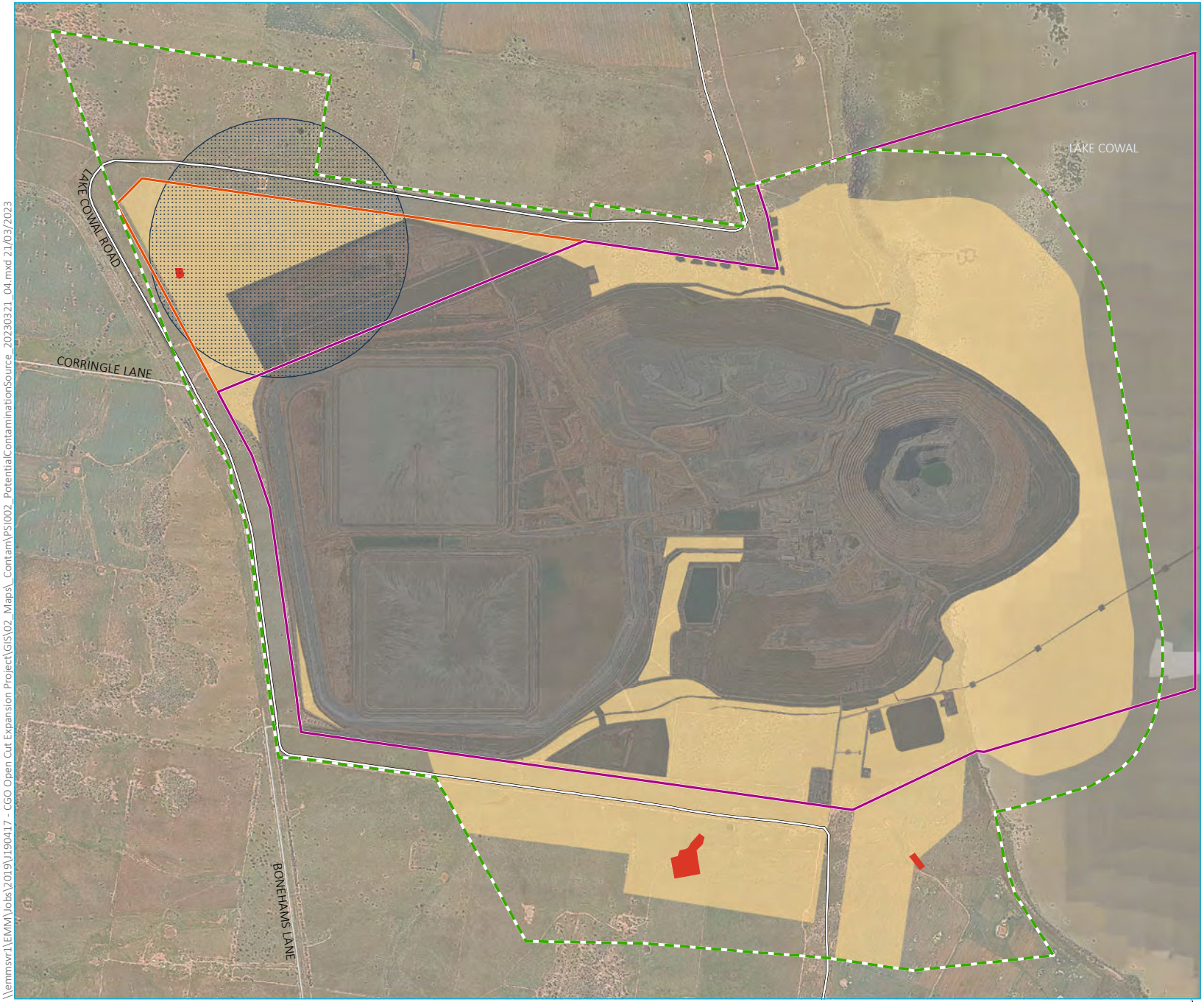
The Project will continue to be managed through the EMS which will be revised as necessary in order to address and mitigate the mentioned potential impacts.

4.2 Sources and preliminary risk assessment

Several sources of potential contamination have been identified (refer to Section 4.1). A tier 1 preliminary risk assessment of these sources is presented in Table 4.2 below. The risk assessment framework is outlined in Section 2.4.

Table 4.2 Potential sources – tier 1 preliminary risk assessment

Source type and CoPC	Identified source area	Tier 1 preliminary risk assessment
Demolished buildings – asbestos	• ACM were found in the remains of the dwelling destroyed by fire in mid 1990s at the north-west boundary of the additional disturbance area (Ground Doctor 2018). Fragments were observed on the ground surface in the vicinity of a former dwelling. • From the historical imagery review other dwellings were identified around the 1990 and could have been constructed with ACMs.	• Low to medium. • Intensive human development and land uses have not occurred across the site except for the CGO operations, so widespread or significant contamination resulting from demolition waste is considered unlikely to be present at concentrations above the relevant assessment criteria. • Historical sampling already confirmed the local presence of ACM on the remains of one of the historical dwellings present on the additional disturbance area.
Historical application of herbicides and pesticides on agricultural land – OCP/OPP	• All land areas used for agricultural and/or pastoral purposes, which comprise most of the site.	• Low. • The agricultural activities observed in general across the site and surrounds appeared non-intensive and thus frequent and widespread application of pesticides and/or herbicides across a large area is considered unlikely.
Historical mining	• Two historical mining sites exist (Section 3.8.1i). There is potential for elevated concentrations of metals associated with the orebody, however, as any ore extracted was not processed on site, these risks are diminished.	• Low. • Historical data indicate that ore was not processed on site. • The scale of the former mines can be considered small in comparison with the current CGO mine operations.
The current CGO mining and Project	• Project will involve more open pits, a new waste rock emplacement, expansion of the integrated waste landform and new lake protection bund. • The CGO overall operations also include the current open pit, ore processing plant, integrated waste landform and tailings management and soil stockpiles.	• Low – Medium. • While the mine current operations have a contamination potential, especially due to ore processing using a conventional carbon-in-leach cyanide leaching circuit, managements measures are implemented and monitored to mitigate this impact. Low concentrations of cyanide in groundwater have been previously detected. This is being monitored as part of the existing CGO operations. • The proposed Project will be included on the Environmental Management System (EMS).



KEY

- EIS study area
- Additional disturbance area
- DA14/98 approved surface disturbance
- Mining lease (ML1535)
- Mining lease (ML1791)
- Major road
- Minor road

Potential contamination source

- Demolished building
- Historical mining

\\emmsvr1\EMM\Jobs\2019\I190417 - CGO Open Cut Expansion Project\GIS\02_Maps_Contam\PSI002_PotentialContaminationSource_20230321_04.mxd 21/03/2023

Source: EMM (2022); Evolution (2022); DFSI (2017)

0 1 2 km

GDA 1994 MGA Zone 55

N

Potential contamination sources

Evolution Mining
Cowal Gold Operations
Open pit continuation project
Contamination Preliminary Site Investigation
Figure 4.1

EMM creating opportunities

4.3 Pathways

The following transport mechanisms may apply at the site:

- surface run-off of Contaminant of Potential Concern (CoPC) into drainage lines and Lake Cowal
- excavation and re-location of soil during construction activities
- vertical seepage of CoPC into the underlying soils and into perched groundwater and migration of contaminants in groundwater
- atmospheric dispersion (aeolian transport) of dust, derived from contaminated soil or hazardous building materials (HBM), e.g. asbestos.

Identified potential exposure pathways for the nominated CoPC include:

i. dermal contact and incidental ingestion of soil

ii. inhalation of dust (including soil derived) or fibres

iii. dermal contact and incidental ingestion of groundwater/surface water

iv. inhalation of soil/groundwater/surface water vapours in outdoor air

v. inhalation of soil/groundwater vapours within a trench

vi. plant uptake and/or ingestion by animals.

Based on the physical and chemical features of the CoPC identified, the exposure pathways that may be applicable to each CoPC at the site are presented in Table 4.3.

Table 4.3 CoPC and applicable exposure pathways

CoPC	Applicable pathways
Asbestos	ii
TPH	I, ii, iii, iv, v, vi
TRH/BTEX	i, ii, iii, iv, v, vi
PAH	i, ii, iii, iv, v, vi
VOCs	i, ii, iii, iv, v, vi
Metals (e.g. arsenic, lead, etc.)	i, ii, iii, vi
Cyanide	i, iii, v, vi
OPP, OCP	i, ii, iii, vi

4.4 Potential receptors

The CSM has been developed to identify existing known sources and areas of contamination, associated potential impacts to human health and ecological receptors and to identify exposure source, pathway and receptor linkages. Typical receptors during the construction and operational phase include:

- Project construction workers and visitors
- ecological receptors, including terrestrial and aquatic ecosystems in receiving surface water bodies, especially Lake Cowal
- mine workers and visitors.

The preliminary CSM is presented in Table 4.4 below.

Table 4.4 Preliminary conceptual site model schematic

Sources	Location	Timeframe of land use	Tier 1 preliminary risk assessment	CoPC	Pathways	Receptors
Demolished buildings – asbestos	On site	Past	Low to medium	Asbestos	ii	Construction workers/ Ecological receptors
Historical agricultural land use	On site/ off site	Past and current	Low	OPP and OCP	i, ii, iii, vi	Construction workers/ Ecological receptors
Historical mineral exploration	On site	Past	Low	TPH, TRH/BTEX, PAH and Metals.	i, ii, iii, iv, v, vi	Construction workers/ Ecological receptors
The CGO operations/ CGO open pit expansion Project	On site/ off site	Current and Future	Low to medium	TPH, TRH/BTEX, PAH, VOCs, Metals and Cyanide.	i, ii, iii, iv, v, vi	Construction workers/ the CGO operations workers/Ecological receptors

5 Environmental management and mitigation measures

5.1 Management objectives

The key objectives of the contamination management approach are to:

- Identify sites and Project activities that may trigger various provisions of the CLM Act, POEO Act and EHC Act.
- Identify means to avoid or mitigate significant impacts to project workers and surrounding human receptors from the disturbance of CoPC identified during this assessment.
- Identify means to avoid or prevent significant impacts to surrounding watercourses and ecological receptors from CoPC.
- Formally record the actions taken to identify and control exposure to workplace hazardous substances, as well as their use and transport.

5.2 Management of impacts

The CGO currently operates under an EMS and a suite of Environmental Management Plans which manage potential contamination risks associated with the CGO and currently approved operations. These management plans will be revised should the Project be approved to include the environmental management and mitigation measures to manage potential contamination issues specific to the Project as presented in the following sections.

5.2.1 Contaminated soil and water management

Protocols for the management of contaminated soil and water during construction and operation of the Project should be documented in an overarching construction environmental management plan (CEMP) and revised EMS including:

- detail requirements for safety controls including the following, where required:
  - air monitoring
  - dust suppression and containment
  - personnel protective equipment
  - training and supervision
- detailed requirements for environmental controls including the following:
  - erosion and sediment control
  - management of surface water runoff around excavations and stockpiles and prevention of surface water escaping disturbance areas
  - stockpile management procedures for segregating materials and preventing cross contamination of clean material (VENM or ENM) with contaminated material including both and anthropogenic sources of contamination

- management and removal of ACM using an experienced and licenced operator prior to disturbance in the vicinity of the former homestead in the north-west of the additional disturbance area (refer Section 5.2.3 and Figure 4.1)

- management of liquid and solid waste arising from construction.

Proposed sediment and erosion mitigation measures are further discussed in the surface water assessment appended to the EIS (refer Appendix G).

5.2.2 Unexpected finds

An unexpected finds procedure should be included in the CEMP and revised EMS for use during construction and operation of the Project. An unexpected find is potential contamination that was not previously identified during this contamination assessment or other investigations conducted for the project. Project workers will be trained in identifying the following:

- soil that appears to be contaminated based on visual and olfactory (odour) assessment
- potential NOA or other potentially ACM (i.e. either bonded or friable asbestos)
- groundwater or surface water that appears to be contaminated based on visual and olfactory (odour) assessment (including sheens or abnormal discolouration on the water surface, free phase liquids such as petroleum fuel, etc.)
- potentially contaminating infrastructure (such as historical building structures potentially containing hazardous materials)
- fill containing wastes (e.g. residual mine waste and tailings, NOA, refuse).

In the event of a suspected unexpected contamination find:

- excavation works will temporarily be suspended at the location of the unexpected find, the Sustainability Manager contacted, the area of concern appropriately isolated and inspected
- If required, the area will be inspected by a contaminated land consultant, and appropriate sampling and analysis would be undertaken with the sampling activities documented in a report
- workplace health and safety and environmental protection requirements will be reviewed, depending on the type of unexpected finds encountered.

