Evolution MINING

APPENDIX D

Aboriginal Cultural Heritage Assessment

COWAL GOLD OPERATIONS
PROCESSING RATE MODIFICATION

Environmental Assessment
2018

Resource Strategies

Aboriginal Cultural Heritage Assessment

Cowal Gold Operations – Processing Rate Modification

Nearest Town:	**West Wyalong**
Local Government Areas:	**Bland/Forbes**
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Proponent:	**Evolution Mining (Cowal) Pty Limited**
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Cover photograph: Aboriginal cultural heritage survey at Lake Cowal August 2017 (Source: Niche)

Executive Summary

This report presents the findings of an Aboriginal Cultural Heritage Assessment (ACHA) for the Cowal Gold Operations' (CGO) proposed Processing Rate Modification (the Modification). The CGO is situated within Mining Lease (ML) 1535 at Lake Cowal near West Wyalong in the Central West of New South Wales (NSW). Evolution Mining (Cowal) Pty Limited (Evolution) is the owner and operator of the CGO. The Modification would primarily comprise:

- An increase in the ore processing rate from 7.5 million tonnes per annum (Mtpa) to 9.8 Mtpa;
- additional disturbance within and to the north-east of the existing ML 1535;
- modification of the existing Tailings Storage Facilities (TSFs) to form one large TSF; and
- duplication of the existing water supply pipeline between ML 1535 and the Bland Creek Palaeochannel borefield (Bore 4).

Development Consent for the Modification will be sought from the NSW Minister for Planning and Environment under the NSW *Environmental Planning and Assessment Act 1979*.

Niche Environment and Heritage Pty Ltd was commissioned by Evolution to produce an ACHA report in accordance with the following regulations, codes and guidelines:

- *Draft Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation* (Department of Environment and Conservation [DEC] 2005);
- *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (ACHCRs) (NSW Department of Environment, Climate Change and Water [DECCW] 2010a);
- *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* (DECCW 2010b);
- *Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales* (DECCW 2010c);
- *Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW* (NSW Office of Environment and Heritage [OEH] 2011);
- *Australia ICOMOS Charter for Places of Cultural Significance (The Burra Charter)* (Australia International Council on Monuments and Sites [ICOMOS] 2013);
- *NSW Minerals Industry Due Diligence Code of Practice for the Protection of Aboriginal Objects* (NSW Minerals Council 2010);
- *Engage Early – Guidance for proponents on best practice Indigenous engagement for environmental assessments under the Environmental Protection and Biodiversity Act 1999* (EPBC Act) (Commonwealth Government 2016); and
- *NSW National Parks and Wildlife Regulation 2009* (NPW Regulation).

The Lake Cowal area is archaeologically well understood, as it has been subject to extensive previous archaeological investigation. The proposed Modification is situated mostly on the micro-environment of the back plains and gilgai plains, where there is a continuous background scatter of stone artefacts and heat retainers, and where larger sites occur in association with gilgai landforms and the shallow local drainage depressions.

An Aboriginal archaeological survey was conducted in late August and early September 2017. The survey covered the entire Modification area, except for the inundated lake bed of Lake Cowal and the eastern lunette of Lake Cowal, which were inaccessible. There were no significant constraints to the survey, and the results were representative of other work conducted on the back plains. The survey was considered to be adequate and effective for the purposes of the assessment.

A total of 65 Aboriginal archaeological sites were identified in the Subject Area, and were comprised of:

- stone artefact sites;
- ovens;
- heat retainers; and
- a scarred tree.

While the majority of sites were stone artefact sites with low densities of artefacts, there was one large site recorded and many of the open sites had multiple features present. Scientific (archaeological) significance assessments of the sites resulted in three sites of high significance, five sites of moderate significance and 57 sites of low significance, but it is recognised that all sites are important to the Aboriginal community.

The impact assessment concluded that cumulative impact from the Modification would be relatively low.

The approved CGO Indigenous Archaeology and Cultural Heritage Management Plan (IACHMP) should be updated to include information on the sites recorded during this assessment, and amended as necessary to accommodate the recommendations of this assessment report, which are:

- All newly recorded sites in the Subject Area should be recorded on AHIMS in the prescribed manner.
- Evolution applies for an Aboriginal Heritage Impact Permit (AHIP[s]) (or variation to an existing AHIP[s]) for Aboriginal cultural heritage sites that will be affected by the Modification.
- The pre-existing management regime established by Consent 1467/Permit 1468 and Consent 1680/Permit 1681 and the IACHMP should continue to be implemented for this Modification via a new AHIP or modification to the existing Consents/Permits, including:
  - surface collection of visible stone artefacts at known sites prior to any disturbance; and
  - grader scraping of representative areas and collection of exposed artefacts and excavation of exposed ovens in all areas where infrastructure is developed.
- Should previously unrecorded sites be discovered within the Subject Area these sites should be:
  - recorded on AHIMS, including significance assessment; and
  - incorporated into the management regime presented by these recommendations, being salvage of scarred trees or collection of surface artefacts or excavation of ovens.
- The known oven sites (Lake Cowal 2017-057, Lake Cowal 2017-030, Lake Cowal 2017-012, Lake Cowal 2017-025 and Lake Cowal 2017-037) should be excavated to collect dating samples prior to disturbance.
- Archaeological salvage excavations should be undertaken at the sites Lake Cowal 2017-057 and Lake Cowal 2017-036. Lake Cowal 2017-023 should be subject to archaeological salvage excavation prior to any future disturbance in this location.
- Wherever possible, sites should be avoided, regardless of their archaeological significance.
- Provision should be made to conduct informative analyses on suitable artefacts and/or materials including:

- radiocarbon dating of charcoal samples from ovens or salvage excavations;
- geochemical characterisation of stone artefact raw materials;
- residue and use-wear analysis; and
- technological analysis of the salvaged flaked stone artefact assemblage.

- Procedures must be put in place for the discovery of Aboriginal ancestral remains during the Modification. These procedures must include, but not be limited to:
  - ensuring no further harm to the remains;
  - immediately ceasing all work in the particular location;
  - securing the area to avoid further harm to the remains;
  - notifying the CGO Environmental Manager, local police and OEH as soon as practicable; and
  - not recommence any work at the particular location unless authorised in writing by OEH.

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1. Introduction

1.1 Background

The Cowal Gold Operations (CGO) is located approximately 38 kilometres (km) north-east of West Wyalong in New South Wales (NSW) (Figure 1). Evolution Mining (Cowal) Pty Limited (Evolution) is the owner and operator of the CGO. Evolution acquired the CGO from Barrick (Cowal) Pty Ltd in July 2015.

Development Consent for the CGO (DA 14/98) (including the Bland Creek Palaeochannel Borefield water supply pipeline) was granted by the NSW Minister for Urban Affairs and Planning under Part 4 of the NSW *Environmental Planning and Assessment Act, 1979* (EP&A Act) on 26 February 1999. The area of land to which the Development Consent (DA 14/98) is relevant includes the underlying Mining Lease (ML) 1535. Development Consent (DA 2011/64) for the operation of the Eastern Saline Borefield was granted by the Forbes Shire Council on 20 December 2010.

Recent feasibility studies have identified potential opportunities to maximise the ore processing capacity of the CGO's existing processing plant. On this basis, Evolution proposes to modify Development Consent DA 14/98 under section 75W of the NSW EP&A Act to increase the CGO's approved ore processing rate of 7.5 million tonnes per annum (Mtpa) to 9.8 Mtpa (herein referred to as the Modification). A more detailed description of the Modification is provided in Section 3. The general arrangement of the Modification is presented on Figure 2.

1.2 Scope of the Assessment

Niche Environment and Heritage Pty Ltd (Niche) has been commissioned by Evolution to undertake an Aboriginal Cultural Heritage Assessment (ACHA) for the proposed Modification. The ACHA for the Modification will specifically assess those areas associated with the Modification, and includes survey of those areas that have not been covered by previous assessments, surveys or investigations. Areas already subject to existing approval, including those portions of the Modification that are located within the extent of the approved Aboriginal Heritage Impact Permits (AHIP) and consent boundaries, have not been reconsidered in this assessment.

1.3 Objectives of the Assessment

The objectives of the ACHA are to provide an assessment of the potential for the Modification to harm Aboriginal objects and Aboriginal heritage values, and identify ways to avoid or minimise this potential harm (including appropriate management measures) in accordance with current best practice and informed by input from the Aboriginal community.

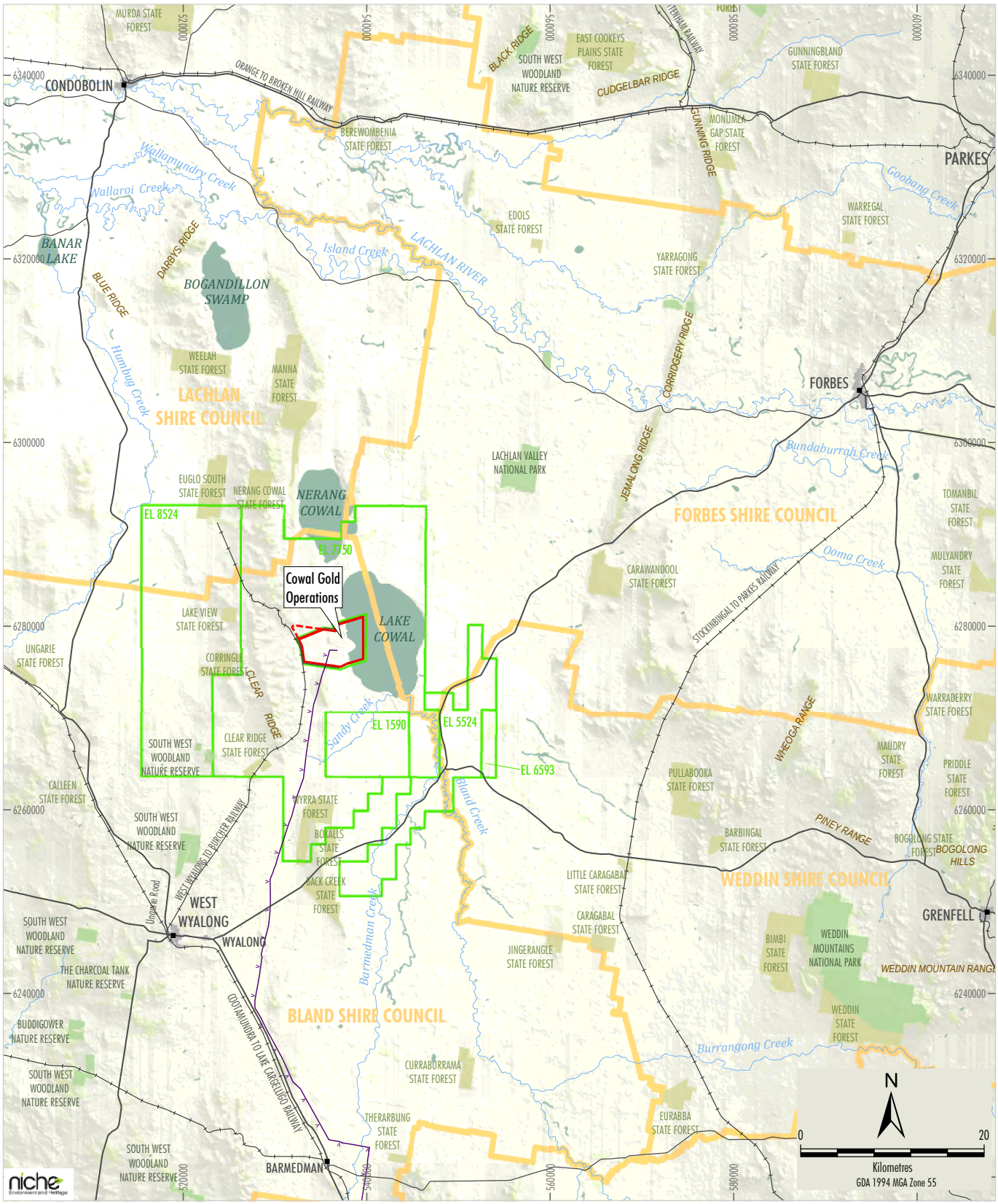
This ACHA has been prepared in accordance with (but not limited to) the following regulation and guidelines (where relevant):

- *Draft Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation* (Department of Environment and Conservation 2005);
- *Aboriginal cultural heritage consultation requirements for proponents 2010* (ACHCRs) (NSW Department of Environment, Climate Change and Water [DECCW] 2010a);
- *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* (DECCW 2010b);
- *Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales* (DECCW 2010c);

- *Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW* (NSW Office of Environment and Heritage [OEH] 2011);
- *The Burra Charter: The Australia ICOMOS Charter for Places of Cultural Significance* (Australia International Council on Monuments and Sites [ICOMOS] 2013);
- *NSW Minerals Industry Due Diligence Code of Practice for the Protection of Aboriginal Objects* (NSW Minerals Council 2010);
- *Engage Early – Guidance for proponents on best practice Indigenous engagement for environmental assessments under the Environmental Protection and Biodiversity Act, 1999* (EPBC Act) (Commonwealth Government 2016); and
- NSW *National Parks and Wildlife Regulation 2009* (NPW Regulation).

Within the above list we note the primacy of the Statutory instruments at items 1, 2 and 3 and confirm the approach was guided by the requirements of these three instruments. Consultation activities, as per item 1, were managed by Evolution.

This ACHA has also been prepared in consideration of the currently approved CGO Indigenous Archaeology and Cultural Heritage Management Plan (IACHMP) (Barrick 2003), and the existing Aboriginal heritage permits and consents.



HAL-16-41_Mod14_PRM_App ACHA 2017

LEGEND

- Mining Lease Boundary (ML 1535)
- Mining Lease Application (MLA 1)
- Exploration Licence (EL)
- National Park & Nature Reserve
- State Forest
- Local Government Area Boundary
- Electricity Transmission Line
- Railway

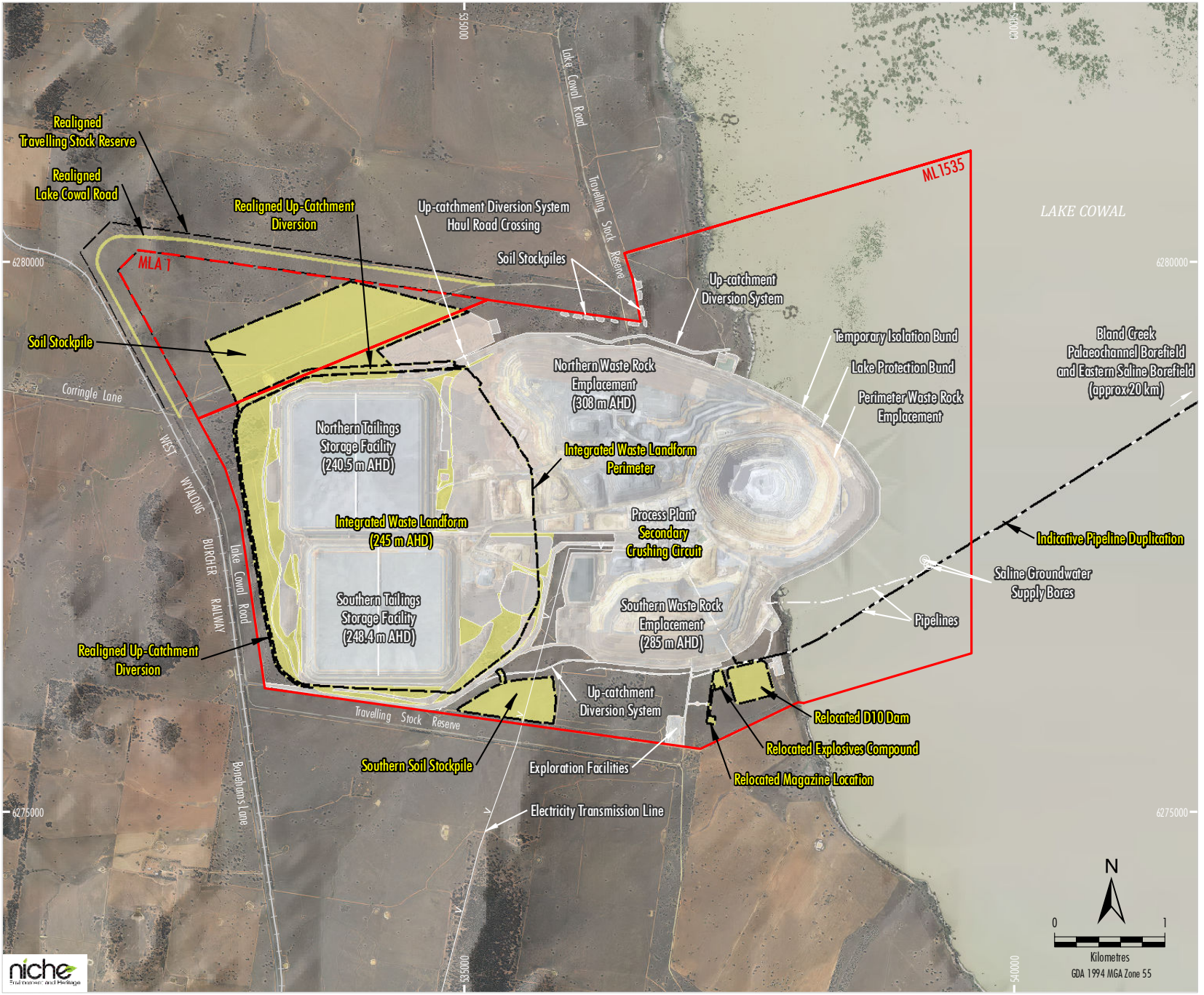
Source: © NSW Department of Finance, Services & Innovation (2017); Office of Environment & Heritage NSW (2017)

Evolution Mining Cowal

CGO PROCESSING RATE MODIFICATION

Regional Location

Figure 1



LEGEND

- Mining Lease Boundary (ML 1535)
- Mining Lease Application Boundary (MLA 1)
- Approximate Extent of Approved Surface Development
- Approximate Extent of Additional Modification Surface Disturbance
- Modification Component

Source: Evolution (2018); © NSW Department of Finance, Services & Innovation (2017)
Orthophoto: Evolution (Oct 2017)

Evolution MINING Cowal

CGO PROCESSING RATE MODIFICATION

Modification General Arrangement

Figure 2

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2. Site Location and Subject Area

The Modification is located in central NSW, approximately 38 km north-east of West Wyalong and 63 km south-east of Condobolin, near the locality of Lake Cowal. The Modification is located within the Local Government Areas (LGA) of Bland and Forbes. The existing ML 1535 is located in the Bland LGA, the Water Supply Pipeline and Bland Creek Palaeochannel (BCPC) and eastern saline borefields are located in the Forbes LGA.

The Subject Area for this ACHA encompasses the Modification area (Figure 2), which comprises various pieces and parcels of land adjacent to and "within" the existing CGO, and a proposed water pipeline in an existing easement that runs from the CGO to a location east of Lake Cowal (Bore 4 in the Bland Creek Palaeochannel Borefield). The water pipeline proposed as part of the Modification would require a disturbance corridor of 6 metres (m) along the pipeline route, as well as several temporary laydown areas along the pipeline route. However, this ACHA has conservatively assessed a larger corridor width of 40 m (as opposed to 6 m) along the pipeline route. Accordingly, the 'Modification Footprint Polygon' shown on figures within this ACHA includes a 40 m wide corridor along the pipeline route.