5.2.3 Asbestos management

Any anthropogenic ACM identified in the additional disturbance area (e.g. in historic building structures or materials), require offsite disposal to an appropriate facility. Management and removal of ACM using an experienced and licenced operator will be required prior establishing soil stockpiles in the north-western portion of the additional disturbance area (refer Figure 4.1). The material should be segregated, managed and disposed of as Special Waste and transported and disposed in accordance with *Protection of the Environment Operations (Waste) Regulation 2014.* In the unlikely event that more than 100 kg of asbestos waste or more than 10 m^2 of asbestos sheeting is transported, the EPA online tool WasteLocate will be used. The handling and disposal of asbestos waste should be tracked and recorded.

5.2.4 Contaminated soil and water management during the Project

In addition to the CEMP, the CGO's existing management plans and EMS will be reviewed to ensure soil and water related activities associated with the Project are appropriately managed. These may include:

- environmental management strategy
- water management plan (including monitoring program)
- hazardous materials management plan
- cyanide management plan
- pollution incident response management plan
- emergency preparedness and response management plan
- transport management plan
- soil stripping and stockpile management plan.

6 Conclusion and recommendations

A review of the environmental setting of the Project area was completed based on available information sources. Furthermore, detailed database searches were undertaken for the additional disturbance area, along with a site inspection and documented in this report.

Several areas of contamination were identified by reviewing historical information, the environmental setting and conditions encountered during the inspections undertaken. This information was used to assess potential contaminants, exposure mechanisms, pathways and potentially affected media as outlined in the conceptual site model.

No identified history of significant widespread contaminating activities was identified within or surrounding the additional disturbance area, with the exception of the CGO current operations and occurrence fragments of ACM associated with a historic demolished building. Agricultural activities observed in general across the additional disturbance area and surrounds appeared non-intensive and thus frequent and widespread application of pesticides/herbicides and/or fill material causing widespread contamination is considered unlikely to have caused concentrations above the relevant assessment criteria throughout the additional disturbance area. There are also two historical mining sites based on a record of titles, however the absence of ore processing and the scale of former mining activities was small in comparison with the current CGO mine operations and therefore the risk of associated widespread contamination is considered to be low.

Supported by the conceptual site model, tier 1 preliminary risk assessment and the review of historical aerial photography, the contamination sources were identified as low or low to medium risk and should be managed in accordance with the recommendations outlined in this report.

The key contamination related management recommendations for the construction and/or ongoing operation of the Project include:

- Removal of residual ACM in the vicinity of the former homestead in the north-west portion of the additional disturbance area.
- Revision or development of appropriate Project documentation to manage contamination (including any residual ACM) identified during the development of the Project.
- implementation of an unexpected finds procedure along the Project.
- Review of the potential impacts outlined in this report and incorporate into the CGO EMS as necessary.

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Attachment A

Database search reports

EMM
creating opportunities

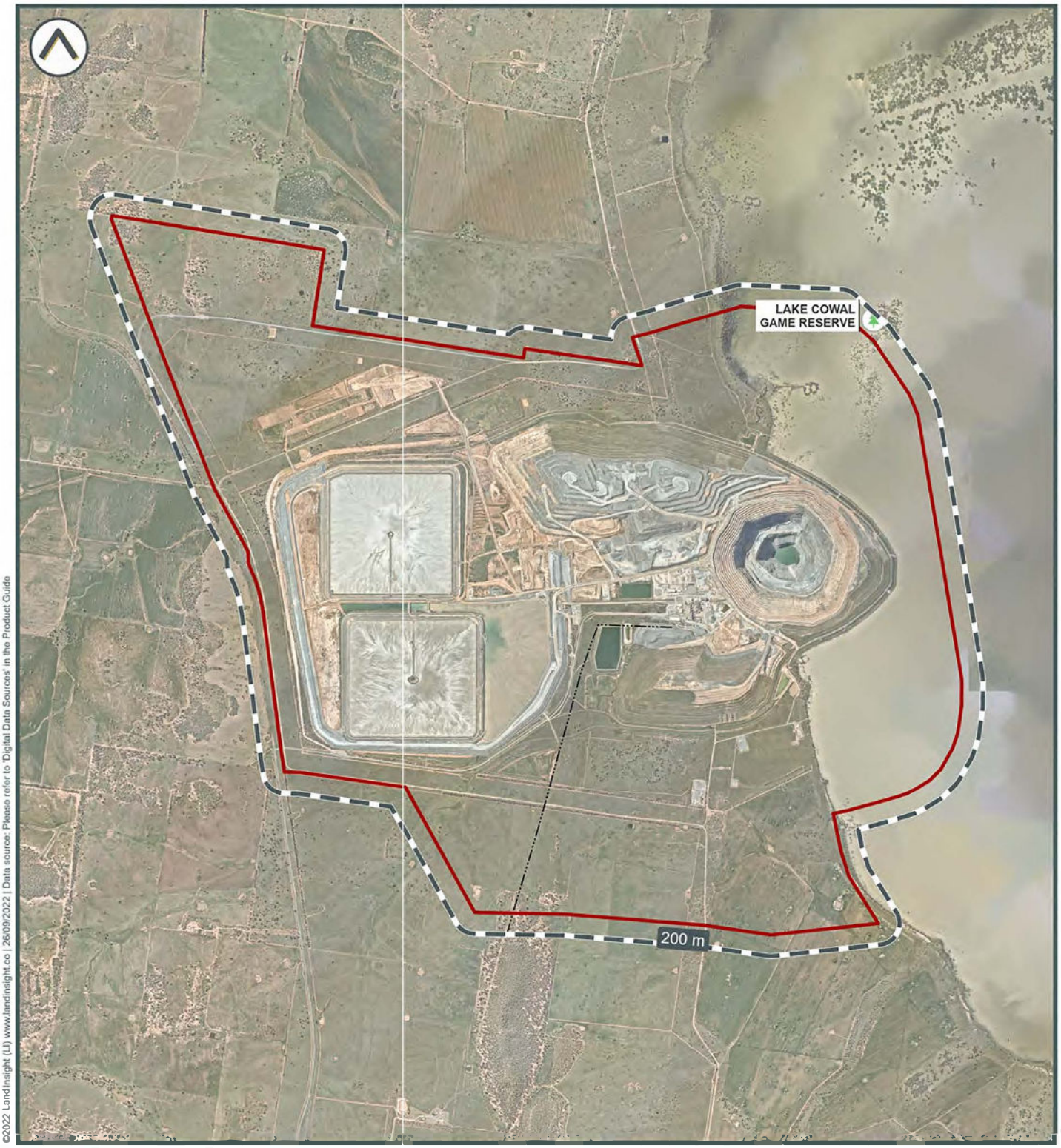
Appendix A

REPORT MAPS

Evolution Mining/Barrick Gold Mine
Lake Cowal, NSW

MAP 1.1

Subject Area and Sensitive Receptors



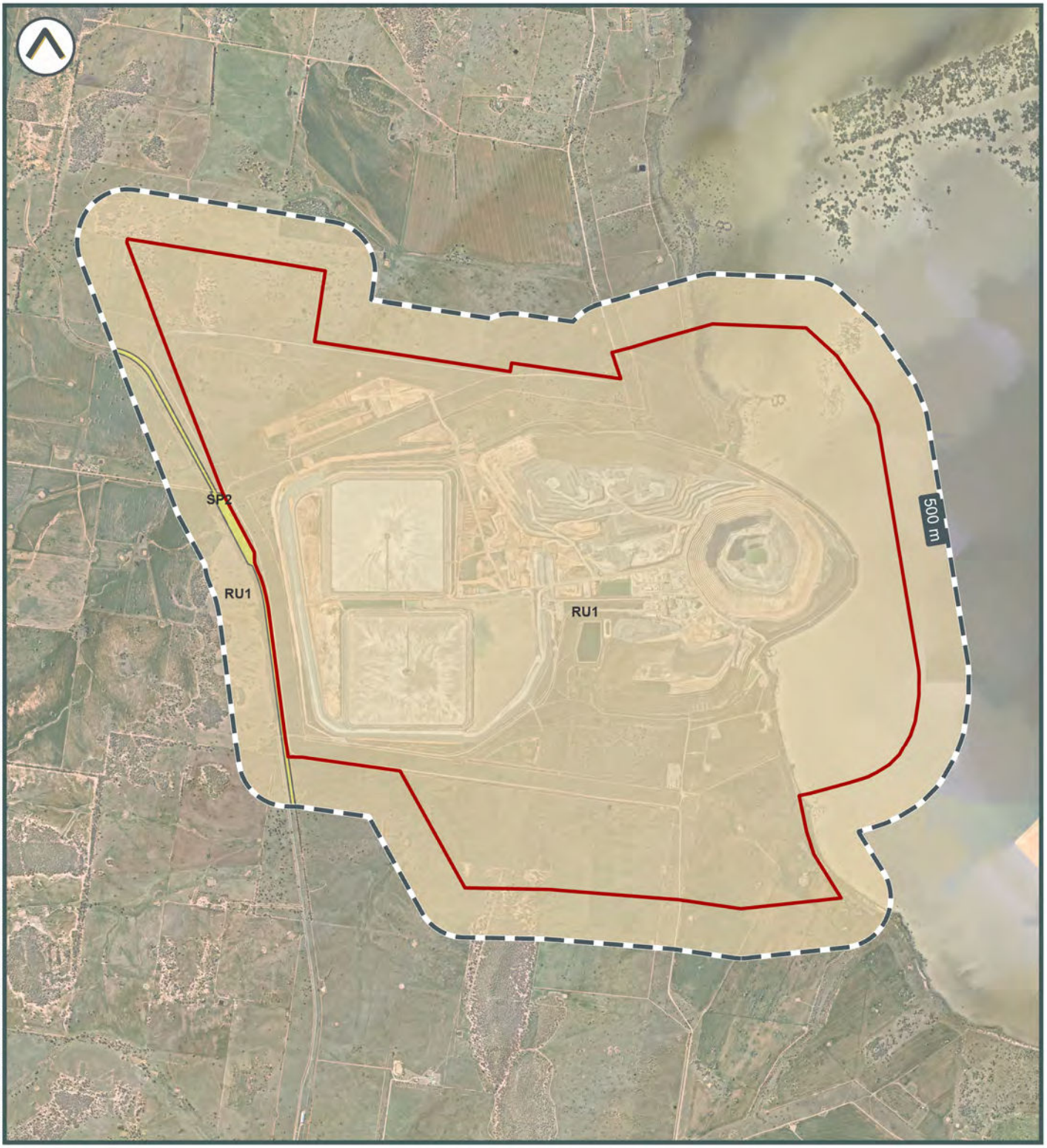
Subject area
Parks
Transmission line

0 500 1,000 1,500 2,000 2,500m

Land Insight

MAP 1.2

Planning Controls



Subject area

Land Zoning

RU1 | Primary Production

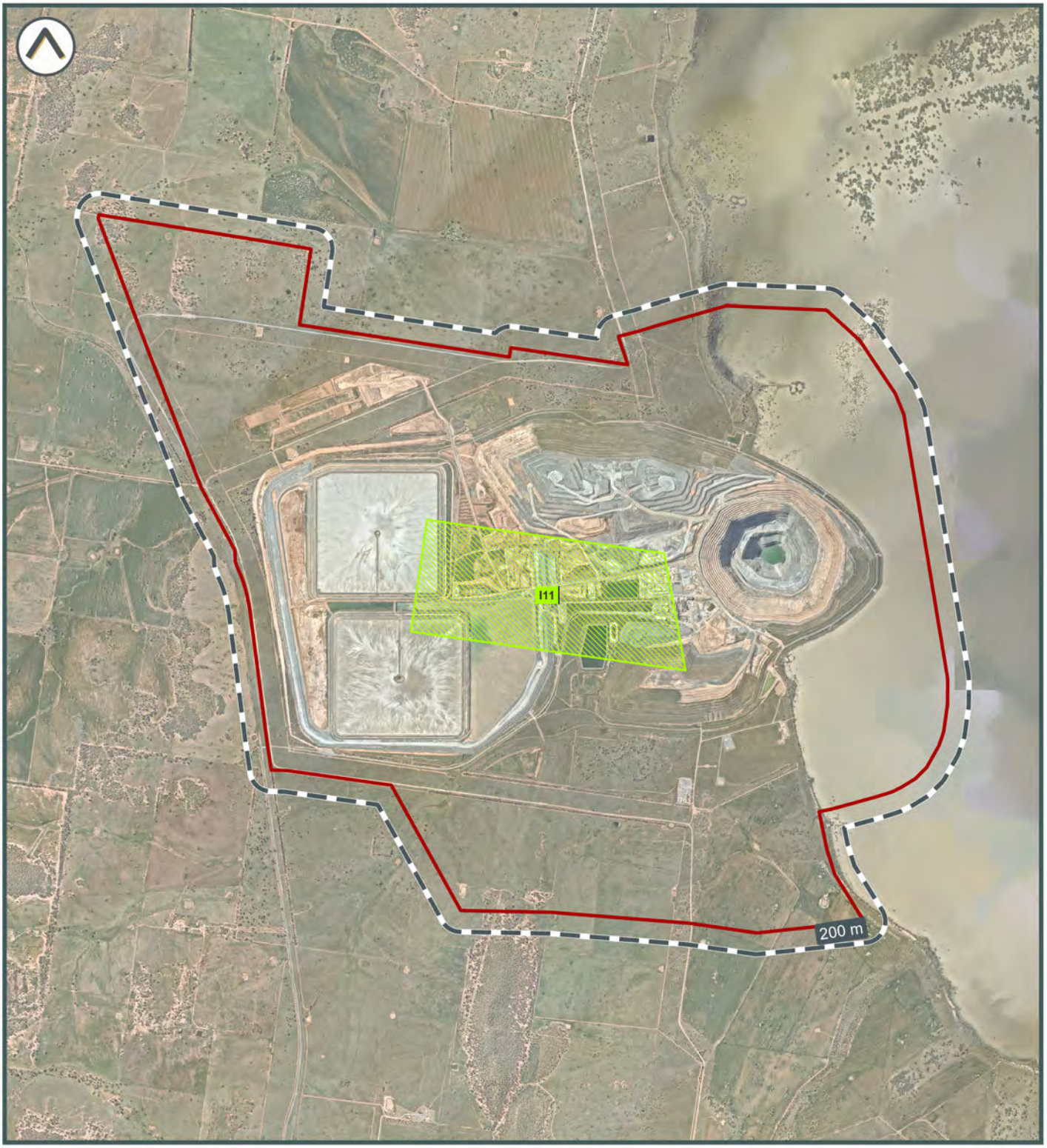
SP2 | Special Purposes Zone - Infrastructure

0 500 1,000 1,500 2,000 2,500m

Land Insight

MAP 1.3

Heritage



Subject area
State Heritage Register (SHR)
Heritage (LEP)
Commonwealth Heritage List (CHL)
National Heritage List (NHL)
World Heritage Area (WHA)

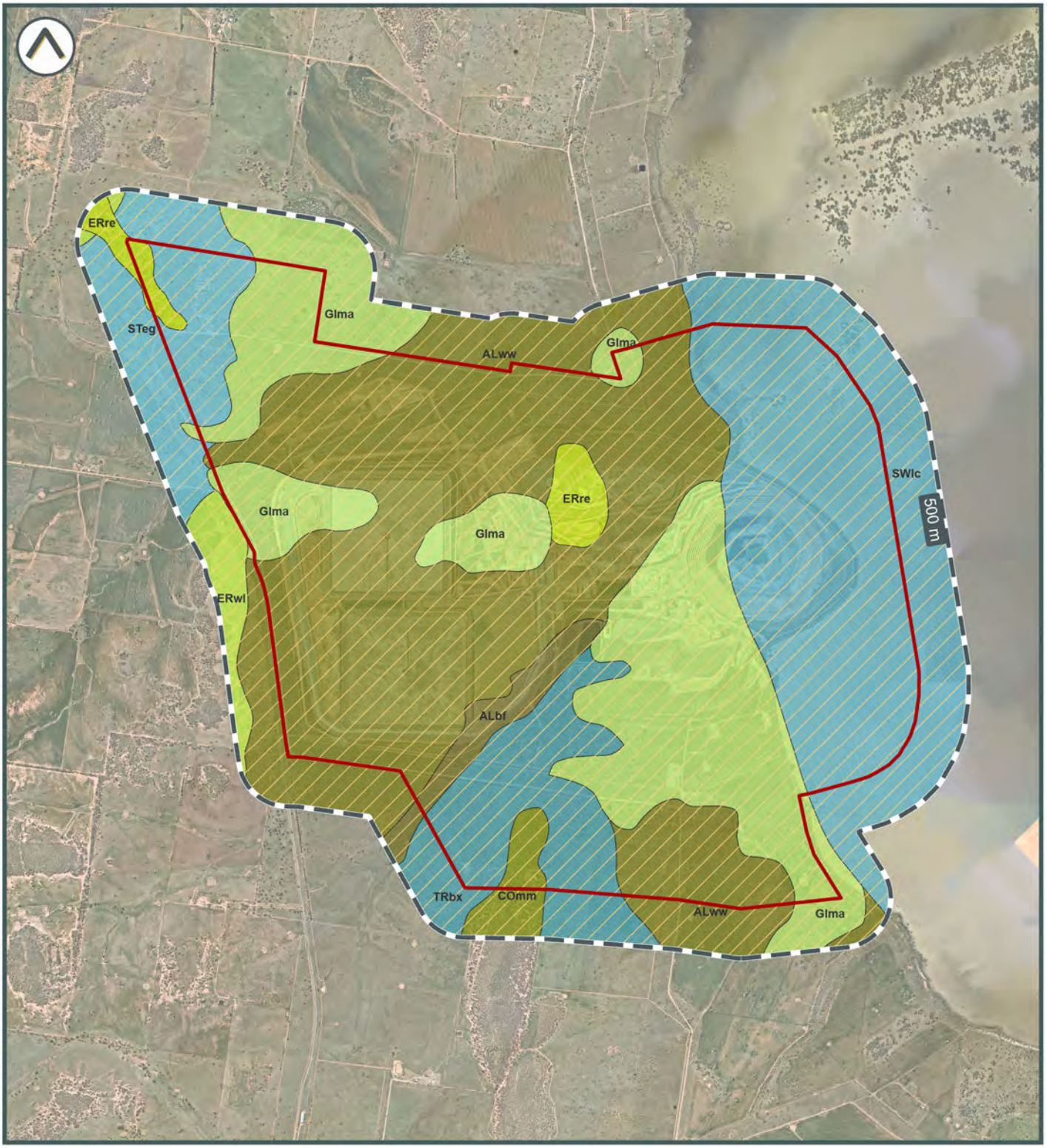
0 500 1,000 1,500 2,000 2,500m

Land Insight

PROPERTY SETTING

MAP 1.4a

Soil Landscape and Salinity



Subject area

Radon Level (Bq/m3)
5-19

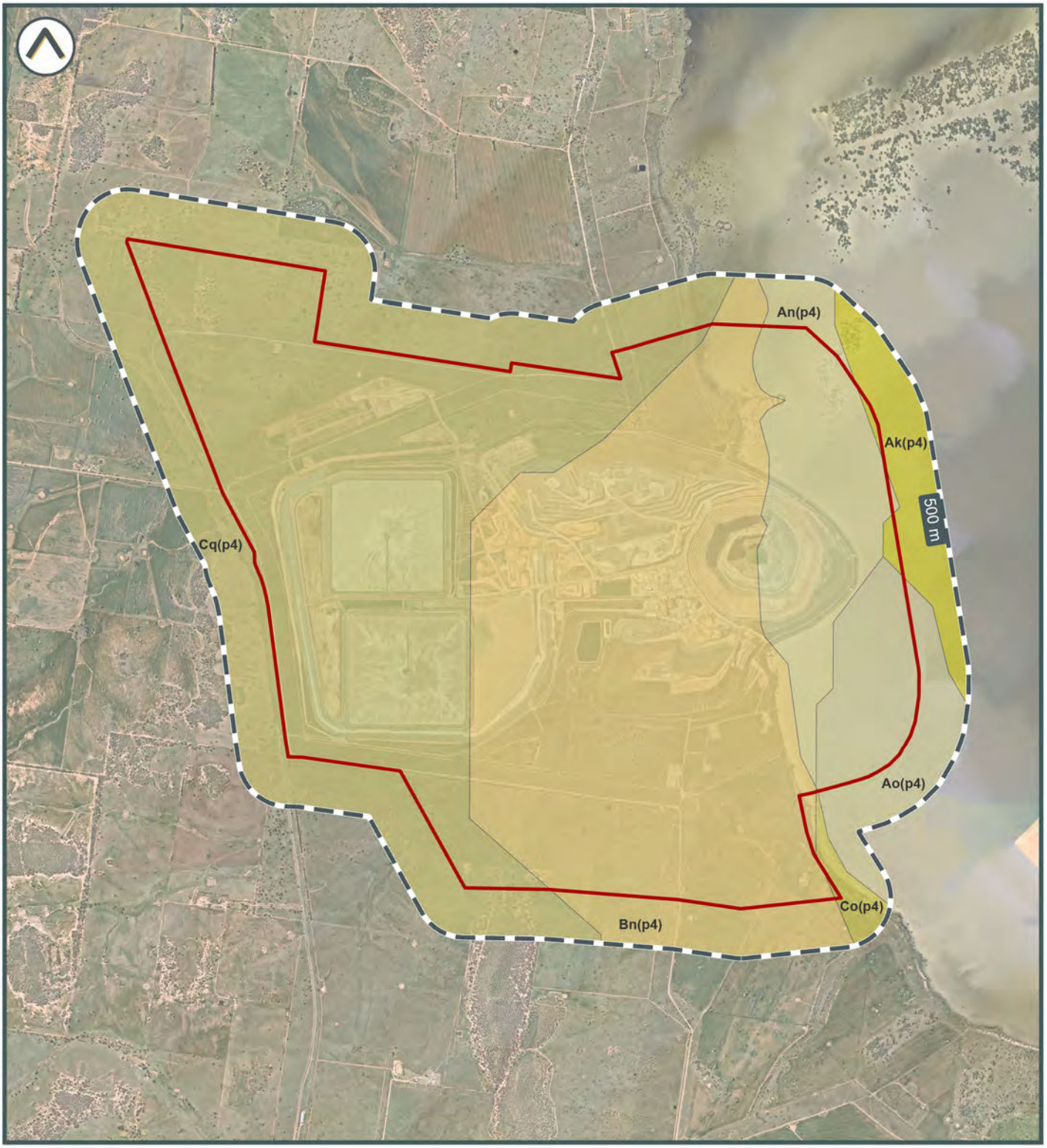
Soil Landscape
ALbf,Alluvial
ALww,Alluvial
COmm,Colluvial
ERre,Erosional
ERwl,Erosional
Glma,Gilgai
STeg,Stagnant alluvial
SWlc,Swamp
TRbx,Transferral

0 500 1,000 1,500 2,000 2,500m

Land Insight

MAP 1.4b

Acid Sulfate Soils



Subject area

ASRIS Atlas of Australian Sulfate Soils

- Ak(p4) | ASS in inland lakes, waterways, wetlands and riparian zones
- An(p4) | ASS in inland lakes, waterways, wetlands and riparian zones
- Ao(p4) | ASS in inland lakes, waterways, wetlands and riparian zones
- Bn(p4) | ASS in inland lakes, waterways, wetlands and riparian zones
- Co(p4) | ASS in inland lakes, waterways, wetlands and riparian zones
- Cq(p4) | ASS in inland lakes, waterways, wetlands and riparian zones