As such the Subject Area is situated in the following administrative and cadastral boundaries:

- Mining Lease (ML) 1535.
- Exploration Lease (EL) 7750.
- Lot 100 DP1059150.
- Lot 101 DP1059150.
- Lot 102 DP1059150.
- Lot 103 DP1059150.
- Lot 104 DP1059150.
- Lot 105 DP1059150.
- Lot 106 DP1059150.
- Lot 107 DP1059150.
- Lot 39 DP39733.
- Lot 18 DP753097.
- Lot 23 DP753097.
- Lot 24 DP753097.
- Lot 25 DP753097.
- Lot 1 DP1060709.
- Lot 2 DP1060907.
- Lot 7 DP753083.
- Lot 44 DP42918.
- Lot 45 DP42918.
- Lot 46 DP42918.
- Lot 47 DP42918.
- Lot 7323 DP1157291.

3. Description of the Development Proposal

3.1 Scope of the Modification

The main activities associated with development of the Modification would include (Figure 2):

- increasing the ore processing rate from 7.5 Mtpa to 9.8 Mtpa;
- modification of the existing Tailings Storage Facilities (TSFs) to form one larger TSF, which would also accommodate mine waste rock (herein referred to as the Integrated Waste Landform [IWL]);
- relocation of water management infrastructure (i.e. the Up-Catchment Diversion System and approved location for contained water storage D10) and other ancillary infrastructure (e.g. internal roads and soil and ore stockpiles) elsewhere within Mining Lease (ML) 1535 and Mining Lease Application (MLA) 1;
- installation of a secondary crushing circuit within the existing process plant area;
- duplication of the existing water supply pipeline across Lake Cowal;
- increased annual extraction of water from the CGO's external water supply sources;
- increased consumption of process reagents (including cyanide) and other process consumables;
- an increase in the average and peak workforce employed at the CGO;
- relocation of a travelling stock reserve (TSR) and Lake Cowal Road; and
- provision of crushed rock material to local councils to assist with road base supplies.

Importantly, the Modification will include surface disturbance that is not subject to the existing section 87 and section 90 permits (#1468 and #1681) and consents (#1467 and #1680) relevant to ML 1535, and as such, Evolution may seek new AHIP(s) (and/or variation to existing permits and consents) for the Modification.

It is anticipated that the Modification would commence as soon as practicable, following all necessary approvals.

3.2 Statutory Framework

The National Parks and Wildlife Act 1974 (NPW Act), administered by the OEH, provides statutory protection for Aboriginal objects and establishes a framework through statutory regulations and subordinate instruments for the management of Aboriginal objects and Aboriginal cultural heritage in NSW. The NPW Act defines Aboriginal objects and Aboriginal places as:

> *"Aboriginal object" means any deposit, object or material evidence (not being a handicraft made for sale) relating to the Aboriginal habitation of the area that comprises New South Wales, being habitation before or concurrent with (or both) the occupation of that area by persons of non-Aboriginal extraction, and includes Aboriginal remains.*
>
> *"Aboriginal place" means any place declared to be an Aboriginal place under section 84.*

The OEH is responsible for the implementation of the Aboriginal heritage provisions of the NPW Act. The rationale behind the NPW Act is to prevent the unnecessary or unwanted destruction of Aboriginal objects and to protect and conserve objects where such action is considered not warranted.

Changes to the NPW Act in 2010 saw regulatory approval to harm Aboriginal objects managed through the AHIP system. An AHIP is required (except when there is a designated State Significant Development) to allow any impacts to an Aboriginal object or Aboriginal place.

Evolution currently manages Aboriginal heritage at the CGO in accordance with the following permits and consents, valid under the then section 87 and section 90 of the NPW Act:

- Permit 1468 authorising certain archaeological works in the ML 1535 area, water pipeline area and borefield area.
- Consent 1467 authorising the destruction of Aboriginal objects (in certain circumstances) in the ML 1535 area, water pipeline area and borefield area.
- Permit 1681 authorising certain archaeological works in the relocated TSR area and road upgrade area.
- Consent 1680 authorising the destruction of Aboriginal objects (in certain circumstances) in the relocated TSR area and road upgrade area.

This ACHA will be used to support an application for a new AHIP(s) (and/or a variation to the existing permits and consents) for the Modification.

3.3 Secretary's Environmental Assessment Requirements

The Secretary's Environmental Assessment Requirements (SEARs) were issued for the Modification on 17 November 2017. Heritage was noted as a key issue for the Modification, and with regard to ACHA, the SEARs require:

- *adequate consultation with Aboriginal stakeholders having regard to the Aboriginal Cultural Heritage Consultation Requirements for Proponents (OEH, 2010); and*
- *an assessment of the likely Aboriginal and historic heritage (cultural and archaeological) impacts of the proposed modification.*

The SEARs further note the following "environmental planning instruments, guidelines, policies, and plans that may be relevant to the environmental assessment of the proposed modification" for Aboriginal heritage and non-Aboriginal heritage:

- The Burra Charter: (The Australia ICOMOS Charter for Places of Cultural Significance).
- Draft Guidelines for Aboriginal Cultural Heritage Assessment and Community Consultation (DP&E).
- Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010 (DECCW).
- Code of Practice for Archaeological Investigations of Objects in NSW (OEH).
- Due Diligence Code of Practice for the Protection of Aboriginal Objects in NSW (OEH).
- NSW Heritage Manual (OEH).
- Statements of Heritage Impact (OEH).

4. Aboriginal Community Consultation Process

In administering its statutory functions under Part 6 of the NPW Act, the OEH requires that proponents consult with Aboriginal people about the Aboriginal cultural heritage values (cultural significance) of Aboriginal objects and/or places within any given development area, in accordance with clause 80C of the NPW Regulation and the ACHCRs (DECCW 2010a).

Consultation with the Aboriginal community for this ACHA has been undertaken in compliance with the requirements of the following legislative instruments and the following guidelines:

- *Draft Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation* (Department of Environment and Conservation 2005);
- ACHCRs (DECCW 2010a);
- *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* (DECCW 2010b);
- *Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales* (DECCW 2010c);
- *Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW* (OEH 2011);
- *The Burra Charter: The Australia ICOMOS Charter for Places of Cultural Significance* (Australia ICOMOS 2013);
- *NSW Minerals Industry Due Diligence Code of Practice for the Protection of Aboriginal Objects* (NSW Minerals Council 2010);
- *Engage Early – Guidance for proponents on best practice Indigenous engagement for environmental assessments under the Environmental Protection and Biodiversity Act, 1999* (EPBC Act) (Commonwealth Government 2016); and
- NSW *National Parks and Wildlife Regulation 2009* (NPW Regulation).

The OEH maintains that the objective of consultation with Aboriginal communities about the cultural heritage values of Aboriginal objects and places is to ensure that Aboriginal people have the opportunity to improve ACHA outcomes by (DECCW 2010a):

- providing relevant information about the cultural significance and values of Aboriginal objects and/or places;
- influencing the design of the method used to assess cultural and scientific significance of Aboriginal objects and/or places;
- actively contributing to the development of cultural heritage management options and recommendations for any Aboriginal objects and/or places within the proposed Subject Area; and
- commenting on draft assessment reports before they are submitted by the proponent to the OEH.

Consultation in the form outlined in the ACHCRs is a formal requirement where a proponent is aware that their development activity has the potential to harm Aboriginal objects and/or places. The OEH also recommends that these requirements be used when the certainty of harm is not yet established but a proponent has, through some formal development mechanism, been required to undertake a cultural heritage assessment to establish the potential harm their proposal may have on Aboriginal objects and places.

Consultation for the Modification has been undertaken in accordance with the ACHCRs as they meet the fundamental tenants of the *Draft Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation* (DEC, 2005), whilst also meeting current industry standards for community consultation.

The ACHCRs outline a four stage consultation process that includes detailed step by step guidance as to the aim of each stage, how it is to proceed and what actions are necessary for it to be successfully completed. The four stages are:

- Stage 1 – Notification of the project proposal and registration of interest.
- Stage 2 – Presentation of information about the proposed project.
- Stage 3 – Gathering information about the cultural significance.
- Stage 4 – Review of the draft cultural heritage assessment report.

The document also outlines the roles and responsibilities of the OEH, Aboriginal parties (including Local and State Aboriginal Land Councils) and proponents throughout the consultation process.

To meet the requirements of consultation it is expected that proponents will (DECCW, 2010a):

- bring the Registered Aboriginal Parties (RAPs) or their nominated representatives together and be responsible for ensuring appropriate administration and management of the consultation process;
- consider the cultural perspectives, views, knowledge and advice of the RAPs involved in the consultation process in assessing cultural significance and developing any heritage management outcomes for Aboriginal objects and/or places;
- provide evidence to the OEH of consultation by including information relevant to the cultural perspectives, views, knowledge and advice provided by the RAPs;
- accurately record and clearly articulate all consultation findings in the final cultural heritage assessment report; and
- provide copies of the cultural heritage assessment report to the RAPs who have been consulted.

The consultation process undertaken to seek active involvement from relevant Aboriginal people followed the current NSW framework, namely, the ACHCRs and clause 80C of the NPW Regulation. Section 1.3 of the ACHCRs describes the guiding principles of the document. The principles have been derived directly from the Australian Heritage Commission's *Ask First: A guide to respecting Indigenous heritage places and values* (Australian Heritage Commission 2002). Both documents share the aim of creating a system where prior informed advice can be sought from the Aboriginal community.

The following sections outline the process and results of the consultation conducted during the preparation of this ACHA to ascertain and manage the Aboriginal cultural heritage values of the Subject Area.

4.1 Stage 1 – Notification and Registration

This stage of the consultation process is used to identify, notify and register any Aboriginal people or groups who may have a cultural interest in and/or possess cultural knowledge relevant to determining the cultural significance of Aboriginal objects or places in the Subject Area.

In accordance with section 4.1.2 of the ACHCRs (DECCW 2010a), Project notifications (Appendices 1 and 2) were sent to relevant organisations on 16 February 2017. The organisations contacted and dates of correspondence are provided in Table 1.

Table 1. List of Contacted Organisations for Step 1 of Consultation Process

Organisation Contacted	Date of Notification Sent	Date of Response Received
Bland Shire Council	16 February 2017	27 February and 6 March 2017
Central West Local Land Services	16 February 2017	-
Condobolin Local Aboriginal Land Council	16 February 2017	-
Forbes Shire Council	16 February 2017	27 February 2017
National Native Title Tribunal	16 February 2017	23 February 2017
Native Title Services Corporation Limited	16 February 2017	-
NSW Office of Environment and Heritage (Dubbo)	16 February 2017	23 March 2017
Office of the Registrar, *Aboriginal Land Rights Act 1983*	16 February 2017	23 February 2017
West Wyalong Local Aboriginal Land Council	16 February 2017	27 February 2017

As a result of contacting the relevant organisations, a number of individuals and groups were identified as potentially having an interest in the Modification. An invitation was sent out to each individual/group inviting Aboriginal persons or groups who hold cultural knowledge relevant to, or who have a right or interest in, determining the cultural heritage significance of Aboriginal object(s) and/or place(s) in the "Area of Interest" to register an interest in the Modification by 22 March 2017 (Appendices 1 and 2).

Public notices seeking registrations of interest from any potential Aboriginal stakeholders were placed in the following newspapers:

- *Forbes Advocate* (7 March 2017);
- *The West Wyalong Advocate* (7 March 2017);
- *The Condobolin Argus* (8 March 2017);
- *Daily Liberal* (8 March 2017);
- *The Daily Advertiser* (8 March 2017);
- *Koori Mail* (8 March 2017); and
- *The Area News (Griffith)* (8 March 2017).

A number of Aboriginal stakeholders have previously been identified as having registered an interest in the community consultation process associated with the approved CGO. All existing RAPs who had previously registered an interest in the CGO were sent a letter on 8 March 2017 to advise them of the Modification and to notify them that they had been automatically registered for the consultation process associated with the Modification (Appendices 1 and 2).

As a result of the registration process undertaken for the Modification, a total of 29 RAPs registered an interest in the Modification. A list of RAPs is provided in Table 2.

A list of the RAPs for the Modification was provided to the OEH, West Wyalong Local Aboriginal Land Council (LALC) and Condobolin LALC on 21 April 2017.

Table 2. Registered Aboriginal Parties for the Modification

Representative Aboriginal Party		
Name	**Name**	**Name**
Alona Apps	Jahnaya Freeman	Norma Freeman
Beverley Johnson	Janine Thompson	Peter Peckham
Braydon & Mikayla Davis	Jirrah Freeman	Sharon Williams
Calara Culture & Heritage Aboriginal Corporation	Judy Johnson	Shawn Williams
Cindy Fuller	Keith Freeman	Stuart Cutmore
Condobolin Local Aboriginal Land Council	Krystal Ingram	Wayne Williams
Didge Ngunawal Clan	Louise Davis	West Wyalong Local Aboriginal Land Council
Enid Clarke	Marnie Freeman	Wiradjuri Condobolin Corporation
Ernie Johnson	Murie Elders Aboriginal Corporation	Wiradjuri Interim Working Party
Isabelle Collins	Neville Williams	

A consultation log detailing all Aboriginal community consultation undertaken for the Modification is provided in Appendix 1. A copy of relevant correspondence sent to and received from the RAPs is provided in Appendix 2.

4.2 Stage 2 and Stage 3 – Presentation of Project Information and Gathering Information about Cultural Significance

4.2.1 Proposed Methodology and Information Session

Information regarding the Modification was provided in writing to all RAPs on 24 March 2017. A copy of the Proposed Methodology for the ACHA was provided for their review and comment, and the correspondence included an invitation to attend an information session regarding the Modification.

A minimum of 28 days was allowed for RAPs to provide input regarding to the following aspects:

- the nature of the Proposed Methodology;
- any Aboriginal objects or places of cultural value within the indicative Subject Area, or issues of cultural significance;
- any restrictions or protocols considered necessary in relation to any information of sensitivity that may be provided; and
- any other factors considered to be relevant to the heritage assessment.

All RAPs were invited to provide advice on Aboriginal cultural heritage values at all stages during the preparation of the assessment.

All RAPs were invited to attend an information session at the Condobolin RSL Club on 17 May 2017. The purpose of the information session was to provide RAPs with an additional opportunity to raise any cultural issues or comments/perspectives regarding the Modification or the Proposed Methodology. A total of 29 representatives of the RAPs attended the information session on 17 May 2017.

The information session supported the information previously provided in writing and included a presentation on the nature and scale of the approved Modification, an overview of the impact assessment process, a discussion of the roles, functions and responsibilities of participants and protocols for the management of any sensitive cultural heritage information. Copies of the Proposed Methodology and attendance record for the information session are provided in Appendices 3 and 4 respectively.

After further detailed mine planning, Evolution identified an additional area to be investigated for the Modification. As a result, a Proposed Methodology Addendum was prepared to reflect this; it was distributed to the RAPs on 29 May 2017, along with a copy of the information session presentation.

There were no comments received from the RAPs regarding the Proposed Methodology or Addendum.

4.3 Aboriginal Cultural Heritage Field Surveys

4.3.1 Survey Engagement Application Process

Due to the relatively large number of RAPs identified for the Modification, it was not logistically possible for Evolution to involve all RAPs in the field survey. On this basis, all RAPs were invited to submit applications for paid engagement in the surveys by 14 June 2017.

The invitation included a *Field Survey Engagement Application Form* which sought responses on:

- cultural, social and historical connections to the Subject Area;
- traditional knowledge of the Subject Area;
- previous experience in ACHA survey; and
- copies of current insurances.

4.3.2 Aboriginal Cultural Heritage Survey

Aboriginal cultural heritage surveys of the Subject Area were conducted over three periods, inclusive of the following dates:

- Monday 7 August 2017 to Friday 11 August 2017;
- Wednesday 30 August 2017 to Friday 1 September 2017; and
- Wednesday 20 December 2017.

Further details regarding the survey and survey coverage are provided in Sections 9.2 and 9.3. Table 3 lists the representatives of the RAPs who attended the surveys.

Table 3: Aboriginal cultural heritage surveys attendance

Date	Name	Representing
7 August 2017	Tiara Dunn	Murie Elders Aboriginal Corporation
	Louise Davis	West Wyalong LALC
	Leeanne Hampton	West Wyalong LALC
	Rebecca Shepherd	Murie Elders Aboriginal Corporation
	Eugene Coe	Wiradjuri Condobolin Corporation
	Joe Coe	Wiradjuri Condobolin Corporation
8 August 2017	Tiara Dunn	Murie Elders Aboriginal Corporation
	Louise Davis	West Wyalong LALC
	Leeanne Hampton	West Wyalong LALC
	Rebecca Shepherd	Murie Elders Aboriginal Corporation
	Eugene Coe	Wiradjuri Condobolin Corporation
	Joe Coe	Wiradjuri Condobolin Corporation
9 August 2017	Tiara Dunn	Murie Elders Aboriginal Corporation
	Louise Davis	West Wyalong LALC
	Leeanne Hampton	West Wyalong LALC
	Rebecca Shepherd	Murie Elders Aboriginal Corporation
	Eugene Coe	Wiradjuri Condobolin Corporation
	Joe Coe	Wiradjuri Condobolin Corporation
10 August 2017	Tiara Dunn	Murie Elders Aboriginal Corporation
	Louise Davis	West Wyalong LALC
	Leeanne Hampton	West Wyalong LALC
	Rebecca Shepherd	Murie Elders Aboriginal Corporation
	Eugene Coe	Wiradjuri Condobolin Corporation
	Joe Coe	Wiradjuri Condobolin Corporation
11 August 2017	Louise Davis	West Wyalong LALC
	Leeanne Hampton	West Wyalong LALC
	Rebecca Shepherd	Murie Elders Aboriginal Corporation
	Eugene Coe	Wiradjuri Condobolin Corporation
	Joe Coe	Wiradjuri Condobolin Corporation
30 August 2017	Tiara Dunn	Murie Elders Aboriginal Corporation
	Leeanne Hampton	West Wyalong LALC
	Rebecca Shepherd	Murie Elders Aboriginal Corporation
	Joe Coe	Wiradjuri Condobolin Corporation
	Cecil Coe	Wiradjuri Condobolin Corporation
	Brayden Davis	West Wyalong LALC

Date	Name	Representing
31 August 2017	Tiara Dunn	Murie Elders Aboriginal Corporation
	Leeanne Hampton	West Wyalong LALC
	Rebecca Shepherd	Murie Elders Aboriginal Corporation
	Joe Coe	Wiradjuri Condobolin Corporation
	Cecil Coe	Wiradjuri Condobolin Corporation
1 September 2017	Tiara Dunn	Murie Elders Aboriginal Corporation
	Leeanne Hampton	West Wyalong LALC
	Rebecca Shepherd	Murie Elders Aboriginal Corporation
	Joe Coe	Wiradjuri Condobolin Corporation
	Cecil Coe	Wiradjuri Condobolin Corporation
20 December 2017	Tiara Dunn	Murie Elders Aboriginal Corporation
	Louise Davis	West Wyalong LALC
	Leeanne Hampton	West Wyalong LALC
	Joe Coe	Wiradjuri Condobolin Corporation

4.4 Stage 4 – Review of Draft Report

In accordance with the Consultation Guidelines, a draft of this ACHA was provided to all RAPs listed in Table 2 for review and comment.