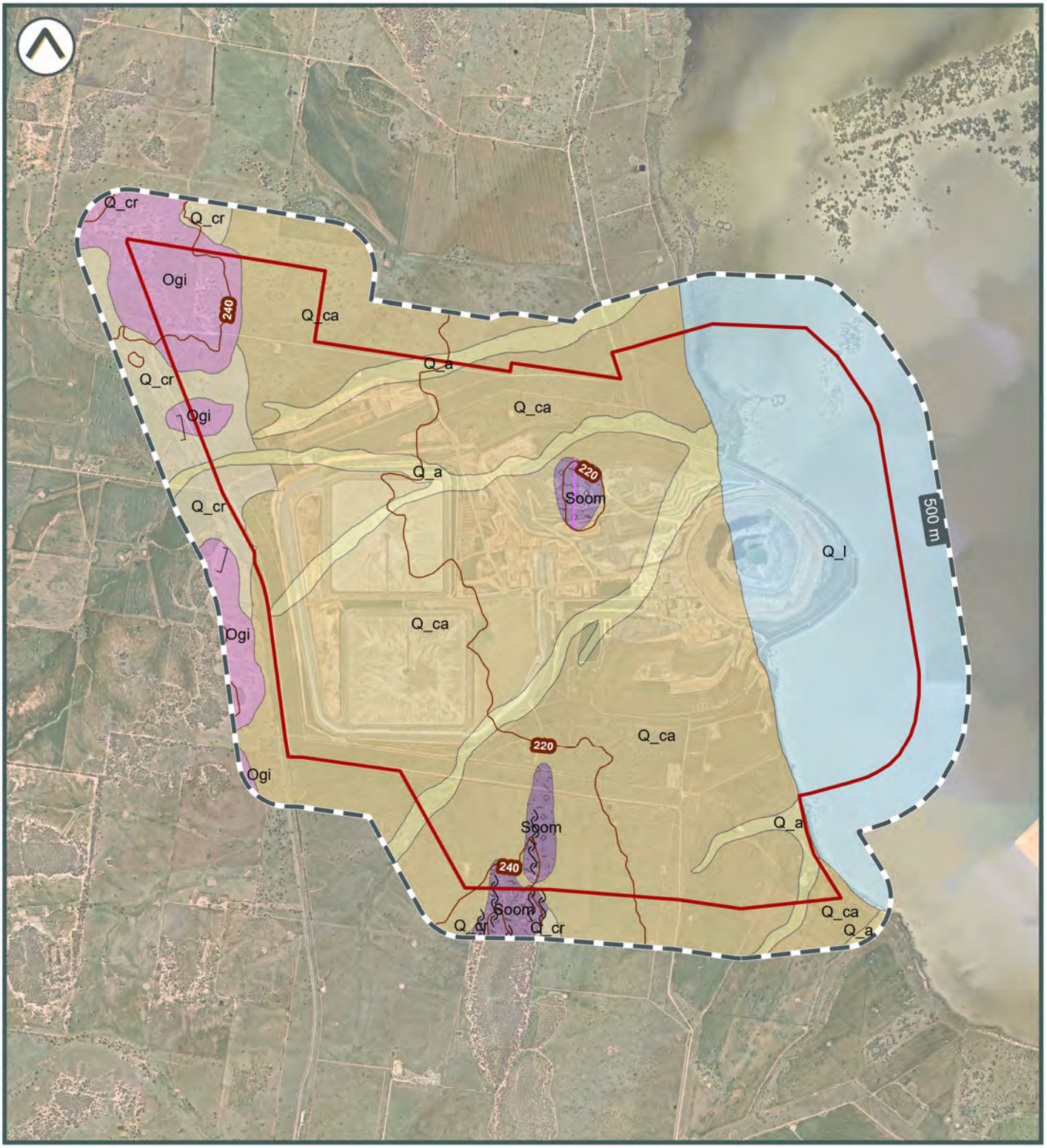
0 500 1,000 1,500 2,000 2,500m

Land Insight

PROPERTY SETTING

MAP 1.5

Geology and Topography



Subject area
Topographic contour (m)
Strike and dip of cleavage
Shear zone (linear), interpretted from airphoto
Major fault, inferred, interpreted from geophysics.

Dominant Lithology
Conglomerate; Conglmerate

Cenozoic Sedimentary Province
Q_a
Q_ca
Q_cr
Q_l

LACHLAN OROGEN
Ogi
Soom

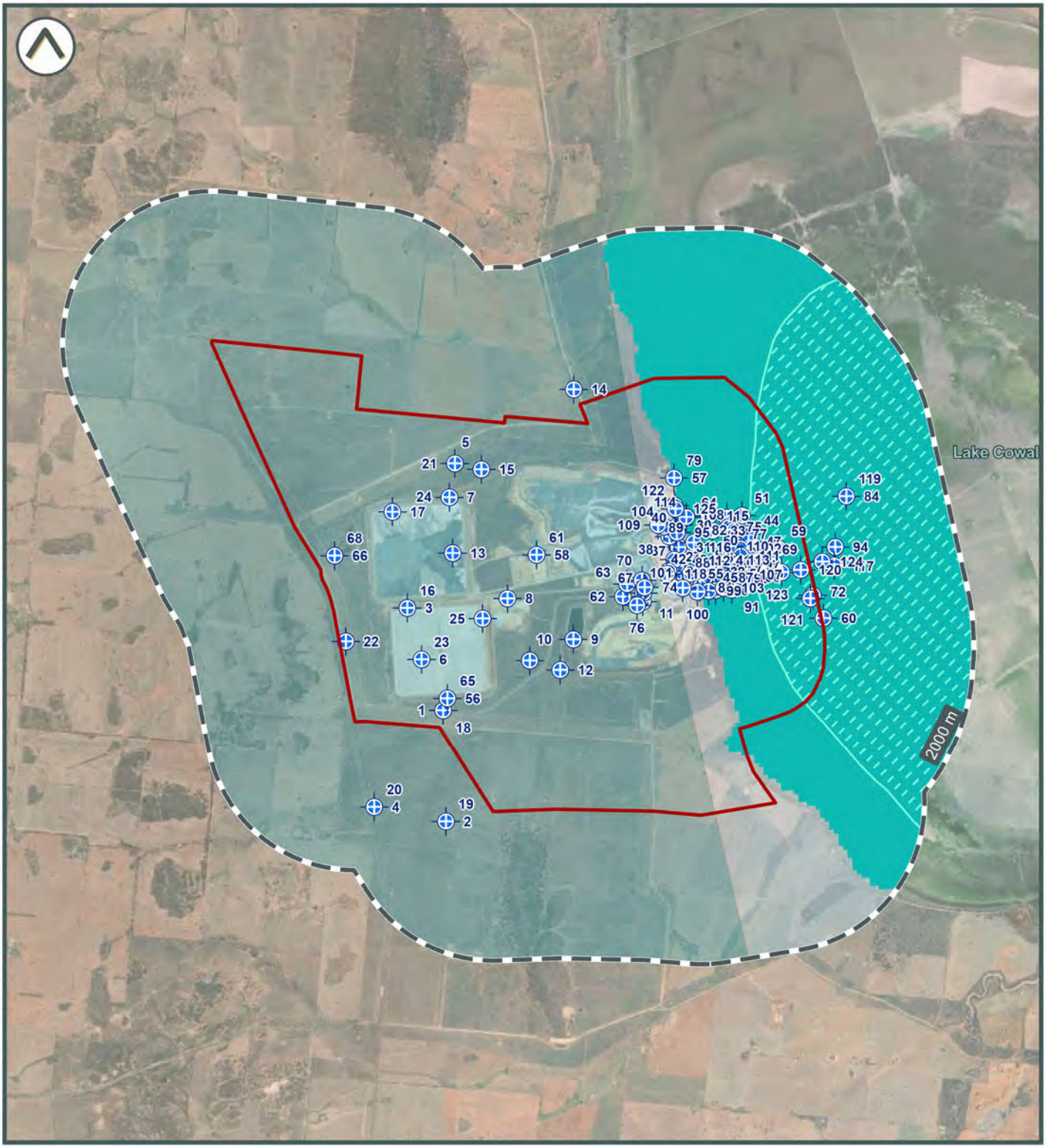
0 500 1,000 1,500 2,000 2,500m

Land Insight

HYDROGEOLOGY

MAP 2.1

Hydrogeology and Groundwater Boreholes



Subject area

Groundwater bores

UPSS Environmentally Sensitive Zone

Wetlands

Aquifer type

Fractured or fissured, extensive aquifers of low to moderate productivity

Porous, extensive highly productive aquifers

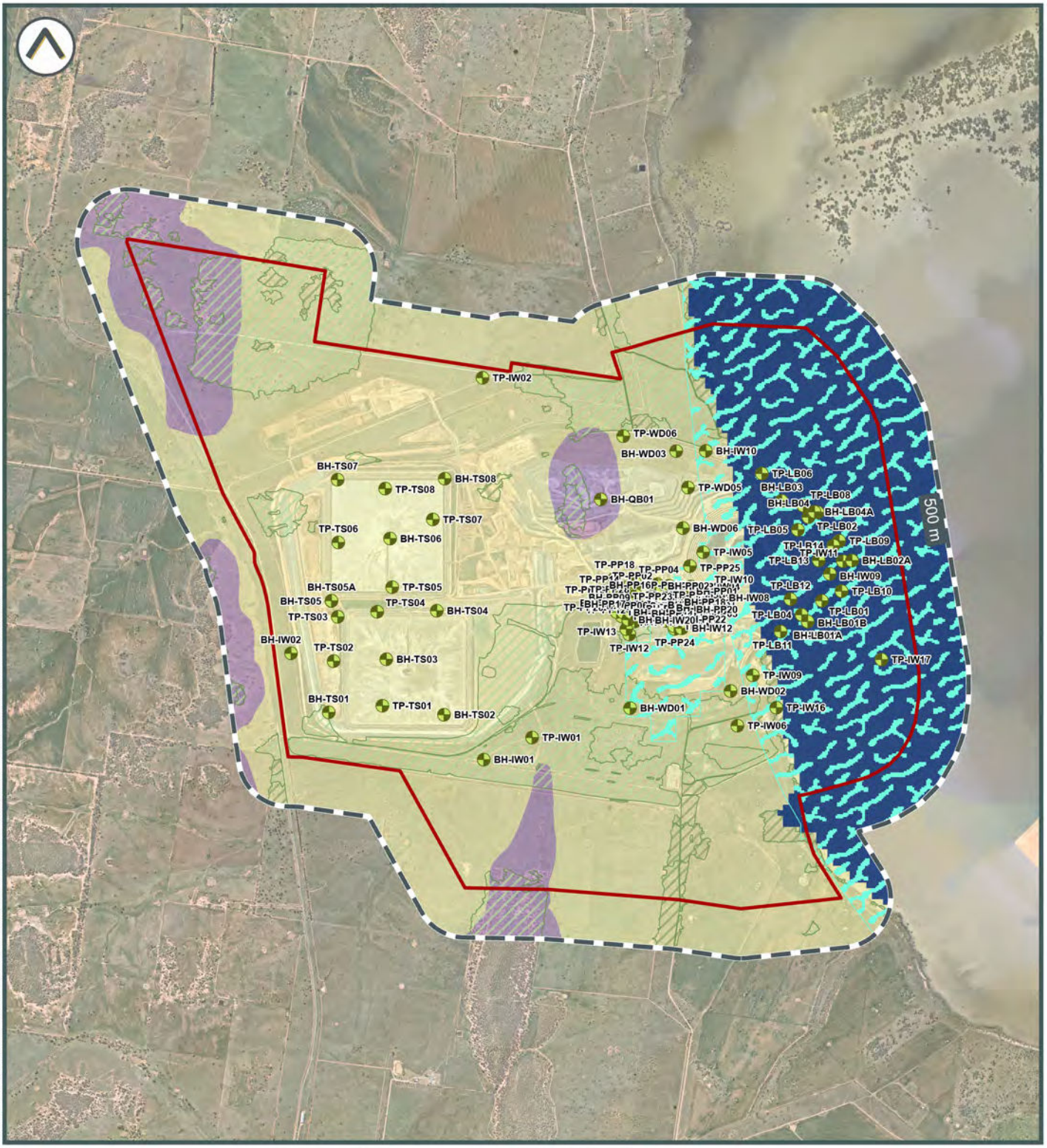
0 500 1,000 1,500 2,000 2,500 3,000 3,500 4,000 4,500 5,000m

Land Insight

HYDROGEOLOGY

MAP 2.2

Hydrogeology and Other Boreholes



Subject area
Other borehole/monitoring well location
Groundwater Vulnerability

Ecosystems that rely on the Surface expression of Groundwater
High potential GDE - from national assessment

Ecosystems that rely on Subsurface presence of Groundwater
Moderate potential GDE - from regional studies
Low potential GDE - from regional studies

Hydrogeologic Unit
Surficial Sediment Aquifer (porous media - unconsolidated)
Palaeozoic and Pre-Cambrian Fractured Rock Aquifers (low permeability)

0 500 1,000 1,500 2,000 2,500m

Land Insight

ENVIRONMENTAL REGISTERS LICENSES AND INCIDENTS

MAP 3.1

Contaminated Land Public Register

Subject area

Contaminated Land Public Register (EPA)
EPA Notified Contaminated Sites
EPA Record of Notices