The draft ACHA report was provided to the RAPs on 16 February 2018, with feedback and comments requested by 5.00 pm 21 March 2018.

4.4.1 Written Submissions Received

A written submission was received from Norma Freeman on 22 February 2018. The submission pointed out a typographic error with regard to a family member's name in the Consultation Log, attached as Appendix 1 of the draft ACHA report. This mistake was amended for this final version of the ACHA report. A copy of this correspondence is not included in Appendix 2, however a record of this correspondence is included in Appendix 1.

No other written submissions were received.

4.4.2 Draft Report Presentation and Site Inspections

During the draft ACHA review period, RAPs (along with Elders and other Aboriginal community members) were invited to attend an information session and site inspection to view a selection of the identified Aboriginal cultural heritage sites within the Subject Area (Appendix 2).

The information session was held at the Lake Cowal Conservation Centre on 8 March 2018. The information session included a presentation on the Modification, including the final impact footprint that had been derived from the detailed design developed in response to environmental constraints. The results of the ACHA were presented at the information session, and an opportunity to discuss the results was provided. Copies of the information session presentation and the attendance record are provided in Appendix 4.

A site inspection of the Study Area was then conducted, visiting representative sites and landscape areas. During the tour the archaeological and cultural aspects of the sites and Study Area were discussed (Plate 1).

Plate 1. Discussing heritage values during the site inspection on 8 March 2018

During the information session and discussion, the following comments were received and the following responses were provided.

Leeanne Hampton (West Wyalong LALC) observed that the final number of 65 sites recorded didn't seem to be in agreement with the high number of individual features observed.

Jamie Reeves (Niche) noted that the figure of 65 sites was based on grouping features together for the purposes of assessment and recording. Jamie noted that there were 225 individual stone artefacts recorded, and many heat retainers and several ovens, so in fact there were a lot of archaeological features recorded.

Norma Freeman (Young LALC)[1] asked if the scarred tree (Lake Cowal 2017-021) would be affected by the proposed modification works.

Danielle Wallace (Evolution) noted that the scarred tree would not be affected by the Modification. This is also made clear in Section 13.1.4 and Table 19.

Leeanne Hampton (West Wyalong LALC) asked which hearths/ovens were proposed for excavation.

Jamie Reeves (Niche) noted that any oven that was within the impact footprint would be excavated prior to disturbance, including at the site of high significance Lake Cowal 2017-057.

Leeanne Hampton (West Wyalong LALC) expressed satisfaction with the proposed salvage works, as they would provide valuable information.

Norma Freeman (Young LALC) expressed satisfaction with the ACHA and report overall and that it was good that the scarred tree would not be affected.

[1] Norma Freeman registered as an individual RAP during the Modification registration process, however indicated she would represent the Young LALC when attending the draft ACHA information session and site inspection.

5. Investigators and Contributors

This investigation was managed by Jamie Reeves (BA Hons), Director of Niche, assisted by Renée Regal (BA Hons), Niche Heritage Team Leader. Both Jamie and Renée are suitably qualified to comply with the *Code of Practice for the Archaeological Investigation of Aboriginal Objects in NSW* (DECCW 2010b). Research, field assessment and report writing were conducted by Renée and Jamie. Clare Leevers (BArch, GradDipArch), Niche Archaeologist, assisted with the report writing for this assessment.

6. Aboriginal Archaeological Context

6.1 Ethnography and History

Lake Cowal sits in the country of the Wiradjuri people. Tindale (1940, 1974) has identified the Wiradjuri lands as a large area in central NSW, from the Blue Mountains in the east, to Hay in the west, north to Nyngan and south to Albury (the South Western slopes region). Attenbrow (2010:35) points out that such boundary mapping, undertaken as it was in the nineteenth century, is indicative at best; however, there is little doubt that the Wiradjuri country was the largest language grouping in the area that is now NSW. Wiradjuri lands are known as the "land of three rivers" after the rivers that border their lands: Murrumbidjeri (Murrumbidgee), Kalari (Lachlan) and Wombol (Macquarie) Rivers.

Comprehensive texts have been written to provide an account of the Wiradjuri experience in Riverina colonial history such as *A Hundred Years War: The Wiradjuri People and the State* (Read 1988) and *Survival Legacies: Stories from Aboriginal settlements of southeastern Australia* (Kabaila 2011). The records and histories of the Wiradjuri and their country at the time of contact with Europeans are often subject to the bias of European recorders and are generally fragmented, providing an incomplete picture of the way Aboriginal people were living prior to European contact. Nevertheless, we know the Wiradjuri regularly communicated, moved, traded and participated in ceremonies between their country and neighbouring areas. Despite differences in dialect, the Wiradjuri are identified as a coherent group as they maintained a cycle of ceremonies that moved in a ring around the whole tribal area. This cycle led to tribal coherence despite the large occupied area. Rather than being confined to strict "tribal" boundaries, such as the borders that were to be artificially imposed by European anthropologists, Wiradjuri family groups and clans would have interacted with neighbouring groups along both physical and social boundaries, with the groups 'not bound by any necessity of maintaining property' and boundaries therefore being 'permeable and shifting' depending on season and circumstance (Kabaila 2005: 9-10). Gatherings and alliances would have been of various sizes, with the largest being tribal gatherings (about 500 people) for ceremonies, initiation and trade, with reciprocal obligations between groups being an important factor in the social and cultural stability of the Wiradjuri (Kabaila 2005: 10).

It is generally accepted that Aboriginal occupation of Australia dates back at least 45,000 years (Allen and O'Connell 2003), and as Pardoe notes, the Wiradjuri were likely present in the Lachlan and Lake Cowal area from the beginning of this time (Pardoe 2013). The result of this extensive and continued occupation of the region, and its changing climate, landscape and ecology over such a long period is a vast amount of accumulated archaeological evidence, or as the Code of Practice refers to this "past traces of Aboriginal land use".

The fertility and quality of Wiradjuri lands meant that they were greatly affected by European settlement in the area, and once interruption restrictions were lifted from the early 1820s, European pressure and Aboriginal resistance led to open conflict from 1822-1824. These conflicts culminated in the 'Battle of Bathurst' on 18 September 1824, where several hundred Wiradjuri people were killed.

The gold rush of the 1850s in the eastern Wiradjuri lands saw the local European population around Orange and Bathurst boom, becoming one of the most densely populated areas in the state. This subjected the Wiradjuri population to new diseases, which would have spread well beyond the new colonist's population centres. This, combined with the pastoral settling of the slopes and plains that had begun some decades earlier, displaced many Wiradjuri placing pressure on the traditional systems of cosmology and economy.

Despite the massive changes that were so quickly brought to the Wiradjuri people around the Lake Cowal region through the impact of European settlement, the Wiradjuri people maintain a sense of community and a strong sense of cultural identity, including the responsibility to be involved in the care and management of their traditional lands and cultural heritage. The social, cultural and community organisation and responsibilities noted to be present during pre-contact times can still be seen in the Wiradjuri communities continuing to live throughout their lands today (Kabaila 2005: 10). There are currently over 25,000 Aboriginal people continuing to live in Wiradjuri country, all of whom continue to be custodians of the land, while Wiradjuri Traditional Owners maintain cultural knowledge.

6.2 Heritage Register Searches

6.2.1 AHIMS Register

A search of the Aboriginal Heritage Information Management System (AHIMS) was conducted on the Subject Area on 24 August 2017 (AHIMS Search #297670) (Appendix 5). There were 26 previously recorded sites in the AHIMS search area in close proximity to the Subject Area, but there were no previously recorded sites within the Subject Area itself (Figure 3). The majority of the 26 sites are open artefact sites in addition to one scarred tree, a stone quarry was recorded as an additional feature to one of the artefact sites and a scarred tree was recorded as an additional feature to another artefact site. Table 4 summarises the results of the AHIMS search (AHIMS Search #297670).

Table 4: Summary of Aboriginal Site Features within Extent of AHIMS Search #297670

Site Context	AHIMS Site Feature*	Total Number	Total Percentage (%)
Open Site	Artefact	23	88%
Open Site	Modified Tree	1	4%
Open Site	Artefact; Modified Tree	1	4%
Open Site	Artefact; Stone Quarry	1	4%
Total		**26**	**100%**

* As per AHIMS Search #29760 and as defined by Brown (2005).

The site records on AHIMS pre-date the current recording system therefore they do not specify the number of feature instances (e.g. the number of artefacts) recorded at each of the sites. The sites were recorded during earlier assessments undertaken for the GCO (discussed further below) and as such 19 of the 26 known sites have been managed (i.e. salvaged) under permits and consents held by the CGO (Figure 3).

6.2.2 Other Registers

In addition to AHIMS, the following heritage registers were searched on 24 August 2017 for Aboriginal heritage items:

- National Heritage List and Commonwealth Heritage List (via the Australian Heritage Database);
- Register of the National Estate (via the Australian Heritage Database);
- State Heritage Register;
- the s170 Heritage and Conservation Register; and
- the National Trust Register.

There were no items pertaining to the Aboriginal history of the Subject Area listed on the above registers and lists. Lake Cowal is registered on the Register of the National Estate for its natural values as a wetland and important bird breeding location.

AHIMS Results

ID	Site Features
43-3-0021	Artefact
43-3-0022	Artefact
43-3-0023	Artefact
43-3-0024	Artefact
43-3-0025	Artefact
43-3-0026	Artefact
43-4-0007	Artefact
43-4-0008	Modified Tree (Carved or Scarred)
43-4-0020	Artefact
43-4-0021	Artefact
43-4-0022	Artefact
43-4-0023	Artefact
43-4-0024	Artefact
43-4-0025	Artefact
43-4-0026	Artefact
43-4-0027	Artefact
43-4-0028	Artefact
43-4-0029	Artefact
43-4-0030	Artefact
43-4-0031	Artefact
43-4-0032	Artefact
43-4-0033	Artefact
43-4-0034	Artefact : 1, Stone Quarry : 1
43-4-0035	Artefact : 1, Modified Tree (Carved or Scarred) : 1
43-4-0044	Artefact : 1
43-4-0045	Artefact : 1

niche Environment and Heritage

AHIMS Search Results

Cowal Gold Operations Processing Rate Modification - Aboriginal Cultural Heritage Assessment

FIGURE 3

Imagery: (c) DigitalGlobe 2015-08-02

6.3 Regional Archaeological Studies

Lake Cowal is located in central NSW, on the low gradient western slopes and plains. Dan Witter has compiled a broad scale review of the Aboriginal archaeology of western NSW, including the region of Lake Cowal (Witter 2004). Witter (2004) classifies the Lake Cowal area in the Southwestern Slopes archaeological region of western NSW. This region takes in the western flank of the Great Dividing Range, and Witter describes it as physiographically "a transitional zone between the high plateaus of the Dividing Range and the vast plains to the west", and notes that the region includes a "pocket of riverine plains around Condobolin" (Witter 2004: 137). Although not noted by Witter, this large Southwestern Slopes Region is very similar to the lands recognised as being Wiradjuri country.

Witter (2004) suggests that open campsites (sites with stone artefacts on the ground surface) are an extremely common site type and that they occur in all parts of the region, but are most frequently found in stream valleys and crests. The region has seen extensive agricultural development, with ploughing harming many sites in an open context. The use of quartz as a raw material for making stone artefacts is very common in the region. Regionally, site types other than open campsites are relatively rare, with heat retainer ovens and ground stones (axes) being uncommon, as are suitable outcrops of rock for stone tool-making. Witter (2004) also notes that sites of Pleistocene age (generally older than 10,000 years) will be rare due to poor landscape preservation conditions.

The concept of archaeological regions is a powerful one for broad scale understanding of large landscapes, however Witter notes that there may be internal variations in the abundance and diversity within sub-districts, while these sub-districts still remain consistent with the surrounding region (Witter 2004: 134). As a major landscape feature, Lake Cowal is the centre of one such sub-district within the broader archaeological region. Pardoe (2009a: 17) notes that while Witter's model is accurate at a region-scale level, closer observation of areas such as Lake Cowal tells a distinctive story, where regionally sparse features such as ovens and heat retainers or grinding stones can be locally very common, as discussed below.

6.4 Local Archaeological Investigations

Extensive Aboriginal cultural heritage investigations have been conducted at Lake Cowal over the last 20 years, mostly driven by the development, operation and modification of the CGO. These assessments are discussed below, with most emphasis placed on recent work by Dr Colin Pardoe, as this is the most informative for the purposes of this report.

Paton 1989. Preliminary Archaeological Inspection of Lake Cowal Mining Exploration Lease.

These preliminary inspections of the mining exploration lease were conducted by Rob Paton in 1989. Based on descriptions in Cane (1995) this entailed a brief site inspection of the Lake Cowal area and the presentation of general predictive statements regarding the likely nature and distribution of Aboriginal heritage sites. Paton was the first to conduct work here, and his interest was in comparisons with other lakes and regional patterns of the archaeological record of Wiradjuri country. There were no subsequent AHIMS registrations from this work.

Cane 1995. Camp sites at Lake Cowal: An Archaeological Survey in Central NSW.

Dr Scott Cane conducted surveys and assessment at Lake Cowal in 1995, recording 10 archaeological sites on the western margin and south of the lake. Nine of the sites were open artefact sites, or as Pardoe quite correctly calls them "lithic concentrations" (Pardoe 2009a: 17), and there was a single scarred tree. The sites recorded by Cane comprise the majority of sites presented by the AHIMS search (Figure 3). Cane's work was the first to start showing the nature of the past Aboriginal traces of land use at Lake Cowal, and how it contained archaeological sites and details that included the area in the typical archaeology of the region, but also showed specific patterns of land-use associated with the lake and surrounding plains.

The artefact sites recorded by Cane ranged from sites where samples of over 100 artefacts were readily acquired, to smaller, less dense sites. Cane also noted the presence of a "continuous background scatter of artefacts" on the land west of the lake. The assessment of the sites and artefact assemblages showed a clear difference between what was relatively closer to the lake, and what was apparent further away from the lake; this was interpreted by Cane as base camps near to Lake Cowal, and hunting and woodworking activities taking place on the plains land systems (Cane 1995: 49). With regard to the flaked stone artefacts it was noted that there were distinct, and what Cane interpreted to be regionally unique, micro blade/backed artefact industries present, and a distinct area that was dominated by quartz artefacts. The presence of backed artefacts was used to tentatively date the artefact assemblages and occupation that produced them as being 4,000 – 1,500 years ago (Cane 1995: 49).

Pardoe 2009a and 2009b. Archaeological Investigations at Lake Cowal.

This work by Colin Pardoe was conducted in 2005 in accordance with Permit #1468 and Permit #1681 granted under section 87 of the NPW Act. The purposes of these permits was to facilitate archaeological works, for mitigation of impacts to Aboriginal cultural heritage from the CGO, which was at the time, was being developed by Barrick Australia Limited (Barrick). In keeping with the legal and regulatory structure of the time, separate section 90 Consents were issued for the development works themselves, being Consent #1467 and Consent #1680, respectively. The archaeological works were part of the commitments made by Barrick under the CGO IACHMP (2003).

Pardoe's (2009a) report on the activities undertaken under the IACHMP describes various activities, including:

- monitoring of ground during topsoil removal;
- collection of surface artefacts;
- archaeological excavations of sites and ovens;
- additional archaeological inspections;
- covering of sites with geo-textile and then placing soil over the sites;
- additional assessment of potential scarred trees;
- relocation of scarred trees; and
- archaeological analysis of the results of the above activities.

The activities of most interest in understanding the local archaeology include the monitoring works, excavations and subsequent dating of some deposits and features.

Test excavations were undertaken at the sites LC-1 and P2, with test pits also placed at the lake edge north of site P2 called LCE-1, LCE-2, LCE-3 and LCE-4 (Pardoe 2009b). LC-1 was situated away from the lake edge, on the back plains and was in a scalded area. The results of excavation here indicated that there had been a high level of disturbance from past land use. Test excavations at P2 and on the lake edge were far more successful and informative, recovering stone artefacts, cultural deposits, ovens and dateable material. The excavations demonstrated the sub-surface archaeological potential of the landscape west of Lake Cowal, especially in areas that had seen relatively less development or land use.

The salvage program resulted in the provision of 10 radiocarbon dates for cultural sites west of Lake Cowal. These dates are summarised in Table 5.

Table 5. Radiocarbon dates from Lake Cowal (after Pardoe 2009a: 68)

Site/Description	Date Before Present (radiocarbon years)
Oven	1,197 +/- 36
Oven	2,845 +/- 41
Oven	3,498 +/- 55
Oven	3,856 +/- 40
LCE2 (10cm depth)	280 +/- 31
LCE2 (15cm depth)	180 +/- 31
LCE2 (20cm depth)	457 +/- 31
LCE2 (45cm depth)	6,054 +/- 40
LCE3 (20cm depth)	2,934 +/- 33
Base of occupation near lake	3,730 +/- 34

As Pardoe notes, the dates establish the fact that Lake Cowal was occupied during the time after the establishment of the current water courses, which occurred about 8,000-6,000 years ago. The dates demonstrate Wiradjuri occupation of Lake Cowal over many thousands of years and hundreds of generations.

A large number of stone artefacts were collected and analysed during the salvage program. The artefacts included flaked stone, ground-edge stone (axes), grinding stones, axe-sharpening stones, hammer stones and percussion stones. Most flaked stone was found on the plain, near the lake edge and quartz and silicified volcanic rock were the most common artefact-making raw materials. The presence of microblade technology and backed artefacts was noted. There was also the production of larger blades, which were snapped to rectangular tools that could be resharpened.

The scarred trees present were all box trees, and only a single scar was determined to definitively be the result of Aboriginal use in the past.

In conclusion, the works showed that Wiradjuri people have used all parts of the Lake Cowal area in the past, resulting in a rich archaeological landscape primarily consisting of stone artefacts, heat retainers and ovens.

Pardoe 2013. Cowal Gold Mine Extension Modification Aboriginal Cultural Heritage Assessment.

This assessment was conducted by Pardoe in 2013, encompassing modifications to allow the extension of operations at CGO. The extension areas were situated between the pit and waste rock emplacement and TSFs, and as such – like this current modification – were situated adjacent to and between previously developed areas. The entire extension area was surveyed for the assessment, although conditions of exposure and visibility were noted to be poor. The survey found several previously recorded sites, recorded two new large sites on the back plains containing stone artefacts and ovens, and observed the continuous low-density background scatter of stone artefacts and heat retainers.

Management recommendations for the sites included salvage and application of informative analyses such as radiocarbon dating, biochemical analysis of artefacts and use-wear studies. Recommendations for the background scatter were consistent with the existing management plan, which includes surface collection and collection after grader scraping of representative artefacts.