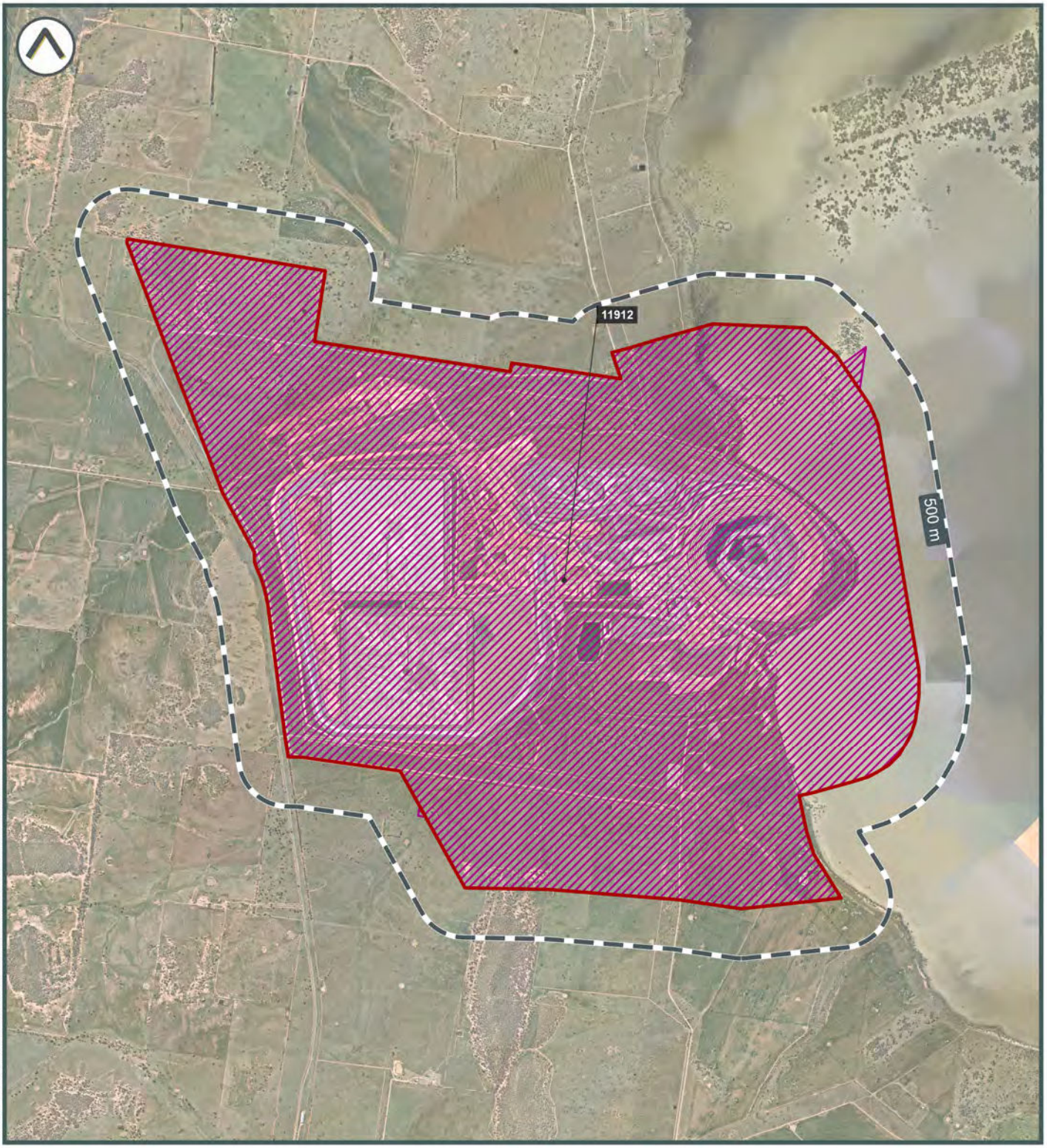
0 500 1,000 1,500 2,000 2,500m

Land Insight

ENVIRONMENTAL REGISTERS LICENSES AND INCIDENTS

MAP 3.2

Licences, Approvals & Assessments



Subject area

POEO Licences
- Issued
- Suspended / Revoked
- Delicensed / No longer in force
- Surrendered

Clean Up and Penalty Notices

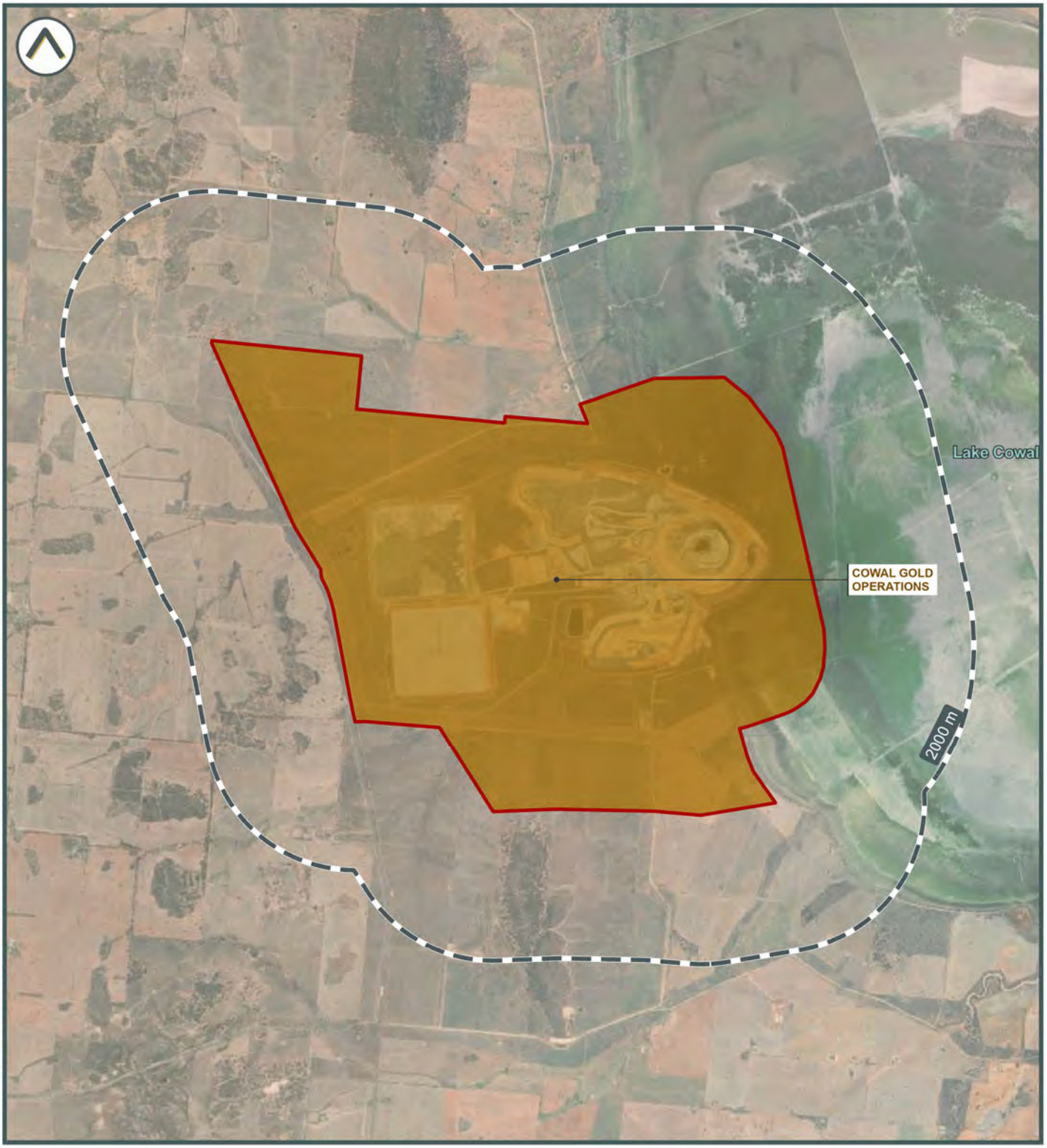
0 500 1,000 1,500 2,000 2,500m

Land Insight

ENVIRONMENTAL REGISTERS LICENSES AND INCIDENTS

MAP 3.3

Sites Regulated by Other Jurisdictional Body



Subject area

PFAS sites
NPI Facilities
Former Gasworks
Defence Area / Military Sites
Defence Controlled Area

Unexploded Ordnance (UXO) Areas
Substantial Potential
Slight potential
Sea Dumping of Depth Charges
Sea Dumping of Depth Charges (Chemical munitions sea dumping)
Other Sea Dumping Sites

Other

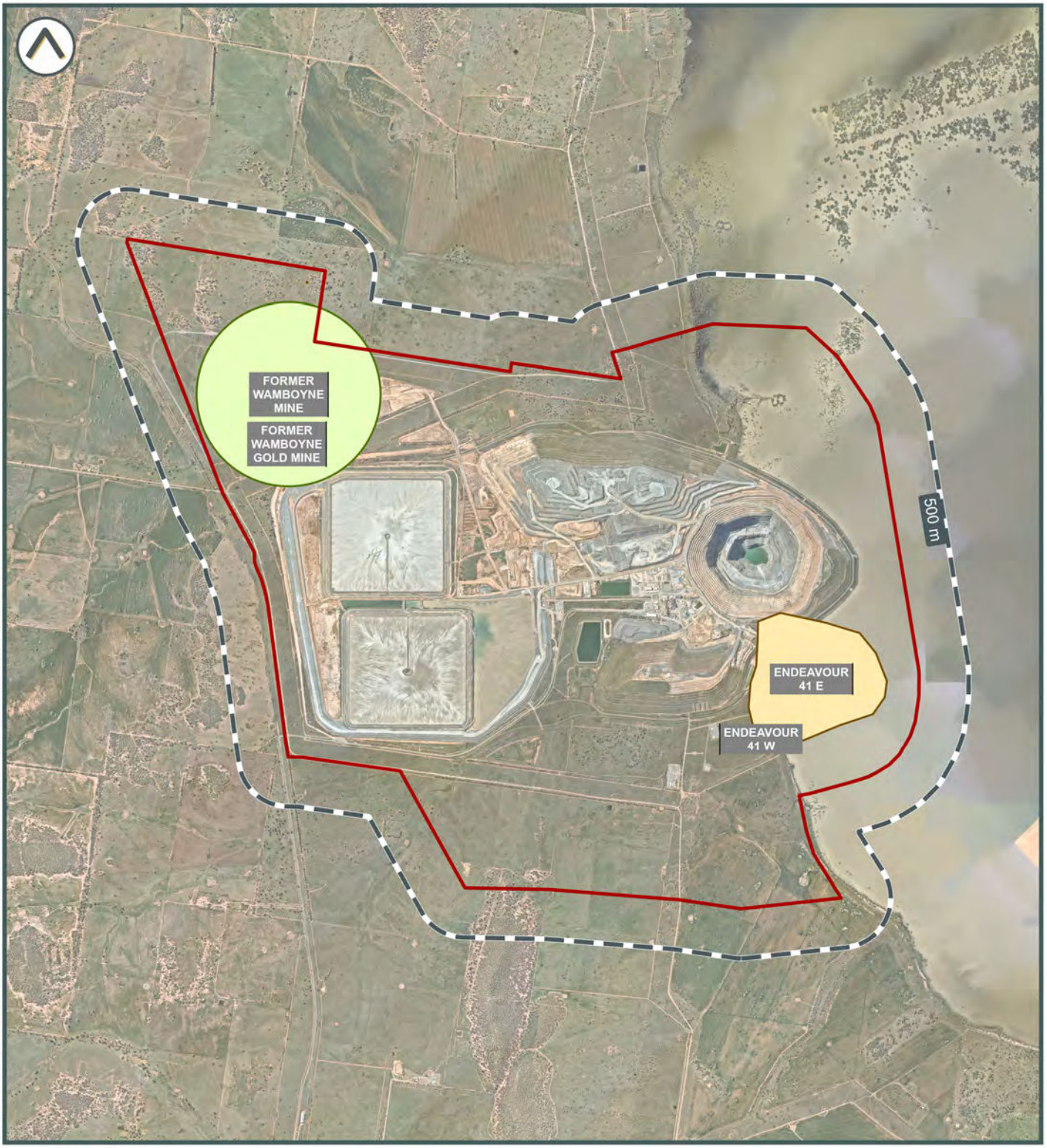
0 500 1,000 1,500 2,000 2,500m

Land Insight

POTENTIALLY CONTAMINATED AREAS

MAP 4.1

Former Potentially Contaminated Land



Subject area

James Hardie Asbestos Legacy Sites
Contaminated Legacy Areas
Historical (legacy) Landfill Sites