6.5 Synthesis

This section summarises the landscape and archaeological context of the Subject Area to provide predictive statements about the likelihood and nature of archaeological evidence in the Subject Area.

There has been extensive archaeological work conducted at Lake Cowal, with Dr Colin Pardoe contributing significant knowledge to our understanding of past Aboriginal land-use of this part of the Southwestern Slopes Region, defined by Witter in 2004. Occupation of the Lake Cowal area by Wiradjuri people dates back to 6,000 years ago, when the current drainage systems established and stabilised. Because of the nature of the landscape, older archaeological sites are not likely to have been preserved at Lake Cowal.

Past traces of Aboriginal land use occur across the entire mining lease, and hence Subject Area, and consist of surface and sub-surface stone artefacts, heat retainers, hearths and ovens, and scarred trees. The stone artefact assemblages include flaked stone artefacts, ground-edge stone artefacts and grinding stones for plant processing.

The largest archaeological sites occur in very close proximity to the lake edge, and these were investigated prior to the development of the pit area at the mine. Areas where ephemeral drainage lines enter Lake Cowal appear to have been the favoured location for large residential areas for Wiradjuri people living at Lake Cowal in the past. Away from the lake edge, there is a continuous distribution of stone artefacts and heat retainers (background scatter). Large occupation sites (though not residential sites) are still frequent on this back plains micro-environment, and are often associated with gilgai landscapes and drainage depressions, which suggests use of this environment after rains when it would have become a resource rich area.

6.6 Predictive Model

The predictive model developed for the Subject Area included the consideration of previous archaeological surveys and assessments in the local area and wider surrounds, the distribution and patterning of known sites within the Subject Area and surrounds, the land form units and landscape context of the Subject Area and the previous known land uses in the area.

The Subject Area is comprised mostly of what Pardoe (2009a) defined as the back plains and gilgai plains micro-environments, with a small section of lake edge micro-environments. The extensive amount of previous work at Lake Cowal, which has thoroughly sampled all landforms that occur within the Subject Area, means simple statements about the expected distribution of past traces of Aboriginal land use can be confidently made.

The following distribution of evidence of Aboriginal land use is predicted to occur in the Subject Area:

- There will be a continuous distribution of stone artefacts and heat retainers across the Subject Area, but this will be:
  - heavily disturbed by pasture and crop land development in some areas; and
  - obscured by thick grass/vegetation in most areas.
- On the back plains and gilgai plains, larger concentrations of stone artefacts, heat retainers and the presence of ovens will occur in association with gilgai plains landscapes, and the shallow drainage depressions that are present within the Subject Area.
- Near to the edge of Lake Cowal large sites may be present, and, if present, may have sub-surface potential depending on the extent of pre-existing disturbance.
- Ovens may be expected to occur in a state of preservation allowing recovery of radiocarbon dating samples.
- Scarred trees may be present where old box trees are found.
- Aboriginal ancestral remains/burials are not likely to occur within the shallow red soils and gilgai areas of the Subject Area.

7. Landscape Context

Understanding the past and present environmental contexts of an area is requisite in any Aboriginal archaeological and cultural heritage investigation (DECCW 2010a). The nature and distribution of Aboriginal archaeological sites are closely related to the environmental context. This section provides a broad overview of the environmental setting of the Subject Area, before describing each of the soil landscapes that are contained within it. When considered with the levels of past land use and modification, soil landscapes are a useful tool in identifying environmental proxies for the likely preservation and burial of Aboriginal objects in a landscape, and resources that may have been available to Aboriginal people in the past, such as the presence of rock outcrops to provide surfaces for art or to sharpen and prepare implements, stone for the manufacture of stone tools and plant species.

7.1 Geology

Lake Cowal is situated in the south-western slopes bio-geographic region of NSW. This diverse region consists of hills and foothills that form the western fall of the Great Diving Range. In the western margin of the region, where Lake Cowal is situated, there are broad alluvial plains. The area is part of the Lachlan Fold Belt, a major geological structure that runs north-south for the state's entire length through the centre of NSW (Branagan and Packham 2000). Around Lake Cowal, the surface geology is characterised by rocks formed during the Ordovician period (about 500 million years ago). The rocks consist of sedimentary types including sandstones, shales, siltstones, conglomerates, their metamorphic equivalents phyllite, schists and some volcanic rocks (King 1998). Pardoe reports that amongst the local geology there are several rock types very suitable for the manufacture of stone artefacts, including: quartz, quartzite, volcanic rock (for axes and flaked stone) and indurated sandstone (Pardoe 2013: 34).

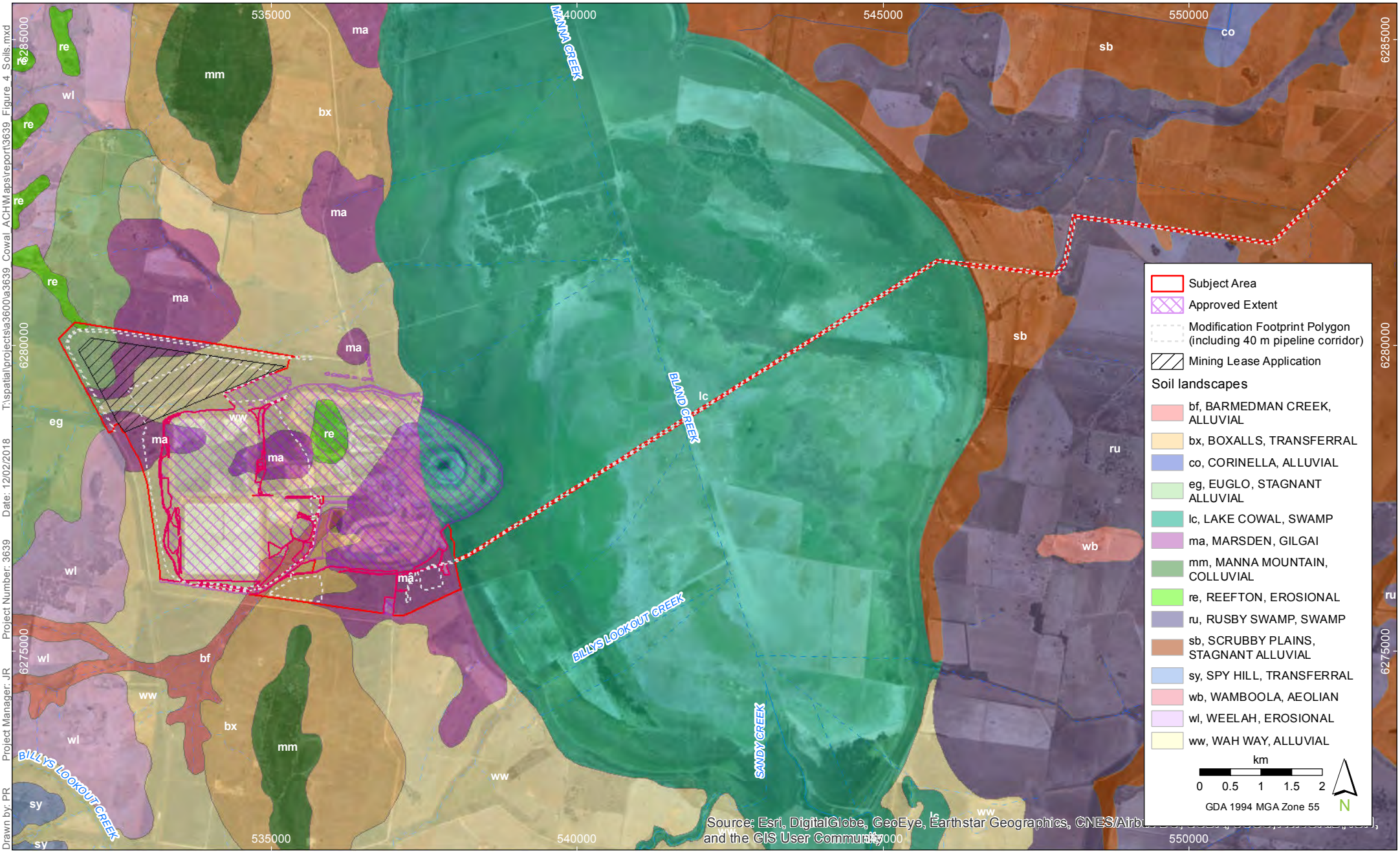
7.2 Landforms and Soils

7.2.1 Soil Landscapes

There are eight soil landscapes present within the Subject Area, as defined by King (1998) (Figure 4). King (1998) grouped the soil landscapes according to the dominant processes of landscape formation and erosion. These dominant landscape processes will affect both the potential for a landscape to accumulate past traces of Aboriginal land use, and the landscape's likelihood to preserve any accumulated artefacts or hearths. The soil landscapes of the Subject Area are discussed below, divided into their dominant geomorphic processes: transferral, alluvial, swamp, gilgai, stagnant alluvial and erosional soil landscapes.

Swamp Soil Landscapes

Swamp soil landscapes consist of seasonally wet or inundated soils and ground surfaces. The soil is formed *in situ* and contains high amounts of decayed organic matter. Usually the water table in these areas is shallow. Typical landform units within this landscape include swamps, lakes, lagoons, old channels and billabongs. The archaeological expectation with these soil landscapes is that they would not be areas favoured for direct use for camping by Aboriginal people in the past, but would have been valuable resource areas. Rather than finding archaeological traces of past Aboriginal land use within this soil landscape, the expectation is that the archaeology will be adjacent to these landscapes.



Soil Landscapes of the Subject Area

Cowal Gold Operations Processing Rate Modification - Aboriginal Cultural Heritage Assessment

FIGURE 4

Imagery: (c) DigitalGlobe 2015-08-02

The Lake Cowal soil landscape consists of the frequently water-inundated lakes and adjoining plains of the Lake Cowal system of Quaternary alluvium (Plate 2). Basically this is the lake bed of Lake Cowal itself. Level closed-depressions form extensive lakes and Lake Cowal is typically inundated from floodwaters and surface water from the Bland Creek and Lachlan River System, taking a period of two to three years to empty, providing no additional inflow occurs. Dominant soils are very deep (>150 centimetres [cm]), very poorly drained clays with occasional very deep (>150cm), poorly drained Black Earths occurring on lake margins and less inundated areas. With permanently high water tables and waterlogging, the soils are of very low permeability and high localised erodibility. The proposed pipeline is the only part of the Subject Area that intersects with the Lake Cowal soil landscape, accounting for a small portion of the proposed development.

Plate 2. Example of Lake Cowal soil landscape (inundated with water)

The Rusby Swamp soil landscape consists of a large area of low lying land east of Lake Cowal (Plate 3). This soil landscape consists of broad open drainage depressions, with slope gradients of less than 1%, and deep clayey soils. The Rusby Swamp landscape is subject to regular inundation, but dries quickly. The Subject Area intersects with this landscape east of Lake Cowal, where the proposed pipeline route is situated entirely within the road reserve, accounting for only a small proportion of the Subject Area's surface. While the landscape has been mostly cleared, old and regrown trees exist in the road reserve, which has seen heavy disturbance from road and drain construction and infrastructure installation (existing pipeline).

Plate 3. Example of the Rusby Swamp soil landscape within the study area (Subject Area entirely road reserve)

Transferral Soil Landscapes

Transferral soil landscapes consist of deep deposits of materials that have washed from upslope areas – typically the landforms of transferral soil landscapes footslopes, flats and piedmonts. Around Lake Cowal the transferral landscapes surround the Wamboyne Mountain (to the north of the Subject Area) and Fellman's Hill just to the south of the Subject Area.

The Boxalls soil landscape ranges from gently undulating footslopes and associated low hills on Silurian colluviums (Plate 4). Slope gradients are gently inclined and generally range from 2-8%. Local relief is very low (<30 m), with slope lengths of up to 1.5 km and unidirectional drainage lines. The soils are comprised of moderately deep (60 cm-100 cm) moderately well-drained Earths on the slopes, and deep well-drained Aeolian sands and Earthy Sands in areas with active sheet erosion or deposits of wind-blown sands. As an accumulating soil landscape this landscape has the potential to contain both surface, and buried archaeological deposits. Within the Subject Area this landscape has been extensively cleared and improved for pasture.

Plate 4. Example of the Boxalls soil landscape

Alluvial Soil Landscapes

Alluvial soil landscapes are formed by the deposition of sediments along rivers and streams. Typical landforms associated with alluvial landscapes include plains, terraces, levees, billabongs and streams. Two alluvial landscapes occur within the Subject Area, the Barmedman Creek and Wah Way soil landscapes. Generally, alluvial soil landscapes are favourable locations for accumulating past traces of Aboriginal land use as they would have been a resource rich area in the past, and the accumulation of sediments can produce stratified (artefacts and ovens preserved in a sequence of time, where deeper is older) archaeological deposits that have great potential to tell us about the past. However, in some alluvial landforms, the movement of drainage channels and redeposition of soils can sometimes also remove archaeological deposits. Often, landforms such as terraces and levees are likely to contain artefacts.

The Barmedman Creek soil landscape consists of the intermittent drainage lines of Barmedman and Bland Creeks and Warralonga Cowal, as well as the adjoining floodplains and terraces (Plate 5). River channels are meandering with associated backswamps and occasional anabranches. Slopes are level (except for streambanks) and local relief is <5 m. Elevation ranges from 205-220 m, and streams are generally intermittent. The dominant soils are deep (>100 cm), poorly drained clays. The Barmedman Creek soil landscape accounts for a small area of land in the south of the Subject Area, with much of this landscape having been previously developed during earlier stages of the mine. The landscape has been cleared of most vegetation for pasture, although some trees remain.

Plate 5. Example of the Barmedman landscape within the Subject Area

The Wah Way landscape is typical plains country that extends from the Barmedman Creek floodplain (Plate 6). It consists of level plains and floodplains with shallow slope gradients (<1%) and local relief (<5 m). It also includes parts of Wah Way and Bland Creeks and associated back swamps and lower floodplains along with less frequently inundated upper floodplains. Isolated areas with weakly developed gilgai micro-relief occur under some belah (*Casuarina cristata*) stands. Soils are predominantly very deep (>150 cm), poorly drained clays. The soils are highly plastic with a low permeability, low fertility and are a water erosion hazard.

The Wah Way soil landscape has been extensively cleared for pasture and crop where it is suitable, however, stands of belah remain in areas less suitable for agricultural development such as the more frequently inundated areas. Due to its high erodibility and hardsetting tendencies this soil landscape has limited archaeological potential, however the erosion is also likely to reveal any buried archaeological deposits at the ground surface that would be readily discovered during survey. This soil landscape accounts for a large portion of the Subject Area, including most of the south, west and north parts of the study area.

Plate 6. Example of the Wah Way soil landscape within the Subject Area

Gilgai Soil Landscapes

Gilgai soil landscapes have characteristic undulating micro-relief of small depressions and mounds. The soils are subject to constant swell-shrinkage processes, and drainage is typically disintegrated. In the Subject Area the gilgai landscapes are characteristically grey or red clays which sit approximately 1 m above the surrounding plains, and consist of depressions of usually less than 5 m diameter, up to 1 m deep, surrounded by mounded areas. The gilgai soil landscapes would have been a valuable resource for Aboriginal people in the past, although the shrink-swell process of cracking clays readily destroys archaeological features, the expectation is that artefacts and heat retainers will be present on the surface of these landforms.

The Marsden soil landscape occurs over a large percentage of the surface area of the Subject Area, in the south, west and north (Plate 7). Slopes are level with pronounced development of normal gilgai and melon hole gilgai with alternate mounds, shelves and depressions. Some areas have been levelled for cropping and the gilgai are no longer apparent. Deep (150 cm), very poorly drained clays dominate gilgai depressions, with moderately deep to deep (>120 cm), imperfectly drained clays occuring on gilgai puffs or crests. Generally the gilgai areas within the Subject Area have not been cleared, and retain belah woodland. As an important and predictable resource area, that has been relatively undisturbed this landscape should contain traces of past Aboriginal land use, however the cracking clays will mean that the archaeological sites will not be stratified, and are likely to be dispersed in nature.

Plate 7. Example of the Marsden soil landscape within the Subject Area

Stagnant Alluvial Soil Landscapes

This group of soil landscapes comprises alluvial plains where erosion and aggradation by channel and overbank flow is hardly active (due to reduced water flow and/or stream migration). Typical landform elements include plains, channels and swamps. The archaeological expectations for this group of soil landscapes is similar to those posited for alluvial soil landscapes, although there will be less erosion and therefore less chance to observe past traces of Aboriginal land use during survey.

The Euglo soil landscape consists of level plains of alluvium and colluviums (Plate 8). The soils are red-brown earths, local relief is confined to below 5 m and slopes have low gradients of less than 1%, being long, broad slopes. This soil landscape exists in the north-west of the Subject Area, accounting for a large area of the Subject Area surface, where it lies around and below the local relief of low hills associated with the Reefton soil landscape. The landscape has been extensively cleared for pasture, although some old trees remain along boundaries and scrubby bush has regrown in some areas.

Plate 8. Example of the Euglo soil landscape within the Subject Area

The Scrubby Plain soil landscape comprises broad alluvial plains with lagoons and back swamps east of Lake Cowal (Plate 9). Local relief is less than 9 m and slope gradients are less than 1%. The soil landscape has seen the construction of extensive man-made water control features for irrigation, such as channels, drains and levees. The Subject Area intersects with this landscape east of Lake Cowal, where the proposed pipeline route is situated within the road reserve, and the cropped area of the eastern lunette of Lake Cowal. Note that the lunette is not identified as a separate geomorphological unit at the scale of the soil landscape mapping. The landscape has been cleared of most trees, although some isolated trees exist in the road reserve, which has seen heavy disturbance from road and drain construction and infrastructure installation (existing pipeline).

Plate 9. Example of the Scrubby Plain soil landscape (within road reserve)

Erosional Soil Landscapes

These soil landscapes have been principally formed by the erosive process of flowing water. In the Subject Area the soils of the erosional soil landscape are derived from *in situ* weathering of parent bedrock. Typically erosional soil landscapes have the landform elements of hillslopes and crests, and may also contain rock outcrops. As differentiated landforms of slopes and crests amongst otherwise flat plains, the archaeological expectation is that the Erosional soil landscapes may be a place that was used as a camping area by Aboriginal people in the past, as the slopes would have provided trees and general shelter from the elements (unlike the plains).

The Reefton soil landscape is a small area of hillslopes and crest that occurs in the very north-west of the Subject Area, accounting for only a small portion of the Subject Area's surface (Plate 10). It has local relief of less than 40 m, slope gradients of between 3% and 10% and shallow soils with some rock outcrop. While the area has been grazed, it still has remnant woodland trees.

Plate 10. Example of the Reefton soil landscape within the Subject Area

7.2.2 Pardoe's Micro-environments of Lake Cowal

Colin Pardoe has conducted extensive previous archaeological work at Lake Cowal, and has designed a landscape classification system that classifies landscapes geomorphologically and archaeologically, based on their topography and proximity to Lake Cowal (Plate 11). For consistency with the previous assessments at Lake Cowal, Pardoe's micro-environments landscape classification is outlined below (Pardoe 2013: 30-31, Pardoe 2009a: 13).