Derelict Mines
Derelict Quarries

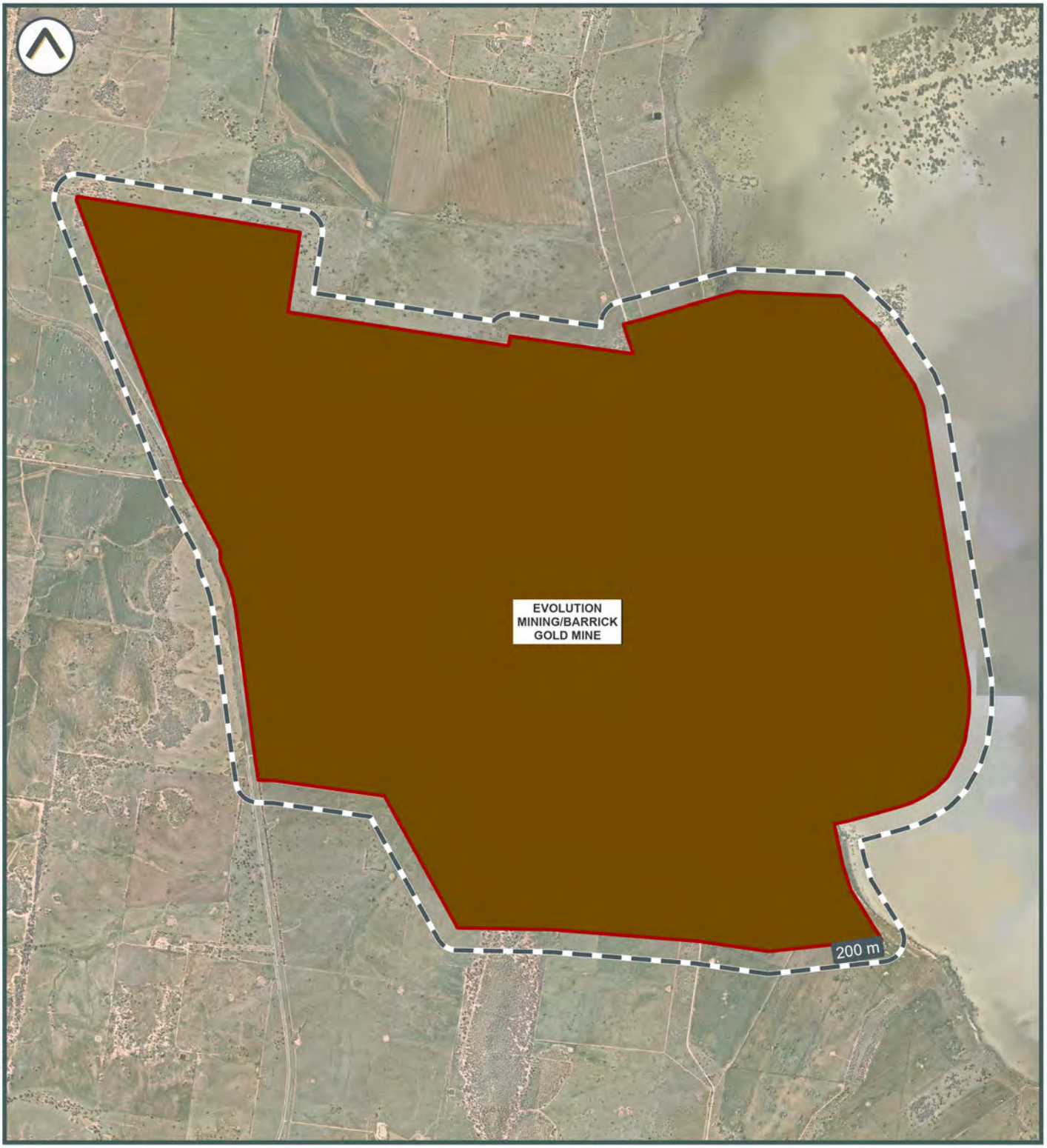
0 500 1,000 1,500 2,000 2,500m

Land Insight

POTENTIALLY CONTAMINATED AREAS

MAP 4.2

Current Potentially Contaminating Activities (PCAs)



Subject area
Extractive Industries (Quarrying)

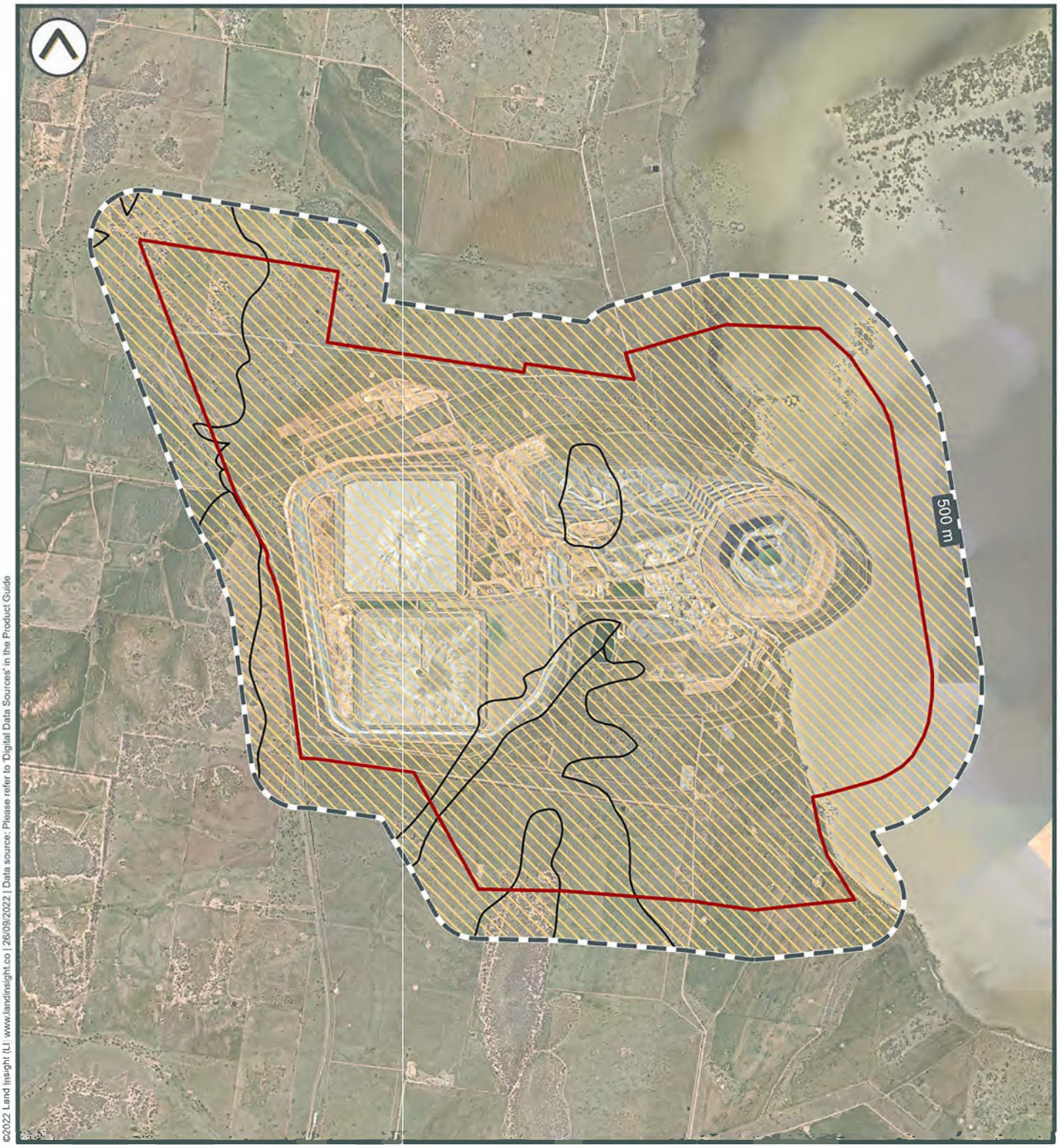
Data is current as when this report was created. However due to the turnover of business locations, some addresses may be former.

0 500 1,000 1,500 2,000 2,500m

Land Insight

MAP 5.1

Soil Erosion Hazards



Subject area

Soil Erosion Hazard
Minor to moderate

0 500 1,000 1,500 2,000 2,500m

Land Insight

Land
Insight

Attachment B
Photographic log

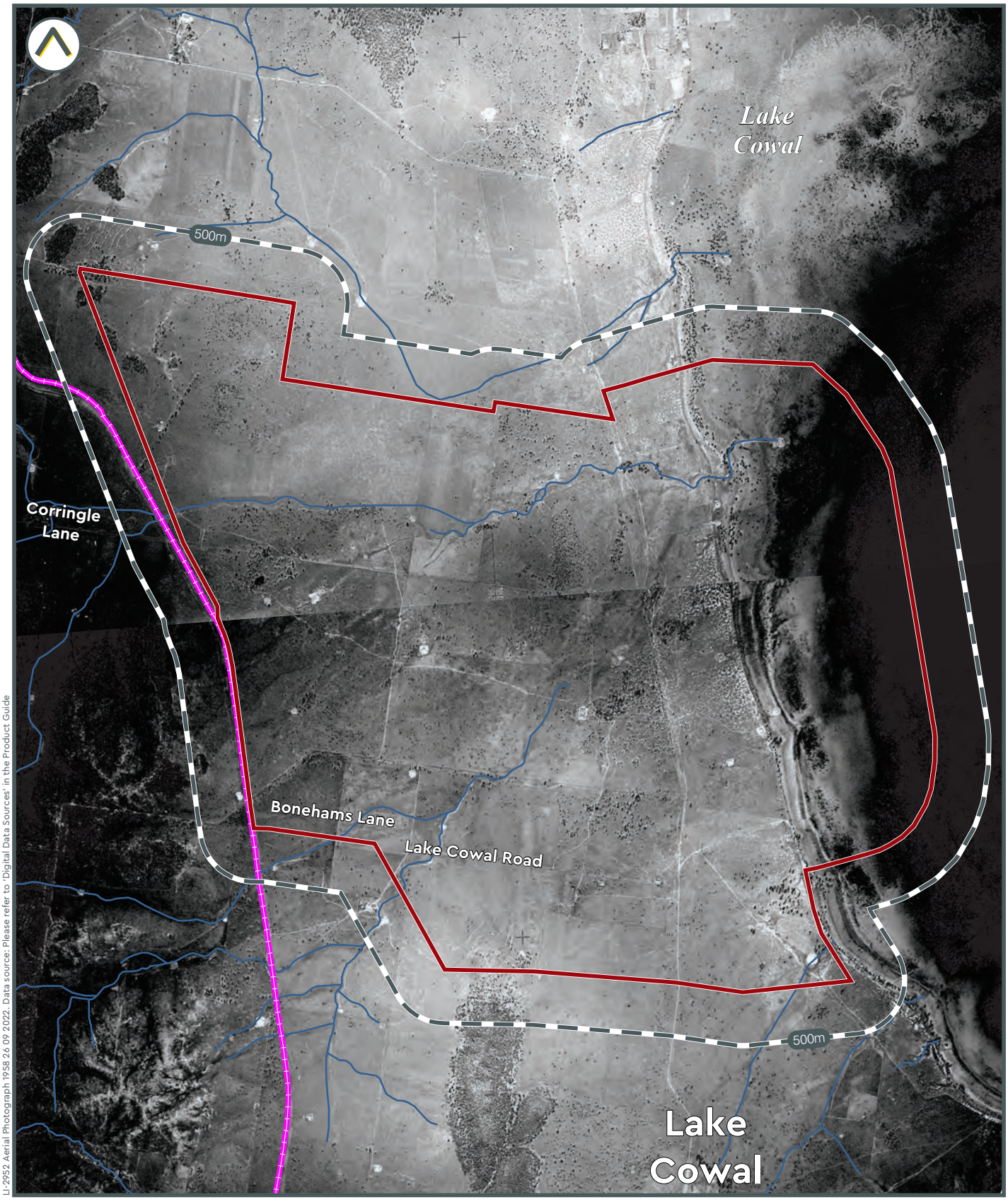
EMM
creating opportunities

Appendix B

HISTORIC IMAGERY

Evolution Mining/Barrick Gold Mine
Lake Cowal, NSW

Historic Aerial Photograph - 1958



LI-2952 Aerial Photograph 1958 26 09 2022. Data source: Please refer to 'Digital Data Sources' in the Product Guide