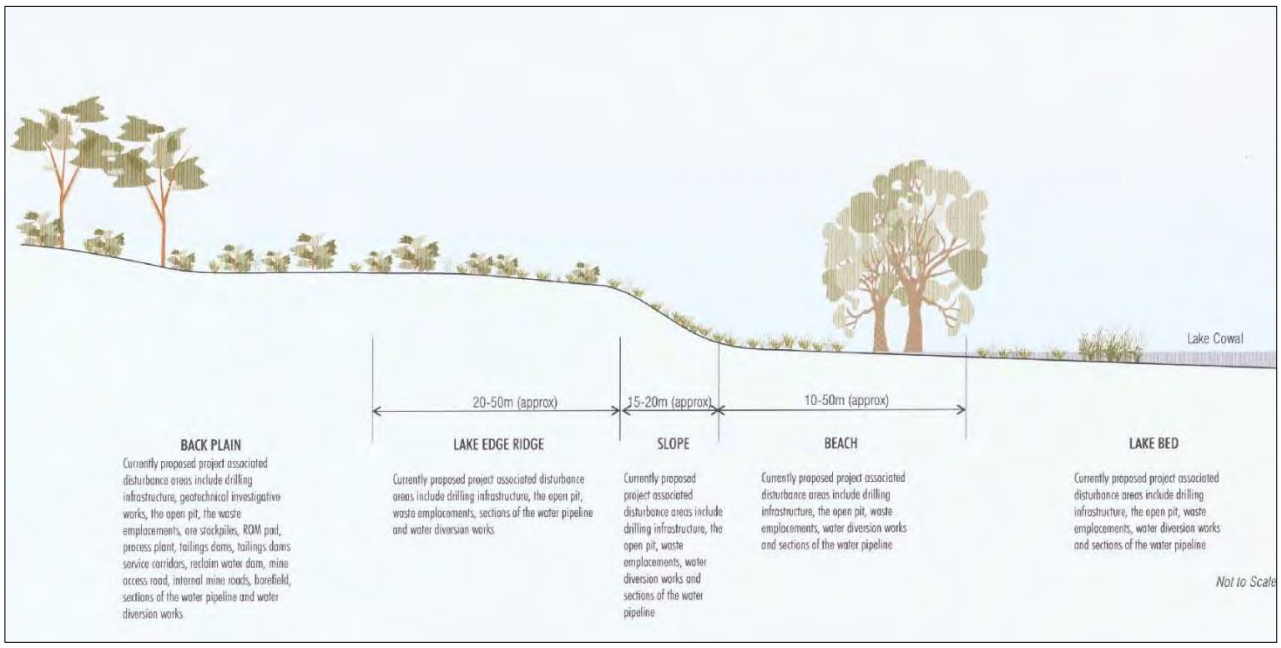


Plate 11. Pardoe's micro-environments of Lake Cowal (Pardoe 2009a)

The following is taken directly from Pardoe (2009a: 13-15).

Lake Bed

The lake bed consists of cracking grey clays that are approximately 5 m deep. The surface has intermittent drifts of washed and well-sorted beach sands, typically no more than 10cm thick. When there is water in the lake these drifts are moved around by wave and current action.

The cracking grey clays build up slowly. Age should increase quickly with depth.

Ephemeral Creeks

There are several ephemeral creeks on the western shore of Lake Cowal, of which three cross the Mining Lease. These appear to be of considerable antiquity, since the land must have drained in a similar fashion for millions of years. The creeks may change course in the space of thousands of years, as has been seen for larger river channels like the Lachlan and Murrumbidgee. Such changes in course are more likely towards the lake, where sediment build-up would choke particular channels, forcing the watercourse to a new position. Carnegie's Creek is very sinuous at the lake edge, and there are probably older channels near the lake. The present channel is probably several thousand years old. The distribution of lithic items follows the main course fairly closely.

There are billabongs along the channel, and it appears that concentrations of artefacts occur near these. The channel is incised. Although Holocene aged channels of major rivers are usually incised, those of small creeks are generally thought to post-date, and to be a product of erosion from the pastoral industry.

It is reasonable to infer that the channel has become incised within the last 150 years or so, but that small billabongs were already in existence and these have been deepened by subsequent erosion.

Beach

The beach consists of coarse, well-sorted light coloured sand intermixed with organic materials washed up as flotsam and jetsam. These beach sands are found all along the western shore and derived from sand washed into the lake, which is then moved around by waves and current, until it is deposited as a shallow unit at the high water mark. The western beach differs from the eastern lunette in several features. The former is water borne, while the latter is air borne.

Eastern Lunette

Lake Cowal's lunette is fairly typical of ephemeral lakes in the region. It is low and wide, appearing to consist of two units, at most. The sand is light coloured, and deposited by wind. Particle size is smaller than the western beach sands, and contains a greater proportion of organic matter.

Lake Edge Slope

The slope has been almost completely scoured by erosion, leaving a 'B' horizon of under-lying clay with some pisolith gravel on the surface. At the toe of the slope where it flattens to become the beach there is a talus of slope-wash. This sediment is likely to be the mixed result of materials up slope, as well as being affected by high water wave action and beach formation. Dates are therefore likely to be inconsistent and unreliable.

Lake Edge Ridge

The lake-edge ridge was defined for archaeological rather than geomorphological reasons. It is part of the surrounding plains.

Back Plains

Although the most visible features are the north-south trending ranges, the surrounding plains form the largest environment surrounding the lakes. The plains are nestled between the ranges. These flat plains were originally attractive for stock. They were eroded in the 1800s, when up to 300 mm of topsoil was lost from wind erosion. Mechanized agricultural methods opened much of these plains to be arable in the 20th century, contributing to loss of topsoil. The back plains of the Mining Lease were reverted to grazing, and the ground surface was stabilised with a lag surface of gravel except in low lying areas that maintained a thicker layer of topsoil.

Gilgai Plains

Gilgai plains are features that were first observed in Wiradjuri country, and the word is a Wiradjuri one, the original term “gilgaay” meaning waterhole. The term has since been used for these features around the world.

A gilgai (plural gilgais) describes a hollow in the ground surrounded by a raised rim. Gilgais occur on plains of heavy clay soil, where the terrain is of low relief, and they are characterised by the presence of hollows, rims, and mounds. They are formed by alternating periods of expansion during wet weather and contraction (with deep cracking) during hot, dry weather. The type of terrain is described as gilgaed. A single hole is known as a gilgai, or gilgai hole. Such holes are also known as crab-holes, dead-men's graves, or melon holes.

Gilgai plains are generally covered by tree or large shrub canopy to an extent of about 30%. There are about 10 trees per hectare on average. Many herbs and grasses surround gilgais, several of which are amphibious and able to take advantage of ephemeral inundation. These plants provide food for animals and particularly birds, which are able to travel quickly to take advantage of short-lived resources.

7.3 Natural Resources and Features

The landscape of the Lake Cowal region is characterised by plains and low hills around the dominant landscape feature of Lake Cowal itself. Lake Cowal is an intermittent inland lake, being typically shallow (Pardoe 2013: 27). Lake Cowal is the only main local water source: there are no major rivers or drainage lines within the Subject Area, only low lying shallow, intermittent channels and creeks and gilgai which will also intermittently hold water. Billys Lookout Creek, which feeds Lake Cowal, is approximately 5 km south of the Subject Area, and Sharpless Creek – a tributary of the Lachlan River – is approximately 18 km west of the Subject Area. While local streams and channels feed Lake Cowal, the main source of inundation for the lake are Bland Creek and overflow from the Lachlan River (Pardoe 2013: 28).

Situated as it is in the plains country, the Subject Area has low energy drainage systems that make their way across the flat landscape. This drainage regime consists of a few short shallow, ephemeral drainage lines that run generally west to east across the Subject Area before draining into Lake Cowal. East of Lake Cowal, the pipeline corridor traverses low lying, swampy land with very poorly defined drainage, further compounded by the construction of artificial irrigation channels. Such flat, low energy and poorly drained country means that the Subject Area has the capacity to hold large amounts of water when there is high enough rainfall. The presence of gilgai is an important part of the hydrology when considering the past Aboriginal land use, as the gilgai would hold large amounts of water, and produce very favourable conditions for activities away from the more reliable water sources in the local Wiradjuri country, such as Lake Cowal and the larger creeks. The pre-mine topography and drainage of the area are shown in Figure 5.

Wiradjuri people have lived in the south-western slopes since the Pleistocene (probably since 40,000 years ago [Pardoe 2009a: 11]), during this time the landscape and ecological and climatic conditions have changed, sometimes dramatically. Wiradjuri people probably first came to the area about 40,000 years ago, a time referred to as the Last Glacial Maximum by archaeologists. This was the last great ice age, a time when Papua New Guinea and Tasmania were joined to the current Australian mainland. At this time the Lake Cowal area would have been drier (more arid), with less rainfall and cooler temperatures. The eastern lunette of the Lake would have formed during this dry time, with prevailing westerly winds blowing sand from the lake bed when it was intermittently dry to form the lunette, which is like a sand dune. We may expect that during this drier time the landscape would have been more open, with sparser trees on the plains, and would also have been inhabited by megafauna. Around 10,000 years ago climatic conditions ameliorated to become like today's climate, and the plains, woodlands and drainage systems will have been very similar to what we see today (notwithstanding changes caused by agriculture). While Wiradjuri people would have shared the Subject Area with a diverse array of plants and animals over such a long time period, the discussion below focuses on the contemporary and likely ecological plant and animal assemblages of the last 5,000 years.

7.3.1 Vegetation

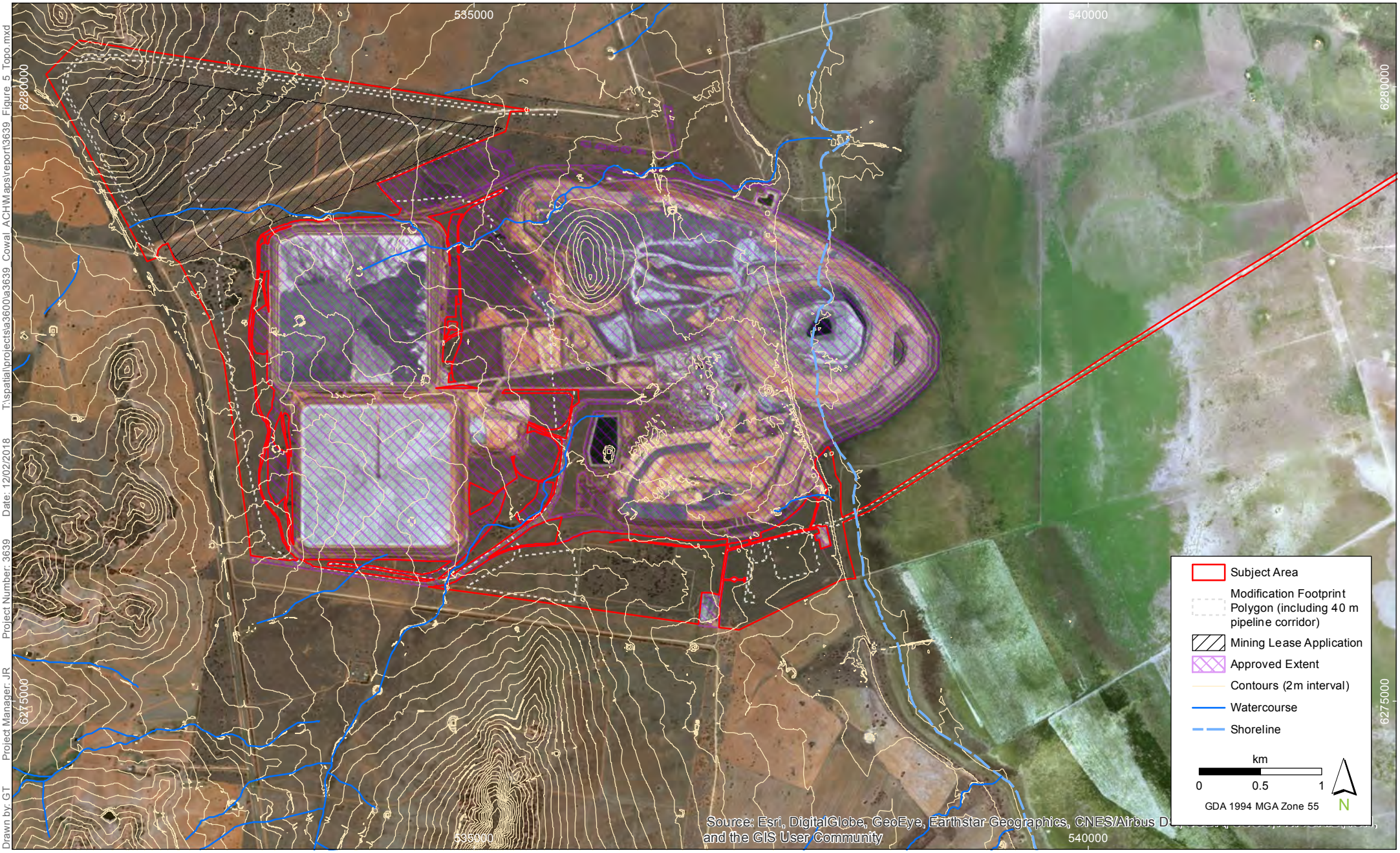
Prior to land clearing, the plains landscape of the Subject Area would have consisted of open woodlands, consisting of trees such as belah, myall, rosewood and white cypress pine; these trees form the dominant remnant and regrowth species witnessed today. Understorey species will have been variable depending on local ground conditions but will have included wallaby grass and saltbush on the dry plains and lignum in frequently inundated or Lake Cowal margin areas. Nardoo a wetland fern that was used to make flour and bread, was noted to be common in the gilgai areas of the Subject Area. Other plants and trees occuring in or near the Subject Area that would have been important in the past Wiradjuri economy include rosewood, wilga, quandong, kurrajong, wallaby grass and old man's weed.

Plants were used for food, but were also important for making tools (wood for canoes, whole tools or handles, bull rush and fibres for weaving and nets) and huts.

7.3.2 Animals

A suite of inland aquatic and plains animals inhabit, and would have previously inhabited the Subject Area. Important species to the Wiradjuri would have included "kangaroos, wallabies, bandicoots, emus, turkeys, snakes and lizards" (Pardoe 2013: 36). Water birds would have been common all year around and seasonally abundant during wet and breeding times. Crayfish and fish would also have been a common food source. Animal products were also important for making clothes, such as possum skin cloaks, for example.

In summary, there is no doubt the plains around Lake Cowal and the aquatic environments of the lake, drainage lines and gilgai would have provided an abundance of resources that would have made the area a comfortable and desirable place in which to live all year round (Pardoe 2013: 37).



niche Environment and Heritage

Topography and Drainage around Lake Cowal

Cowal Gold Operations Processing Rate Modification - Aboriginal Cultural Heritage Assessment

FIGURE 5

7.4 Land-Use History

The landscape within and surrounding the Subject Area has been subject to substantial impacts over time, most substantially land clearing for agricultural purposes. Pastoralists first arrived in the Lachlan Plains in the mid-1800s, and the introduction of stock (sheep and cattle) to the plains would have caused loss of vegetation and increased erosion over the subsequent decades. However substantial landscape modification probably did not occur in the region until the late 1800s, during a gold rush. Later, in the early 1900s and prior to the 1950s there was significant land clearing and modification, as pastures were improved and broad acre farming and irrigation begun (NSW Heritage Office and DUAP ,1996).

Grazing of livestock and cultivation of crops both impact the preservation and visibility of the archaeological record within the Subject Area. The majority of the Subject Area has been subject to moderate modification and disturbance through both active and passive pasture management and intensive tilling for crops. Obviously, in areas adjacent to the Subject Area there has also been the development of the CGO within previously approved areas. By way of summary here we can note Pardoe (2013: 39) presents an excellent summary of the main local factors causing historical and contemporary landscape impact at Lake Cowal, being:

- land clearance (tree and shrub removal);
- road construction;
- fire breaks;
- stock;
- rabbits; and
- historical mining.

In conclusion the general landscape impacts of the Subject Area are variable in their intensity, including: grazing only in some gilgai areas (as the uneven land required significant investment to clear and level); tree clearing and pasture improvement on plains; tree clearing and dry land cropping on plains; clearing and irrigated cropping of plains; and, tree clearing and significant modification of some areas (parts of the southern Subject Area appear to be completely cleared and levelled gilgai – a major landscape transformation).

On the whole, these agricultural activities will lead to subsoil salinity and tree decline, soil structure decline in the form of trampled and compacted surfaces and alluvial sheet and gully erosion. These land use activities will have the effect of both disturbing and hastening the natural decay of archaeological sites, but will also provide conditions in which the archaeological sites may become readily visible and detectable during archaeological survey.

7.5 Summary

Pardoe (2013) offers the following summary that “the local ecology at Lake Cowal is dominated by three main factors, namely, the lake itself, the local variation in soil and topography, and the flow of local drainages.” The climate and ecology of the Subject Area indicates that it would have been a place of reliable and sometimes seasonally abundant resources, which could be lived in year round. The local rocks contain many rock types that are very good for making flaked stone tools, ground edge axes and grinding stones for seed and plant processing.

The landscapes of the area are predominantly slowly aggraded alluvium (or Aeolian in the case of the east lunette), which should preserve accumulations of traces of past Aboriginal land use. The more recent impacts to the landscapes, mostly for agricultural development, will have sometimes removed all traces of past Aboriginal land use, but most likely will have caused erosion that should help to reveal Aboriginal archaeological sites. Some landscapes, such as the swamp soil landscapes are not expected to have any traces of past Aboriginal land use, while others such as the gilgai will have traces left within the otherwise naturally destructive environment of cracking clays.

8. Survey Methodology

In accordance with the ACHCRs (DECCW 2010a) a proposed methodology for the Modification was distributed on 24 March 2017. A copy of the proposed methodology is provided in Appendix 3.

8.1 Sampling Strategy

The sampling strategy was prepared in consideration of the existing approved IACHMP and the Code of Practice (DECCW 2010b). The sampling strategy for the survey aimed for full coverage of the Subject Area as it was:

- a relatively small and contained size;
- easily accessible; and
- mostly cleared, open country.

Pedestrian survey of the entire footprint of the Subject Area meant that all environments and landforms within the Subject Area could be directly observed, providing an opportunity for the survey team and this assessment to develop and express an appreciation of both the landscape being assessed, and the traces of past Aboriginal land use present within the landscape.

However, because Lake Cowal was full at the time of the survey (and would not be empty for several years) an immediate constraint to the full coverage survey was the inability to survey the Subject Area across the lake bed of Lake Cowal. This area is marked for a proposed water pipeline, which was previously surveyed by Pardoe (2013). The lake bed has very low archaeological potential: no artefacts were found here during the 2013 assessment (Pardoe 2013); the area is frequently inundated with water; and when dry has been subject to extensive cropping in historical times. For these reasons the inability to survey the lake bed for the current assessment is not considered to be a constraint to the survey or the assessment.