Subject area

0 2km

Land Insight

Historic Aerial Photograph - 1967

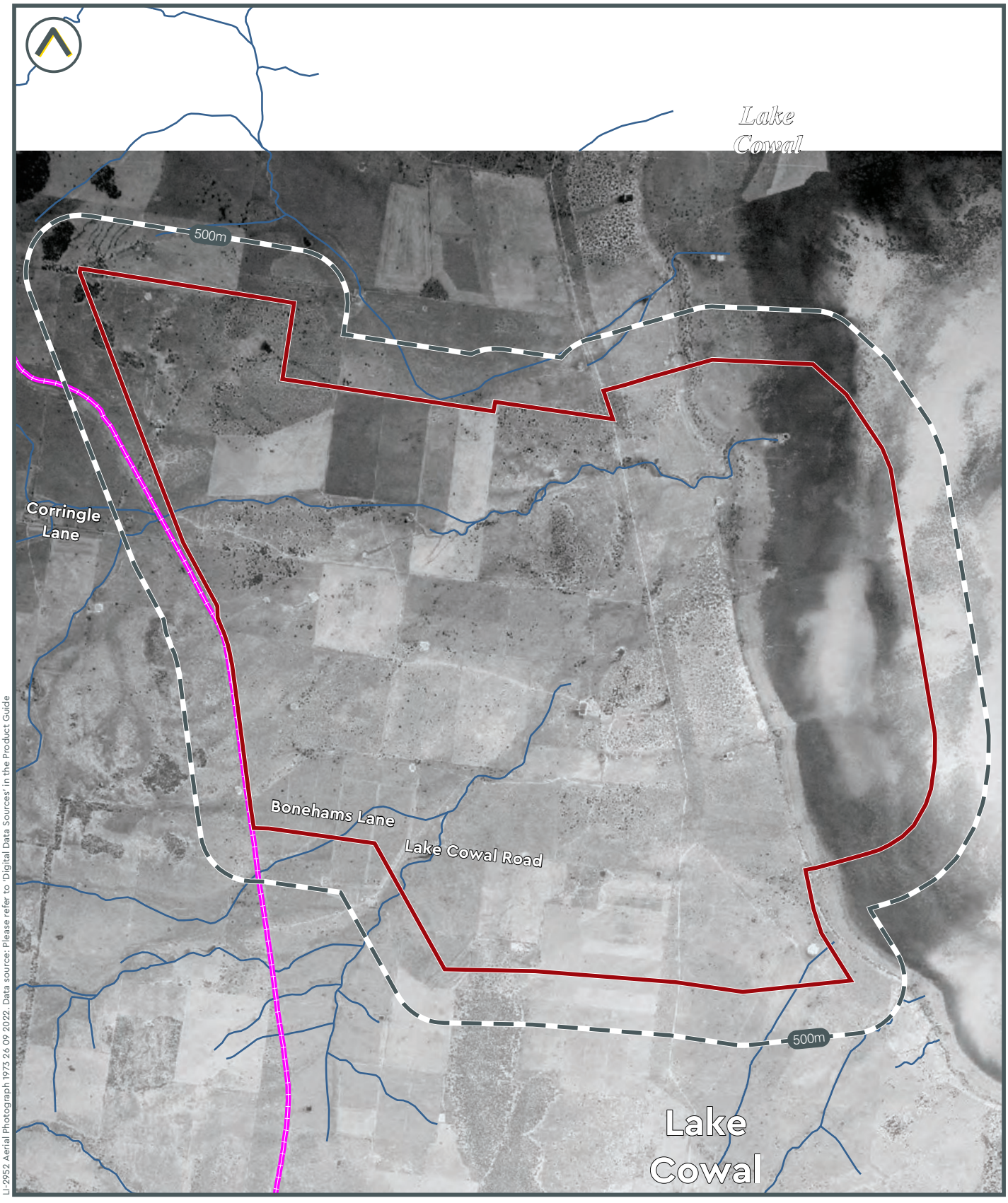
LI-2952 Aerial Photograph 1967 26 09 2022. Data source: Please refer to 'Digital Data Sources' in the Product Guide

Subject area

0 2km

Land Insight

Historic Aerial Photograph - 1973



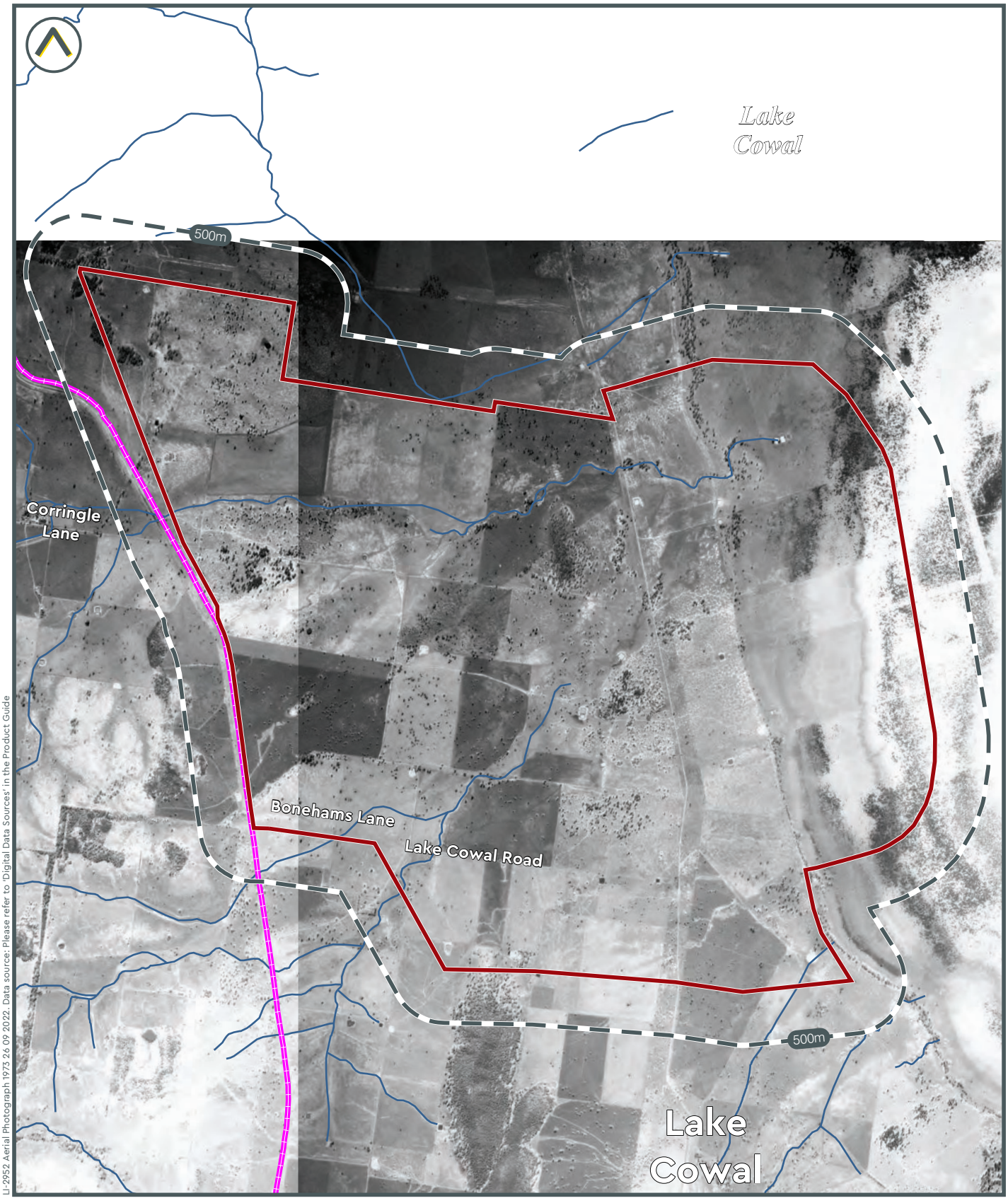
LI-2952 Aerial Photograph 1973 26 09 2022. Data source: Please refer to 'Digital Data Sources' in the Product Guide

Subject area

0 2km

Land Insight

Historic Aerial Photograph - 1983



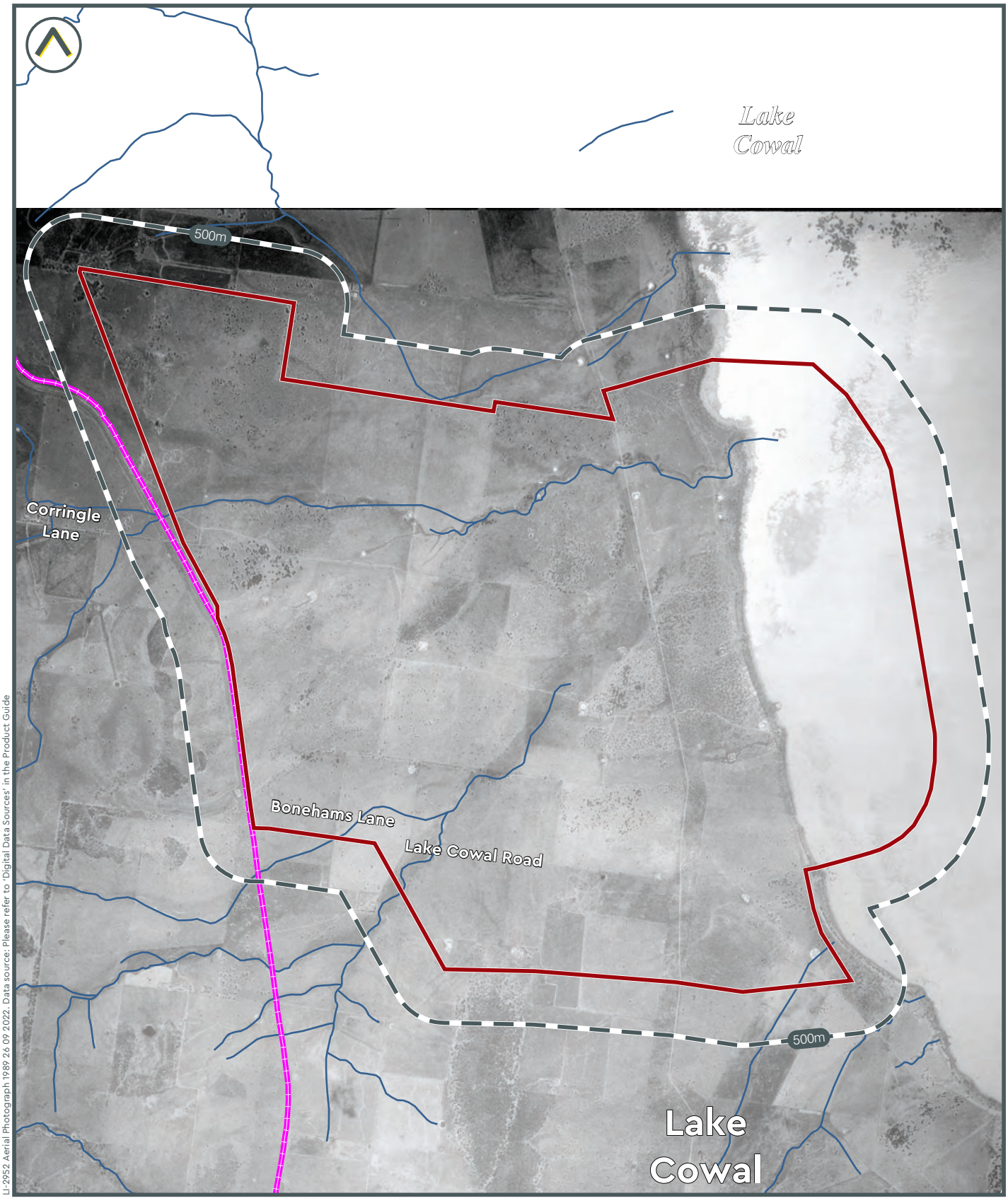
LI-2952 Aerial Photograph 1973 26 09 2022. Data source: Please refer to 'Digital Data Sources' in the Product Guide

Subject area

0 2km

Land Insight

Historic Aerial Photograph - 1989



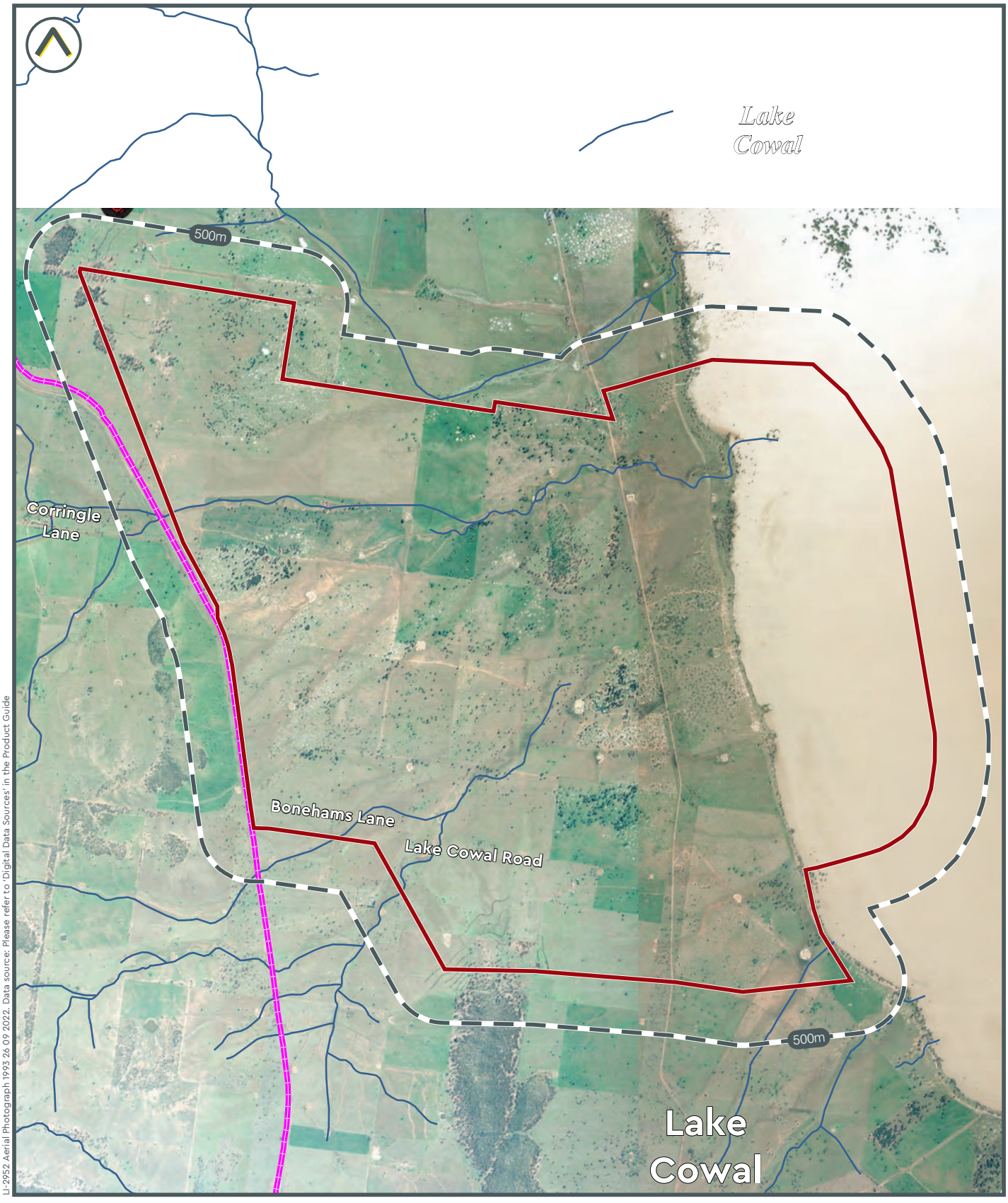
LI-2952 Aerial Photograph 1989 26 09 2022. Data source: Please refer to 'Digital Data Sources' in the Product Guide

Subject area

0 2km

Land Insight

Historic Aerial Photograph - 1993



LI-2952 Aerial Photograph 1993 26 09 2022. Data source: Please refer to 'Digital Data Sources' in the Product Guide

Subject area

0 2km

Land Insight

Historic Aerial Photograph - 1997

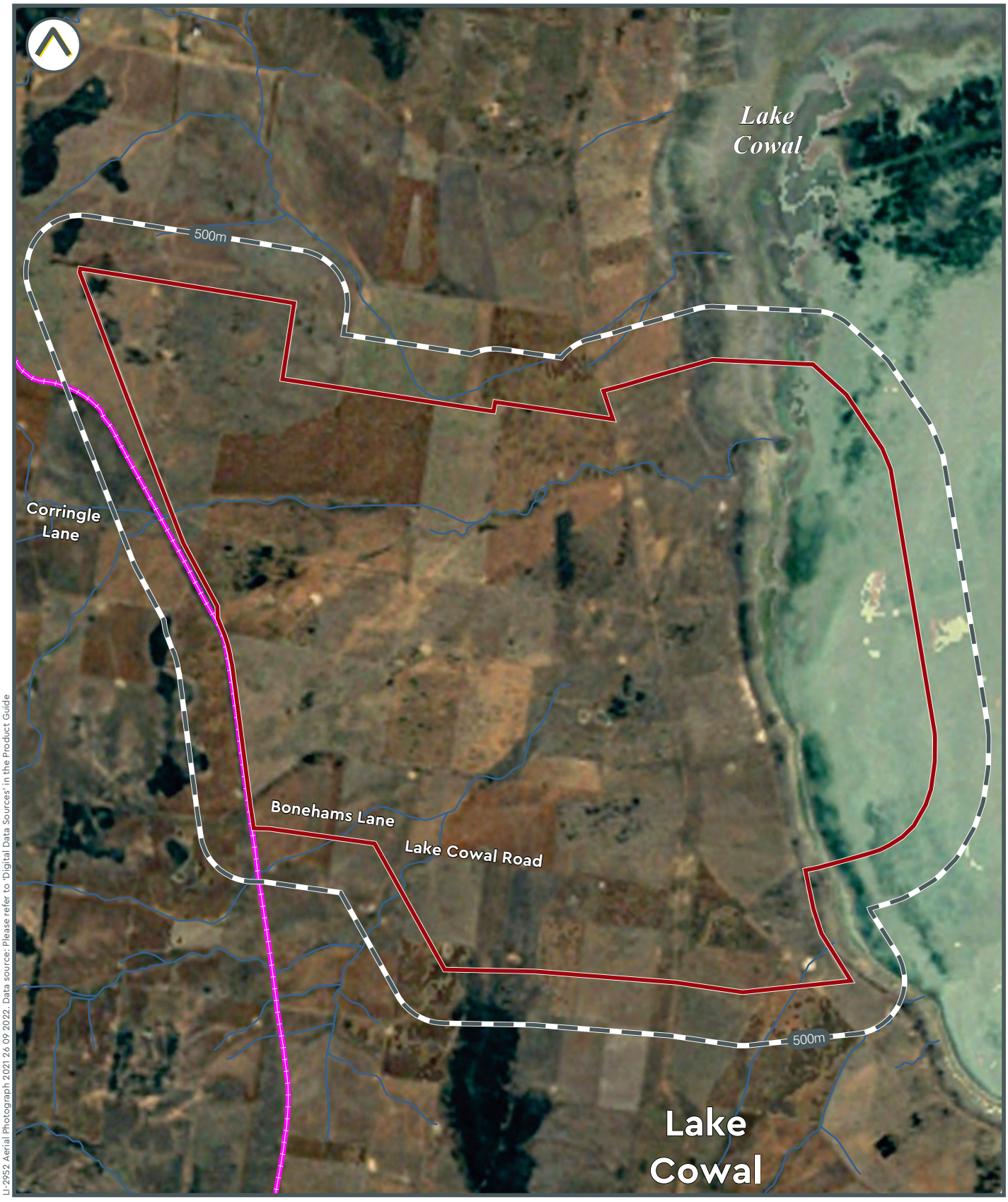
LI-2952 Aerial Photograph 1997 26 09 2022. Data source: Please refer to 'Digital Data Sources' in the Product Guide

Subject area

0 2km

Land Insight

Historic Aerial Photograph - 2002



LI-2952 Aerial Photograph 2021 26 09 2022. Data source: Please refer to 'Digital Data Sources' in the Product Guide

Subject area

0 2km

Land Insight

Historic Aerial Photograph - 2021

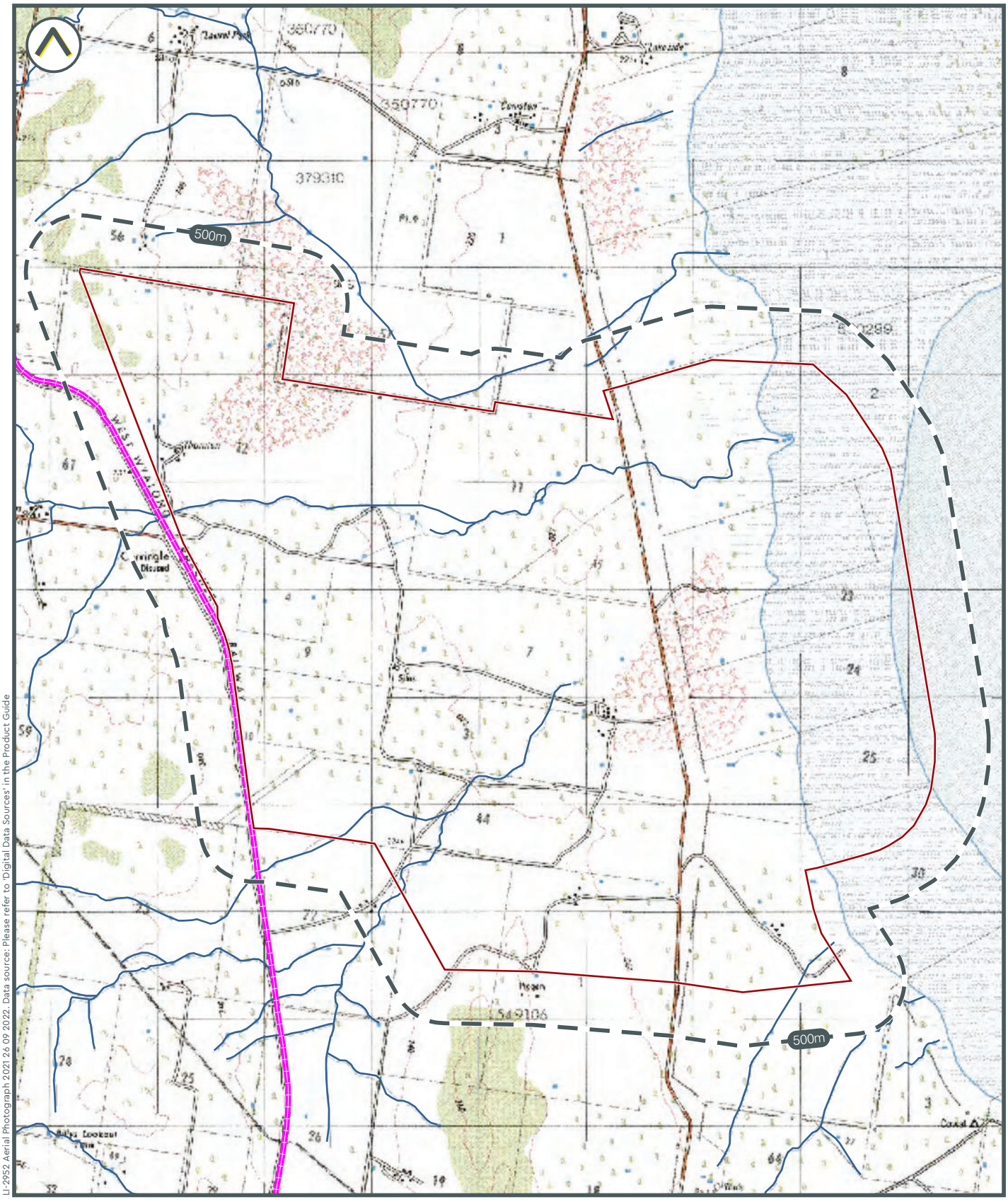
LI-2952 Aerial Photograph 2021 26 09 2022. Data source: Please refer to 'Digital Data Sources' in the Product Guide

Subject area

0 2km

Land Insight

1969-1991 1:50,000 Topographic Map (Wamboyne 8330-N)



LI-2952 Aerial Photograph 2021 26 09 2022. Data source: Please refer to 'Digital Data Sources' in the Product Guide

Subject area

0 2km

Land Insight

Land Insight

Australia

SYDNEY
Ground floor 20 Chandos Street
St Leonards NSW 2065
T 02 9493 9500

NEWCASTLE
Level 3 175 Scott Street
Newcastle NSW 2300
T 02 4907 4800

BRISBANE
Level 1 87 Wickham Terrace
Spring Hill QLD 4000
T 07 3648 1200

CANBERRA
Suite 2.04 Level 2
15 London Circuit
Canberra City ACT 2601

ADELAIDE
Level 4 74 Pirie Street
Adelaide SA 5000
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MELBOURNE
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454 Collins Street
Melbourne VIC 3000
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