8.2 Field Methods

8.2.1 Survey

The survey team walked a series of regular transects across the Subject Area, encompassing all landforms and terrain units. Survey transects were conducted within survey units, which were defined based on landform, as per the Code of Practice (DECCW 2010b). All survey transects, and hence all survey units were surveyed on foot. The number of participants in a transect ranged between three and 10 individuals (with the team sometimes working as a single large group of 10, and at other times working as smaller groups, depending on conditions). Survey participants were generally spaced between 10 m and 20 m apart, and sometimes as close as 5 m apart, dependent on the conditions of the survey unit under survey. For example:

- in areas with very low archaeological visibility and exposure (such as a paddock with thick grass) survey participants were spaced up to 20 m apart, and would seek areas of exposure for closer inspection; and
- in areas with relatively higher archaeological visibility and exposure survey participants would be spaced 5 m apart, allowing close and regular inspection of the exposed ground surface.

The Subject Area was comprised mostly of paddocks, which were used as the basic structure of the survey. Most paddocks included typical graded, vehicle track-like firebreaks along the side of fences, and many areas also included formed vehicle tracks. These firebreaks and vehicle tracks presented excellent conditions of exposure and visibility, and were therefore accorded special attention in the survey, with a dedicated team of at least two survey participants focussed solely on transects of the firebreaks and tracks when these features were present (Plate 12).

Plate 12. Example of a firebreak – tracks and firebreaks were intensively surveyed

East of Lake Cowal the Subject Area consisted of a proposed pipeline easement in the road reserve. In this case a survey team of nine surveyed the road reserve, with four team members on one side of the road, and five on the other side of the road.

8.2.2 Recording Methods

Survey unit data was collected using individual forms for each survey unit that recorded:

- landform;
- land surface conditions;
- slope;
- archaeological exposure and visibility;
- exposure type/cause of exposure;
- geomorphological activity (stable/eroding/aggrading);
- disturbance/modification;
- soil type; and
- vegetation type.

Survey transect and survey unit location were recorded using waypoints and the track function on non-differential global positioning system (GPS). The spatial information from the survey was combined with the survey data on the forms in a geographic information system (GIS).

All finds and features were recorded with non-differential GPS, with a single point recorded for each individual stone artefact, scarred tree or oven. Heat retainers are a common occurrence in the Subject Area, and each cluster or isolated individual heat retainer was recorded with a single GPS point. Photographs were taken with standard compact digital cameras.

8.2.3 Site Definition

The following types of sites were observed during the survey:

- stone artefacts (flaked, ground and grinding/abraded);
- scarred trees;
- heat retainers (semi-spherical occurrences of baked clay or earth, sometimes single or sometimes on sparse clusters); and
- ovens (buried, tightly clustered heat retainers and discoloured sediments exposed in plan or section).

As per the Code of Practice (DECCW 2010b) site definition for the recording of sites during the assessment, and on AHIMS site recording forms, was completed as described below.

During survey each stone artefact, oven or scarred tree was recorded with an individual record consisting of a unique geospatial location (GPS waypoint). In the case of individual or sparsely clustered heat retainers a single GPS point was also taken (for example, two heat retainers within a metre or so of each other were recorded by one GPS point). Feature specific site recording forms for artefacts, ovens and scarred trees were used to record site information and plans, and each artefact's basic attributes were recorded.

The individual feature points were then loaded into a GIS and the geoprocessing function of the GIS was used to group artefacts, ovens and heat retainers into cultural heritage sites by grouping any features within 100 m of each other together. This method of site definition uses the spatial extent of visible objects as the criteria for definition (as per the Code of Practice) and provided results that accorded well with observations of artefacts and sites in the landscape with the sites being more or less as logged on the recording forms while in the field.

9. Results

9.1 Aboriginal Cultural Heritage Survey

The Aboriginal cultural heritage surveys were conducted over a total of nine days during three survey periods, on the following dates:

- Monday 7 August to Friday 11 August 2017;
- Wednesday 30 August to Friday 1 September 2017; and
- Wednesday 20 December 2017.

Conditions during the survey periods were fine except for drizzle on 20 December, and depending on availability the survey team numbered nine or ten people each day, consisting of RAP representatives, Evolution staff, and two archaeologists (note that only a single archaeologist was available for survey on 8 August 2017 and 20 December 2017). In total this amounts to approximately 78 person-days of survey.

During the available survey times the Lake Cowal lake bed was inundated with water and was therefore not surveyed. This was the only constraint to the survey.

There were no other constraints to the survey, and all portions of the Subject Area were freely accessible and subject to systematic survey with no restrictions. The survey coverage described in Section 9.2 and the data collected and data reviewed (including extensive previous work by Dr. Colin Pardoe and the Wiradjuri Aboriginal community) provide adequate information that can be used as the basis for this assessment and impact statement.

9.2 Survey Coverage

The Subject Area measures approximately 785.48 hectares (ha), of which approximately 38.33 ha was inundated with water and was not subject to survey as part of this assessment. Therefore a total of 747.15 ha of the Subject Area was surveyed, providing a sample of 95% of the total Subject Area. Notably, all landforms that were considered more likely to contain Aboriginal objects were included in the survey. Notwithstanding ground surface visibility conditions, this represents a very high level of survey coverage, as a significantly large portion of the Subject Area was assessed by systematic survey, rather than a representative landform sample as is typically achieved for some similar scale projects and developments.

Archaeological visibility and exposure across the survey units was highly varied, ranging from <5% in heavily grassed paddocks, through to 100% on cleared tracks and firebreaks. Situated mostly on the back plains environment, the majority of the Subject Area survey conditions are best summarised, in order of relative amount of the Subject Area ground surface they account for, as:

- flat heavily grassed paddocks with linear sections of excellent exposure and visibility (vehicle tracks and firebreaks) (Plate 13);
- road reserve that has been heavily disturbed, and has very low visibility (Plate 14);
- lake shore and near lake shore areas with relatively good exposure and visibility (Plate 15);
- gilgai areas with relatively good exposure and visibility (Plate 16);
- low rises and gentle slopes of paddock pasture with good exposure and visibility (usually with remnant trees) (Plate 17); and
- the eastern lunette of Lake Cowal (Plate 18).

Plate 13. Survey conditions – heavily grassed paddocks

Plate 16. Survey conditions – Gilgai area

Plate 14. Survey conditions – road reserve

Plate 17. Survey conditions – low rises and slopes of paddock pasture

Plate 15. Survey conditions – lake shore and near shore areas

Plate 18. Survey conditions – eastern lunette

On the whole, survey conditions were as expected from the landscape review: generally flat plains, some broader areas of low relief and slope associated with the plains, and areas of small local topography changes (drainage courses, the lake edge). Landscape disturbance was typical for rural areas, consisting of:

- fence lines;
- occasional rural infrastructure such as sheds, tanks and silos;
- dams and modified drainage lines;
- tracks and firebreaks; and
- roads and road reserve.

Some survey units were in close proximity to existing mine infrastructure and developed areas, being small "slivers" of land adjacent to and between previously approved and developed mine areas. In these locations there was a relatively higher level of disturbance from approved roads, haul roads, tracks and bulk earth works, such as soil stockpiles. Generally such close proximity to previously developed areas meant these locations had relatively higher archaeological exposure and visibility than the other survey units.

A summary of survey coverage for the Subject Area by survey unit is provided in Table 6 and the survey units are presented in (Figure 6). Survey data was collected for individual survey transects, with transects then aggregated into survey units as per the Code of Practice. These survey units were based on the soil landscapes defined and mapped by King (1998), however the broad soil landscape boundaries were refined and modified based on interpretation with Pardoe's (2009a) micro-environments and observations of topography (for example slopes) and general conditions (for example soil type, rock outcrop, drainage and erosion) made on the ground during the survey.[2] Note that the survey unit data below is presented in ha, rather than square metres to avoid excessively large numbers. The survey units are presented in Table 6.

Table 6: Survey Coverage across Subject Area by landform

Name	Land-form	Geomorph-Process	Soil Landscape (King 1998)	Pardoe Micro-environment (Pardoe 2009a)	Area (ha)	Visibility (%)	Exposure (%)	Effective Coverage (ha)	Effective Coverage (%)
SU1	Plain	Alluvial	Wah Way	Back Plain	204.77	5	10	1.02	0.50
SU2	Plain	Gilgai	Marsden	Back Plains	57.48	5	5	0.14	0.25
SU3	Lower Slope	Stagnant Alluvial	Euglo	Back Plains	83.72	10	5	0.42	0.50
SU4	Crest	Erosional	Reefton	Back Plains	6.11	30	30	0.55	9.00
SU5	Plain	Gilgai	Marsden	Back Plain	69.41	15	20	2.08	3.00
SU6	Plain	Swamp	Lake Cowal	Lake Edge Slope	11.63	50	50	2.91	25.00
SU7	Plain	Gilgai	Marsden	Back Plain	6.97	10	10	0.07	1.00
SU8	Plain	Gilgai	Marsden	Back Plain	55.80	10	10	0.56	1.00
SU9	Plain	Gilgai	Marsden	Back Plains	77.65	40	50	15.53	20
SU10	Plain	Transferral	Boxalls	Back Plain	32.69	5	5	0.08	0.25
SU11	Plain	Alluvial	Barmedman Creek	Back Plains	17.13	10	10	0.17	1.00
SU12	Plain	Alluvial	Wah Way	Back Plains	3.32	5	5	0.01	0.25
SU13	Plain	Alluvial	Wah Way	Back Plains	10.05	5	5	0.03	0.25

[2] The Niche staff who conducted the survey are not soil experts, however the boundaries as defined are specific and suitable for the purposes of the assessment, and in accordance with the practices prescribed by the *Code of Practice for the archaeological investigation of Aboriignal objects in NSW.*

Name	Land-form	Geomorph-Process	Soil Landscape (King 1998)	Pardoe Micro-environment (Pardoe 2009a)	Area (ha)	Visibility (%)	Exposure (%)	Effective Coverage (ha)	Effective Coverage (%)
SU14	Plain	Alluvial	Wah Way	Back Plains	42.13	5	5	0.11	0.25
SU15	Plain	Alluvial	Wah Way	Back Plain	13.68	5	10	0.07	0.50
SU16	Plain	Alluvial	Wah Way	Back Plain	1.58	5	5	<0.01	0.25
SU17	Plain	Alluvial	Wah Way	Back Plain	2.02	5	10	0.01	0.50
SU18	Plain	Alluvial	Wah Way	Back Plain	1.05	5	10	0.01	0.50
SU19	Plain	Alluvial	Wah Way	Back Plain	0.76	5	5	0.00	0.25
SU20	Plain	Alluvial	Wah Way	Back Plains	0.35	20	20	0.01	4.00
SU21	Plain	Alluvial	Wah Way	Back Plain	3.10	50	80	1.24	40.00
SU22	Plain	Alluvial	Wah Way	Back Plain	0.16	50	80	0.06	40.00
SU23	Plain	Gilgai	Marsden	Back Plain	2.25	5	5	0.01	00.25
SU24	Plain	Alluvial	Wah Way	Back Plain	2.61	5	10	0.01	0.50
SU25	Plain	Alluvial	Wah Way	Back Plain	0.39	5	10	0.00	0.50
SU26	Plain	Alluvial	Wah Way	Back Plain	3.48	5	10	0.02	0.50
SU27	Plain	Transferral	Boxalls	Back Plains	5.66	5	5	0.01	0.205
SU28	Plain	Stagnant Alluvial	Scrubby Plains	Back Plains	14.83	5	5	0.04	0.25
SU29	Plain	Swamp	Rusby Swamp	Back Plains	9.42	5	5	0.02	0.25
SU30	Plain	Alluvial	Wah Way	Back Plain	0.63	5	10	0.00	0.50
SU31	Lunette	Stagnant Alluvial	Scrubby Plains	Eastern Lunette	6.33	70	50	2.21	35.00
Not Surveyed	*Plain*	*Swamp*	*Lake Cowal*	*Lake Bed*	*38.33*	*0*	*0*	*0.00*	*0.00*
Total Surveyed					747.15				
Total for Subject Area:					**785.48**			**27.41**	**3.49%**

• Note that the geomorphic process that has formed the lunette is aeolian, but this is of too fine scale to be presented in the soil landscape mapping of King 1998.

The survey achieved a ground surface coverage of 747.15 ha, or approximately 95% of the Subject Area. The only section not surveyed was the proposed pipeline across the bed of Lake Cowal. The effective survey coverage was approximately 27.41 ha, or around 3.49% of the Subject Area. Given the landscape and rural conditions encountered in the Subject Area, this is considered to be a good representative sample of the Aboriginal archaeological heritage that is present, and a sample that provides a good characterisation of the material traces of past Aboriginal land use that is more than sufficient for the purposes of the assessment.

The Subject Area consists mostly of flats and plains, and this is reflected in the survey units being situated mostly in what Pardoe (2009a) classified as the back plains and gilgai plains micro-environments. The survey sampled all soil landscapes and all landform units present within the Subject Area. However, large sections of the Lake Cowal soil landscape were not accessible because of water inundation. This was the only physical constraint to the survey, however it is worth noting that Pardoe surveyed the pre-existing pipeline corridor on the lake bed, and noted no evidence of cultural heritage on this landform, within the corridor (Pardoe 2009a: 26).

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Survey Results - Survey Units

Cowal Gold Operations Processing Rate Modification- Aboriginal Cultural Heritage Assessment

FIGURE 6

Imagery: (c) DigitalGlobe 2015-08-02

A summary of the survey results by soil landscape is presented in Table 7.

Table 7: Landform Summary – Soil Landscapes

Soil Landscape (King 1998)	Soil Landscape Area (ha)	Effective Coverage (ha)	Soil Landscape effectively surveyed (%)	Number of Sites	Number of Artefacts	Number of Ovens	Number of Heat Retainers	Number of Scarred trees
Barmedman Creek	17.13	0.17	1%	2	1	1	5	0
Boxalls	38.35	0.10	<1%	0	0	0	0	0
Euglo	83.72	0.42	1%	6	5	1	5	0
Lake Cowal	11.63	2.91	25%	2	3	0	0	1
Marsden	269.56	18.39	7%	31	173	1	23	0
Reefton	6.11	0.55	9%	4	0	0	5	0
Rusby Swamp	9.42	0.02	<1%	0	0	0	0	0
Scrubby Plains	21.16	2.25	11%	0	0	0	0	0
Wah Way	290.08	2.60	1%	20	45	1	3	0
Lake Cowal (not surveyed)	*38.33*	*0.00*	*0%*	*0*	*0*	*0*	*0*	*0*
Total	**785.48**	**27.41**	**3.49%**	**65**	**227**	**4**	**41**	**1**

The dominant soil landscapes by surface area of survey were the alluvial plains of the Wah Way soil landscape and the gilgai areas of the Marsden soil landscape, which make up 37% and 34% of the Subject Area respectively. Notably the survey conditions were far better in the gilgai areas of the Marsden soil landscape, which have been subject to less development than the Wah Way and other plains landscapes. The gilgai landscapes are subject to water-logging and their mound and depression micro-topography, in most cases, have neither been cleared of trees nor ploughed or modified for pasture or crop (unlike the other plains landscapes) and because of this these areas have more intact soils. They also have higher archaeological visibility and exposure with natural ground exposure in their woodland environment, rather than dense pasture grass or fallow.

The majority of Aboriginal heritage sites found during the survey were located in the gilgai areas and the alluvial plains, which is reflective of the larger areas of these landscapes that were surveyed. Small numbers of sites were located in most of the other landscapes surveyed, suggesting that the survey has been effective in its sampling of both the individual landscapes and the Subject Area as a whole. As noted above, for most soil landscapes and landform units there were opportunistic areas of improved exposure and visibility, such as tracks, firebreaks and rural infrastructure, and these provided valuable windows of opportunity to observe Aboriginal archaeological sites within the broader context of local landscapes and the Subject Area as a whole. However, it is noteworthy that sometimes, even in the poorest exposure and visibility conditions such as densely grassed paddocks, the survey team found more obtrusive artefacts such as heat retainers and large stone artefacts.

9.3 Survey Results

The survey found a total of 65 Aboriginal cultural heritage sites within the Subject Area. The sites mostly consisted of stone artefact concentrations and heat retainers, with some intact ovens found, and a single scarred tree was located.

Table 8 provides a summary of the sites recorded in the Subject Area, and the location of the sites is shown in Figure 7.

Table 8: Summary of Aboriginal sites located within the Subject Area

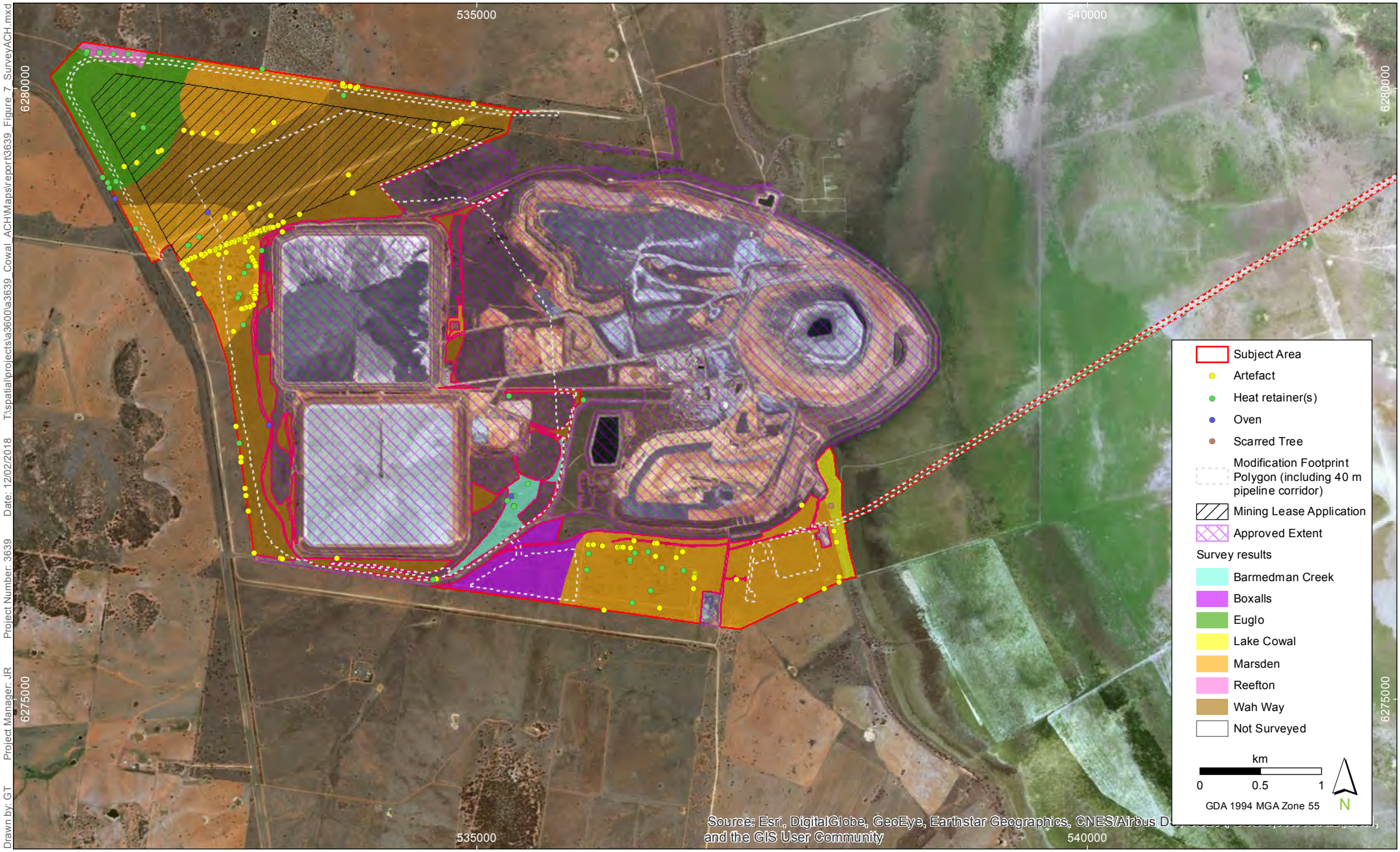
Site Type (Features)	Number of Sites Recorded in the Study Area	% of Total Number of Sites[1]
Artefact(s)	32	49%
Artefact(s)/Heat Retainer	10	15%
Artefacts/Oven	1	2%
Artefacts/Heat Retainer/Oven	1	2%
Heat Retainer	17	26%
Oven/Heat Retainer	2	3%
Oven	1	2%
Scarred Tree	1	2%
Total	**65**	

[1] Please note that due to rounding this column does not equate to 100%

As expected, based on the review of previous work, the most common site and feature encountered during the survey was stone artefacts (Table 8). Heat retainers were also a frequently encountered artefact type, and it is notable that these are quite obtrusive in the landscape, even in poor exposure conditions such as densely grassed paddocks.

A site gazetteer providing an overview of site features of each of the sites recorded is presented in Table 9, and more general observations about each class of site and feature follow. After the site name, the sites in Table 9 are arranged based on primary feature, which follows a hierarchy of artefact (oven – heat retainer – scarred tree) where more than one feature is present.

The majority of sites were stone artefact sites, containing either single or multiple stone artefacts, and heat retainers (either single or multiple examples) were the next most common site type (Table 8). Individual occurrences of an oven and a scarred tree were also recorded during the survey, while 22% of the sites recorded contained multiple features, usually stone artefacts and heat retainers. As noted above, within the broader back plains micro-environment, which accounted for most of the Subject Area, most sites were located on the Wah Way alluvial soil landscape and the Marsden gilgai soil landscape (Table 7).



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Survey Results - Aboriginal Cultural Heritage Sites

Cowal Gold Operations Processing Rate Modification - Aboriginal Cultural Heritage Assessment

FIGURE 7

Table 9. Description of sites recorded during the survey

Name	AHIMS	Primary Feature	Number of Artefacts	Additional Features	Additional Features
Lake Cowal 2017-001	39-4-0333	Artefact	1		
Lake Cowal 2017-003	39-4-0315	Artefact	3		
Lake Cowal 2017-004	39-4-0316	Artefact	5		
Lake Cowal 2017-005	39-4-0317	Artefact	2		
Lake Cowal 2017-006	39-4-0318	Artefact	6	Heat Retainer	
Lake Cowal 2017-007	39-4-0319	Artefact	1		
Lake Cowal 2017-008	39-4-0320	Artefact	2		
Lake Cowal 2017-009	39-4-0321	Artefact	1		
Lake Cowal 2017-010	39-4-0322	Artefact	3		
Lake Cowal 2017-011	39-4-0323	Artefact	6		
Lake Cowal 2017-012	39-4-0324	Oven	-	Heat Retainer	
Lake Cowal 2017-013	39-4-0325	Artefact	3		
Lake Cowal 2017-014	39-4-0326	Artefact	1		
Lake Cowal 2017-015	39-4-0329	Heat Retainer	-		
Lake Cowal 2017-016	39-4-0330	Heat Retainer	-		
Lake Cowal 2017-017	39-4-0331	Heat Retainer	-		
Lake Cowal 2017-018	39-4-0332	Heat Retainer	-		
Lake Cowal 2017-019	39-4-0328	Heat Retainer	-		
Lake Cowal 2017-020	39-4-0327	Artefact	1		
Lake Cowal 2017-021	39-4-0311	Tree	-		
Lake Cowal 2017-022	39-4-0312	Artefact	3		
Lake Cowal 2017-023	39-4-0313	Artefact	23		
Lake Cowal 2017-024	39-4-0314	Artefact	1		
Lake Cowal 2017-025	39-4-0308	Artefact	1		
Lake Cowal 2017-026	39-4-0309	Artefact	1		
Lake Cowal 2017-027	39-4-0310	Artefact	2		
Lake Cowal 2017-028	39-4-0307	Artefact	1		
Lake Cowal 2017-029	39-4-0306	Artefact	1		
Lake Cowal 2017-030	39-4-0305	Oven	-	Heat Retainer	
Lake Cowal 2017-031	39-4-0304	Artefact	17	Heat Retainer	
Lake Cowal 2017-032	39-4-0303	Artefact	1	Heat Retainer	
Lake Cowal 2017-033	39-4-0302	Heat Retainer	-		
Lake Cowal 2017-034	39-4-0301	Heat Retainer	-		
Lake Cowal 2017-035	39-4-0299	Artefact	2		
Lake Cowal 2017-036	39-4-0300	Artefact	76	Heat Retainer	
Lake Cowal 2017-037	39-4-0298	Oven	-		
Lake Cowal 2017-038	39-4-0297	Artefact	1		
Lake Cowal 2017-039	39-4-0293	Artefact	4		
Lake Cowal 2017-040	39-4-0294	Artefact	2		
Lake Cowal 2017-041	39-4-0295	Artefact	12	Heat Retainer	
Lake Cowal 2017-042	39-4-0296	Artefact	1		
Lake Cowal 2017-043	39-4-0292	Heat Retainer	-		

Name	AHIMS	Primary Feature	Number of Artefacts	Additional Features	Additional Features
Lake Cowal 2017-044	39-4-0291	Heat Retainer	-		
Lake Cowal 2017-045	39-4-0290	Artefact	13	Heat Retainer	
Lake Cowal 2017-046	39-4-0289	Artefact	3	Heat Retainer	
Lake Cowal 2017-047	39-4-0288	Artefact	13	Heat Retainer	
Lake Cowal 2017-048	39-4-0284	Heat Retainer	-		
Lake Cowal 2017-049	39-4-0286	Artefact	1		
Lake Cowal 2017-050	39-4-0285	Artefact	1	Heat Retainer	
Lake Cowal 2017-051	39-4-0287	Artefact	1		
Lake Cowal 2017-052	39-4-0283	Artefact	2		
Lake Cowal 2017-053	39-4-0282	Artefact	1		
Lake Cowal 2017-054	39-4-0281	Artefact	2		
Lake Cowal 2017-055	39-4-0271	Artefact	1	Oven	
Lake Cowal 2017-056	39-4-0272	Artefact	1	Heat Retainer	
Lake Cowal 2017-057	39-4-0273	Artefact	1	Oven	Heat Retainer
Lake Cowal 2017-058	39-4-0274	Heat Retainer	-		
Lake Cowal 2017-059	39-4-0275	Heat Retainer	-		
Lake Cowal 2017-060	39-4-0276	Heat Retainer	-		
Lake Cowal 2017-061	39-4-0277	Heat Retainer	-		
Lake Cowal 2017-062	39-4-0278	Artefact	2		
Lake Cowal 2017-063	39-4-0279	Artefact	1		
Lake Cowal 2017-066	39-4-0280	Heat Retainer	-		
Lake Cowal 2017-067	43-4-0054	Heat Retainer	-		
Lake Cowal 2017-068	43-4-0055	Heat Retainer	-		

9.3.1 Stone Artefact Sites

A total of 44 sites containing stone artefacts were recorded in the Subject Area, with most of these occurring on the flat alluvial plains and gilgai landscapes. Twelve of the stone artefact sites had additional site features, comprising both ovens and/or heat retainers (Section 9.3.2). Site boundaries were determined by grouping any artefacts (or other archaeological features) within 100 m of each other. While this method of defining site boundaries is arbitrary it provides an unbiased grouping of artefacts into sites based on their location relative to each other, and provides a good independent way of measuring the density of artefacts per site. The highest number of artefacts in a single site was 76 artefacts, which occurred in the large, relatively dense site Lake Cowal 2017-036. The lowest number of artefacts in a site was a single artefact (sometimes referred to as an isolated find) and this was the case in 21 of the stone artefact sites. The average number of artefacts per site was approximately five artefacts, with only six sites containing more than 10 artefacts. An example of the artefacts found within the Subject Area is shown in Plate 19.

Plate 19. Flaked stone artefacts

9.3.2 Ovens and Heat Retainer Sites

A total of three ovens were recorded as the individual or primary site feature during the survey (Plate 20), and a total of 17 heat retainer examples were recorded as the primary or individual site feature during the survey (Plate 21). Two of the ovens were recorded in association with stone artefacts and 13 additional heat retainers were recorded in association with artefacts and/or ovens. The recorded ovens were defined as discrete clusters of partially buried heat retainers, charcoal and ashy deposit. They were distinguished from features described as heat retainers, which were isolated burnt/baked clay or termite nest, occurring only on the ground surface as mobile individual or loosely associated examples. Heat retainers can be difficult to distinguish from naturally occurring burnt/baked sediments, and the approach taken during the survey was precautionary in that most (but not all) examples of rounded and sub-rounded burnt/baked clay and termite nest were recorded. In some cases the heat retainers were clearly shaped clay balls, with concavities, interpreted as being finger indentations often present.

Plate 20. An example of an oven

Plate 21. An example of a typical heat retainer

9.3.3 Scarred Tree

The Subject Area did not include many old growth trees as most woodland, except that in some gilgai areas and immediately adjacent to the lake edge, has been cleared. A single scarred tree was recorded on the lake edge slope of Lake Cowal (Plate 22). The tree was a eucalypt (probably black box) and has a large scar consistent with cultural removal and does not show any attributes of natural causes.

Plate 22. Scarred tree Lake Cowal 2017-021

9.3.4 Sites with Multiple Features

Thirteen of the recorded sites had two features present (artefacts and heat retainers/oven), and a single site had three features present (artefacts, oven and heat retainers). This represents approximately 22% of all the sites containing multiple features. It is not uncommon in the western slopes and plains of NSW for open sites to contain both stone artefacts and ovens or heat retainers in association on the ground surface.

It is noteworthy that all five sites with artefact counts greater than 10 artefacts also contained heat retainers, suggesting that there is a genuine relationship between a relatively higher number of artefacts and the presence of heat retainers.

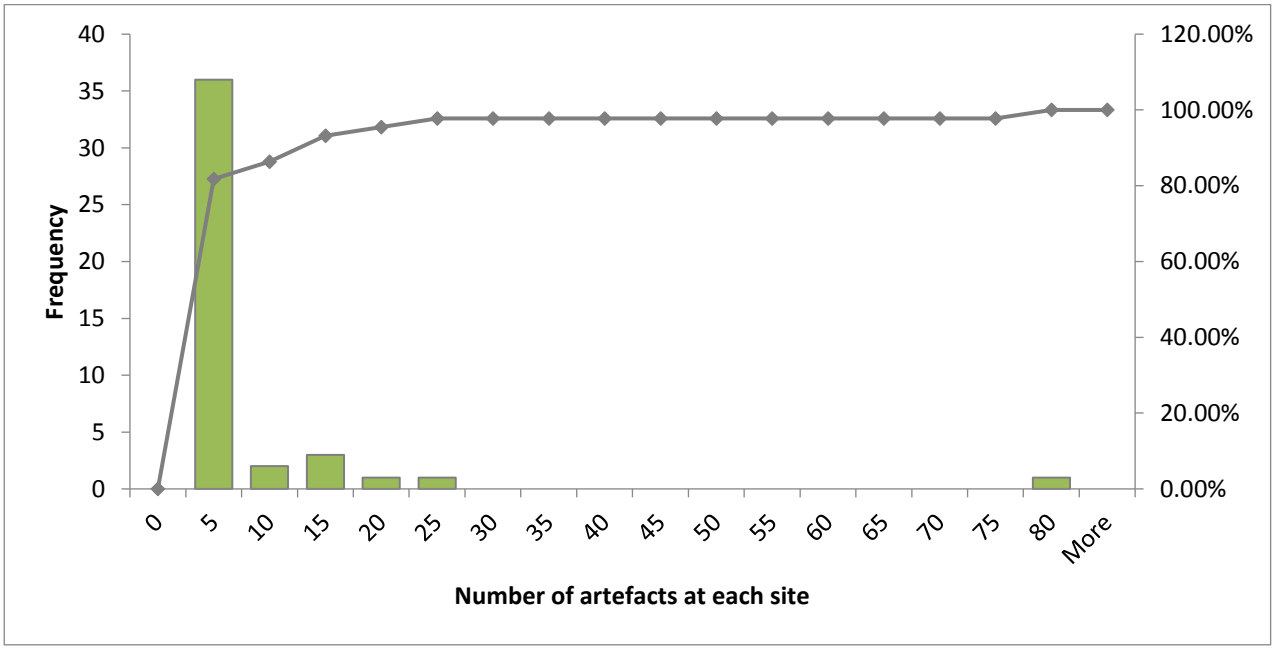
10. Analysis and Discussion

10.1 Site and Artefact Distribution

The majority of sites and artefacts occurred on the gilgai and alluvial landforms (Marsden and Wah Way soil landscapes respectively) (Table 7), with 33% of all artefacts occurring at one site, Lake Cowal 2017-036, which is so large it occurs across both the gilgai (Marsden) and alluvial (Wah Way) soil landscapes in the north-west corner of the Subject Area (Figure 7). The distribution of sites and artefacts in the Subject Area clusters or corresponds strongly with the presence of undisturbed gilgai (Marsden) landforms (Figure 7). The largest site is associated with a small west-east running drainage line that has been previously noted to be a significant factor in the distribution of traces of past Aboriginal land use (Pardoe 2013).

Chart 1 presents a histogram and cumulative percentage of the number of artefacts in each site. The majority of stone artefact sites contain between one and five artefacts, with very few sites containing more than 10 artefacts. This is representative of both the exposure conditions encountered (with generally small, linear windows of archaeological exposure and visibility) and what Pardoe (2013: 46) calls the "background distribution" of artefacts at Lake Cowal and the areas surrounding it. In general, as per Pardoe (2013), there is low density of stone artefacts (and heat retainers) throughout the back plains, and "sites generally consist of areas with both larger numbers and greater density of lithic items" (Pardoe 2009a, 2013: 46).

Chart 1. Histogram and cumulative percentage of artefacts per site



The presence of sites in proximity to the gilgai areas, and also the shallow drainage lines of the Subject Area are probably indicative of these areas as being resource rich locations, a little distance away from Lake Cowal. The local drainage regime of the channels and gilgai would have operated independently to the more seasonal or decadal filling of Lake Cowal, and hence these locations would have been even more important in the past Wiradjuri use of the land when the lake was not full. Pardoe (2009a: 33-39) has provided an extensive discussion on the role of the gilgai plains around Lake Cowal in the Wiradjuri traditional economy, noting that timing of most use of the gilgai areas would have been in the few weeks after rains, when the gilgai hold water and produce new vegetation growth (including nardoo) which could be both directly used by Wiradjuri people, and also would have attracted game species such as kangaroos and wallabies.

The Subject Area included only a small portion of area on the immediate margin of Lake Cowal (Survey Unit 6) (Figure 6). Above the lake edge slope the ridge and plains had been subject to intensive clearing and modification involving the leveling for pasture or cropping of what in the past would have been a gilgai plain. The lake edge ridge micro-environment was noted to be a sandy deposit, and one of the larger and denser sites recorded, Lake Cowal 2017-023 (containing 23 artefacts), was recorded here on the lake edge. The largest sites previously noted around Lake Cowal have generally been within proximity to the lake in similar situations to the north of the Subject Area (the area already developed for mining), especially where local drainage lines enter the lake. Indeed artefact densities in previously salvaged areas on the western side of Lake Cowal have been ten times greater than the next most dense areas (gilgai plains) (Pardoe 2009a: 19).

10.2 Stone Artefact Assemblage

A total of 227 individual artefacts were recorded during the current assessment (Table 10). Basic attributes and measurements were taken for each stone artefact observed.

Table 10. Raw Material Frequency in the Subject Area

Raw Material	Count of Raw Material	% of Total
Fine grained volcanic	151	67%
Silcrete	32	14%
Volcanic	12	5%
Quartz	9	4%
Quartzite	9	4%
Basalt	7	3%
Chert	3	1%
Petrified wood	2	1%
Hornfels	1	<1%
Rhyolite	1	<1%
Total	**227**	**100%**

Most artefacts were made from the raw material classified as “fine grained volcanic” (67%) (Plate 23), with the next most frequent artefact raw material being silcrete (14%). This is similar to Pardoe’s results for artefacts on the back plains during his recent work (Pardoe 2015) except for the relative lack of quartz discovered during this current assessment. This discrepancy could be explained by different access to raw materials in the past by Wiradjuri, or more likely, quartz not being recorded during the current survey because it was difficult to detect in most exposures, or has possibly been crushed by vehicle movements during the formation and use of tracks and firebreaks. In summary, the raw materials are representative of the types of raw materials previously observed in the back plains.

Plate 23. Flake made on fine grained volcanic raw material

Basic recording of stone artefact categories was undertaken during the assessment, with the categories generally separating flaked stone into flakes and pieces of flakes, tools (retouched items) and cores. In addition, ground and grinding categories were also noted (Table 11).

Table 11. Stone Artefact Categories Recorded during the Assessment

Artefact Category	Number	% of total
Complete Flake	92	41%
Broken Flake	40	18%
Tool	31	14%
Distal Flake	23	10%
Core	15	7%
Proximal Flake	12	5%
Medial Flake	7	3%
Hammer Stone	2	1%
Core Fragment	2	1%
Axe	1	<1%
Grinder Fragment	1	<1%
Grinding Stone	1	<1%
Grand Total	**227**	**100%**

The frequency of the various artefact categories is very similar to previous assessments conducted at Lake Cowal, with unmodified flakes dominating the assemblage. A relatively high number of tools (flakes that are then worked and resharpened to make tools for specific uses) were observed as compared to previous studies. The number of cores is similar to previous results, as is the presence of relatively rarer items such as grinding stones, and ground edge pieces (axe). Examples of some artefact categories are presented in Plates 24-26.

Plate 24. A core made on fine grained volcanic raw material

Plate 25. Grinding stone fragment

Plate 26. A ground edge axe discovered during the survey

The presence of cortex (the outside, weathered part of a rock) was recorded for all artefacts, and is summarised in Table 12.

Table 12. Cortex on Flaked Stone Artefacts

Amount of artefact dorsal surface that is cortex	Count of Artefact Type	% of total
0%	175	77%
1-25%	30	13%
26-50%	10	4%
51-75%	4	2%
76-99%	1	0%
100%	7	3%
Grand Total	**227**	**100%**

Most artefacts (77%) did not have any cortex; 13% of the artefacts had a small amount of cortex; relatively few artefacts had more than 50% of their outside surface covered with cortex; and 7 artefacts (3%) had completely cortical dorsal surfaces. Archaeologists frequently use the presence and amount of cortex on flaked stone artefacts as a measure of how far an artefact is from where it was sourced. The results of the cortex observations in this assessment are that stone raw materials were being imported from some distance away. Although the 3% of artefacts with entire cortical surfaces also suggests that there may have been more local stone sources in the nearby ranges, which may have been less frequently used. The type of cortex was also recorded during the assessment where it could be confidently identified, and both water rolled cortex (indicating that the raw material was sourced from a stream bed) and outcrop weathered cortex (indicating the raw material was sourced from an outcrop of decomposed rocks in the landscape) were present.

10.3 Ovens and Heat Retainers

A total of five ovens were recorded, and heat retainers were a frequently encountered artefact type. The ovens and heat retainers are similar to what has previously been found at Lake Cowal. Heat retainers are common, and are usually present as sparse clusters or individual heat retainers. All heat retainers would have begun as components of ovens but erosion and ground modification caused by agriculture and pastoral practices has “deflated” (lowered through erosion) the ground surface into which the ovens were originally dug, leaving the scattered heat retainers.

The distribution of heat retainers and ovens generally follows the pattern of stone artefacts within the Subject Area, with both artefact types generally being near concentrations of stone artefacts. However, there are three examples where ovens and/or heat retainers are the only features present: Lake Cowal 2017-01, Lake Cowal 2017-030 and Lake Cowal 2017-043-044, -058-061, -066-068. In the far north-west corner of the Subject Area, in the low hills of the Reefton soil landscape there is a notable occurrence of five sites containing heat retainers only in a situation of good exposure and visibility (Lake Cowal 2017-015 to Lake Cowal 2017-019) where, all other things being equal artefacts would have been visible if they were present. In the central part of the Subject Area the sites Lake Cowal 2017-057 and Lake Cowal 2017-058 are also notable for the occurrence of ovens and heat retainers in a relatively undisturbed context.

Lake Cowal 2017-057 is particularly notable as it had no flaked stone artefacts, but did contain an axe, as well as an intact oven and relatively dense clusters of heat retainers. The strong impression at this location was one of an area where Wiradjuri people had camped and constructed ovens in a small area, (what archaeologists would call a "complex of features") (Plate 27). When discussed in the field the survey team members were all in agreement that the site was of high archaeological and cultural value given its good preservation, setting and contents. If we assume all the archaeological material present at Lake Cowal 2017-057 is from the same time/occupation then the site is easily interpreted as representing what Kabaila has called "a pre-European Wiradjuri household cluster". Kabaila also states that a typical household cluster would have contained several shelters for very windy or rainy conditions. Each shelter had its own hearth. Outside another hearth was used for cooking. Beyond the swept area around the shelter was a household refuse zone (Kabaila 2005: 11).

Plate 27. Rebecca Shepherd discusses the significance of site Lake Cowal 2017-057

10.4 Scarred Tree

A single scarred tree was located in the Subject Area. There were very few old trees in the Subject Area, and the scarred tree Lake Cowal 2017-021 was located in a timbered area on the bank of Lake Cowal. The scarred tree was a Eucalypt (probably a box tree) with a large scar, representing a removal probably for shelter or utilitarian use, as it was not considered large enough to be a canoe scar (Plate 22).

10.5 Subsurface Archaeological Potential

It was noted throughout the survey that the distribution of artefacts in areas of exposure indicated, in some cases, the likely presence of further artefacts in areas with low visibility. It has previously been generally theorised (i.e. not specific to the Subject Area) that relatively intact archaeological deposits may be present in geomorphological locations such as the transitional zones between the flats and simple slopes, alluvial and transferal and/or erosional soils, and in association with in-filled features such as drainage channels, gilgai, depressions and swamps. Not all of these features occur within the Subject Area.

With regard to sub-surface archaeological potential in the Subject Area there are a few salient observations that can be made:

- All intact ovens (i.e. those ovens still partially in the ground) have high sub-surface potential because they may be radiocarbon dated.
- Adjacent to areas of very high artefact density (such as at Lake Cowal 2017-031, -036, -041, -045, -047), there are likely to be areas of sub-surface potential.
- Feature complexes such as Lake Cowal 2017-057, in a stable alluvial landscape, will have high sub-surface potential.
- Areas that have been subject to heavy land modification (such as Survey Unit 8 and Survey Unit 10) will have low sub-surface potential.

10.6 Summary and Re-evaluation of the Predictive Model

The Subject Area is located in the south-western slopes of central west NSW, in the heart of Wiradjuri country, between West Wyalong and Condobolin. Although there is no direct evidence such as radiometric dates, it is generally accepted that Wiradjuri people would have been present in central west NSW during the earliest phases of human occupation of Australia, approximately 40,000 years ago (Pardoe 2013). However, sites that date to this antiquity are rare in the region due to poor conditions of long term preservation (Witter 2004).

The survey of the Subject Area included all landforms and land units within the study area, although the lake bed of Lake Cowal was not accessible for survey. The Subject Area consists of alluvial and gilgai plains, with some low, gently sloping hills in the north-west corner. A total of 65 Aboriginal cultural heritage sites were recorded by the survey, comprising 29 stone artefact sites (incorporating 227 stone artefacts), five ovens, 30 heat retainers and a single scarred tree. Several sites contained multiple features, mostly associations between stone artefacts and heat retainers.

Virtually all of the Subject Area is situated on the micro-environments that Pardoe (2009a, 2013) has defined as back plains and gilgai plains. Broadly speaking, these are flat areas of alluvial plain, or slightly elevated gilgai country of small diameter depressions and mounds. Large areas of the Subject Area were cleared of vegetation, consisting of pasture or former crop lands, except for gilgai areas, which usually contained woodland. In the south east of the Subject Area, gilgai country has been heavily modified by levelling for crops.

The sites present represent a range of activities and events, such as camping and day-to-day living, stone artefact manufacture, use and discard, the use and discard of stone axes, the use of flaked stone artefacts to prepare foods and utilitarian items, the grinding of plant foods to produce flour, the forming and use of heat retainer ovens to cook foods and the removal of bark and cambium from trees for utilitarian items such as shelter and coolamon-style dishes. Pardoe has presented a model of past Wiradjuri use of the back plains that saw these areas used subsequent to rains, when the depressions would hold water and the gilgai plains would become particularly resource rich areas on the back plains (Pardoe 2009a). The archaeological result of this model, the traces of past Aboriginal land use we see, is a tendency for stone artefacts, ovens and heat retainers to be associated with gilgai landforms and the shallow ephemeral drainage lines that exist within the Subject Area. The results of the survey strongly agree with this model, with the majority of finds being associated with gilgai landforms, and the ephemeral drainage line that bisects the north-west of the Subject Area.

This assessment has not involved any dating, but it is reasonable to assume the artefacts and other items encountered date to the last 5,000 years, in line with the radiocarbon dates obtained by Pardoe (2009a: 68). In general there was strong similarity between the finds of previous assessments at Lake Cowal, with the exception of a lack of quartz artefacts recorded during the current assessment. The absence of quartz may be the result of the nature of disturbance of the Subject Area (tracks and firebreaks) that was providing archaeological visibility and exposure. Otherwise, the stone artefact assemblage contained flaked, ground-edge and grinding artefacts very similar to what has been previously recorded at Lake Cowal. The above assessment suggested (based on the presence of only small amounts of cortex on stone artefacts) that most stone artefacts appear to have been brought into the Subject Area by Wiradjuri people from stone sources that are reasonably distant.

The Subject Area contains archaeological sites and artefacts that provide information about past Aboriginal land use and settlement of the area. As it is so close to a large frequently full lake, and because of the previous detailed work by Pardoe (2009a) the types and locations of these sites can be interpreted to provide further insight into what past events, and how the landscape was used in the past – at both broad scale and detailed observational levels, and to gain an appreciation of the Wiradjuri way of life over the long time period that they have lived in their country.

11. Cultural Heritage Values and Significance Assessment

11.1 The Burra Charter

The Burra Charter (Australia ICOMOS 2013) defines the basic principles and procedures to be observed in the conservation of important heritage places. It provides a primary and 'best-practice' framework within which decisions about the management of heritage sites in Australia should be made. The Burra Charter and the OEH policy *Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW* (OEH 2011) define cultural significance as being derived from the four values defined in Table 13.

Table 13: Definition of Heritage Values of the Burra Charter (Australia ICOMOS 2013)

Value	Description
Aesthetic	This value includes aspects of sensory perception for which criteria can and should be stated. Such criteria may include consideration of the form, scale, colour, texture and material of the fabric; the smells and sounds associated with the place and its use.
Historic	This value encompasses the history of aesthetics, science and society, and therefore to a large extent underlies all of the terms set out in this section. A place may have historic value because it has influenced, or has been influenced by, an historic figure, event, phase or activity. It may also have historic value as the site of an important event. For any given place the significance will be greater where evidence of the association or event survives in situ, or where the settings are substantially intact, than where it has been changed or evidence does not survive. However, some events or associations may be so important that the place retains significance regardless of subsequent treatment.
Scientific	The scientific or research value of a place will depend upon the importance of the data involved, on its rarity, quality or representativeness, and on the degree to which the place may contribute further substantial information.
Social	This value embraces the qualities for which a place has become a focus of spiritual, political, national or other cultural sentiment to a majority or minority group.

11.2 Scientific (Archaeological) Significance Assessment of Aboriginal Heritage Sites

The NSW Aboriginal cultural heritage regulatory framework supports the significance assessment of Aboriginal archaeological sites and provides guidelines for this ACHA within the *Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW* (OEH 2011). The *Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW* (OEH 2011) outlines two main themes in the overall Aboriginal cultural heritage significance assessment process, namely, the identification of the cultural/social significance of Aboriginal objects and/or places to Aboriginal people and the identification of the scientific (archaeological) significance to the scientific/research community. These themes encapsulate those aspects of the Burra Charter that are of particular relevance to Aboriginal objects and places.

The guidelines specify that information about scientific values will be gathered through archaeological investigation carried out according to the *Code of Practice for Archaeological Investigation of Aboriginal Object in New South Wales* (DECCW 2010b). *The Code of Practice for Archaeological Investigation of Aboriginal Object in New South Wales* (DECCW 2010b) itself does not specify criteria for assessment of Aboriginal objects, but rather suggests to "identify the archaeological values and assess their significance" (DECCW 2010b). The assessment must be supportable and the assessment criteria must reflect best practice assessment processes as set out in the Burra Charter.

Notwithstanding the circularity of this advice, the scientific values described in the Burra Charter (above) were considered further by the then NSW National Parks and Wildlife Service in their *Aboriginal Cultural Heritage Standards and Guidelines Kit* (NPWS 1999).

In lieu of specific criteria, the advice from the *Aboriginal Cultural Heritage Standards and Guidelines Kit* (NPWS 1999) is summarised and paraphrased in Table 14 to provide guidance to the assessment of scientific values.

Table 14: Advice of the *Aboriginal Cultural Heritage Standards and Guidelines Kit* (NPWS 1999)

Scientific value	Description
Research Potential	It is the potential to elucidate past behaviour, rather than the potential to yield collections of artefacts that gives significance to this criterion. Matters considered under this criterion include the intactness of a site, the potential for the site to build a chronology and the connectedness of the site to other sites in the archaeological landscape.
Representativeness	As a criterion, representativeness is only meaningful in relation to a conservation objective. Presumably all sites are representative of those in their class or they would not be in that class. What is at issue is the extent to which a class of sites is conserved and whether the particular site being assessed should be conserved in order to ensure that we retain a representative sample of the archaeological record as a whole. The conservation objective which underwrites the 'representativeness' criteria is that such a sample should be conserved.
Rarity	This criterion cannot easily be separated from that of representativeness. If a site is 'distinctive' then by definition, it will be part of the variability which a representative sample would represent. The criteria might best be approached as one which exists within the criteria of representativeness, giving a particular weighting to certain classes of site. The main requirement for being able to assess rarity is to determine what is common and what is unusual in the archaeological record, but also the way that archaeology confers prestige on certain sites because of their ability to provide certain information. The criterion of rarity may be assessed at a range of levels including local, regional, state, national, and global.
Educational Potential	This criterion relates to the ability of the cultural heritage item or place to inform and/or educate people about one or other aspects of the past. It incorporates notions of intactness, relevance, interpretative value and accessibility. Where archaeologists or others carrying out cultural heritage assessments are promoting/advocating the educational value of a cultural heritage item or place it is imperative that public input and support for this value is sought and achieved. Without public input and support the educative value of the items/places is likely to not ever be fully realised.
Aesthetics	In relation to heritage places, aesthetic significance is generally taken to mean the visual beauty of the place. Aesthetic value is not inherent in a place but arises in the sensory response people have to it. The guidelines provide no expectation for archaeologists to consider aesthetic values, it is often the case that the aesthetics including the physical setting of an archaeological site or a landscape contributes to its cultural heritage significance. Examples of archaeological sites that may have high aesthetic values include rock art sites or sites located in environments that evoke strong sensory responses.

11.2.1 Grading Values and Significance

The following gradations, where a site or zone satisfies at least one criterion, have been applied to provide a measure of the values/significance for Aboriginal objects identified within the Subject Area, and to provide an overall assessment of the significance of each of the zones used that define the Subject Area (Table 15).

Table 15: Grades of Values and Significance

Grade of value	Description of grade
Low	The site or object contains only a single or limited number of features, and has no potential to meaningfully inform our understanding of the past beyond what it contributes through its current recording (i.e. no or low research potential). The site or object is a representative but unexceptional example of the most common class of sites or objects in the region. Many more similar examples can be confidently predicted to occur within the Subject Area, and in the region.
Moderate	The site or object derives value because it contains features, both archaeological and contextual, which through further investigation may contribute to our understanding of the local past. These features include, but are not limited to: the relationship with landscape features or other Aboriginal archaeological sites or areas of identified heritage importance; diagnostic archaeological or landscape features that inform a chronology; and a relatively large assemblage of stone artefacts. The presence of a diverse artefact and feature assemblage, and connectedness with landscape features and other notable sites provide relatively higher representative and rarity values than sites of low significance.
High	The site or object has value because it contains archaeological and/or contextual features which through further investigation may significantly contribute to our understanding of the past, both locally and on a regional scale. These features include, but are not limited to: Aboriginal ancestral remains; the site's relationship with landscape features or other Aboriginal archaeological sites or areas of identified heritage importance; diagnostic archaeological or landscape features that inform a chronology; and a very large assemblage of stone artefacts associated with other features such as oven remains or shell midden. Such sites will be relatively rare, and will be representative of a limited number of similar sites that make up this class; hence they derive high representative and rarity values.

The scientific significance assessments for each site are presented in Table 16. Educational potential and aesthetic values are not considered to be criteria against which scientific values and significance can be assessed. Aesthetic values should be considered as a distinct category (rather than a criteria that contributes to scientific value) in accordance with the Burra Charter and the *Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW* (OEH 2011). Educational potential is considered to be a criterion that contributes to social value, rather than scientific value, and hence is considered to be of lesser value in the overall cultural significance assessment.

Table 16: Scientific Significance Assessment – Individual Sites

AHIMS ID	Site Name	Features	Significance Statement	Research Potential	Representativeness	Rarity	Scientific Significance Rating
39-4-0333	Lake Cowal 2017-001	Artefact	Isolated stone artefacts, or low number concentrations of stone artefacts are typical, common and well represented sites and many more are known to have existed at Lake Cowal, and are likely to exist in both the Subject Area and surrounding region. The site is therefore assessed to be of low archaeological value.	Low	Low	Low	Low
39-4-0315	Lake Cowal 2017-003	Artefact	Isolated stone artefacts, or low number concentrations of stone artefacts are typical, common and well represented sites and many more are known to have existed at Lake Cowal, and are likely to exist in both the Subject Area and surrounding region. The site is therefore assessed to be of low archaeological value.	Low	Low	Low	Low
39-4-0316	Lake Cowal 2017-004	Artefact	Isolated stone artefacts, or low number concentrations of stone artefacts are typical, common and well represented sites and many more are known to have existed at Lake Cowal, and are likely to exist in both the Subject Area and surrounding region. The site is therefore assessed to be of low archaeological value.	Low	Low	Low	Low
39-4-0317	Lake Cowal 2017-005	Artefact	Isolated stone artefacts, or low number concentrations of stone artefacts are typical, common and well represented sites and many more are known to have existed at Lake Cowal, and are likely to exist in both the Subject Area and surrounding region. The site is therefore assessed to be of low archaeological value.	Low	Low	Low	Low
39-4-0318	Lake Cowal 2017-006	Artefact Heat Retainer	Isolated stone artefacts, or low number concentrations of stone artefacts are typical, common and well represented sites and many more are known to have existed at Lake Cowal, and are likely to exist in both the Subject Area and surrounding region. This site has multiple features as it includes heat retainers, which are also a common site feature. The site is therefore assessed to be of low archaeological value.	Low	Low	Low	Low
39-4-0319	Lake Cowal 2017-007	Artefact	Isolated stone artefacts, or low number concentrations of stone artefacts are typical, common and well represented sites and many more are known to have existed at Lake Cowal, and are likely to exist in both the Subject Area and surrounding region. The site is therefore assessed to be of low archaeological value.	Low	Low	Low	Low

AHIMS ID	Site Name	Features	Significance Statement	Research Potential	Representativeness	Rarity	Scientific Significance Rating
39-4-0320	Lake Cowal 2017-008	Artefact	Isolated stone artefacts, or low number concentrations of stone artefacts are typical, common and well represented sites and many more are known to have existed at Lake Cowal, and are likely to exist in both the Subject Area and surrounding region. The site is therefore assessed to be of low archaeological value.	Low	Low	Low	Low
39-4-0321	Lake Cowal 2017-009	Artefact	Isolated stone artefacts, or low number concentrations of stone artefacts are typical, common and well represented sites and many more are known to have existed at Lake Cowal, and are likely to exist in both the Subject Area and surrounding region. The site is therefore assessed to be of low archaeological value.	Low	Low	Low	Low
39-4-0322	Lake Cowal 2017-010	Artefact	Isolated stone artefacts, or low number concentrations of stone artefacts are typical, common and well represented sites and many more are known to have existed at Lake Cowal, and are likely to exist in both the Subject Area and surrounding region. The site is therefore assessed to be of low archaeological value.	Low	Low	Low	Low
39-4-0323	Lake Cowal 2017-011	Heat Retainer	Isolated heat retainers, or low number concentrations of heat retainers are typical, common and well represented sites and many more are known to have existed at Lake Cowal, and are likely to exist in both the Subject Area and surrounding region. The site is therefore assessed to be of low archaeological value.	Low	Low	Low	Low
39-4-0324	Lake Cowal 2017-012	Oven Heat Retainer	Ovens are not uncommon but they have high information potential because they are one of the few archaeological features around Lake Cowal, in the Subject Area and the region that can be dated to provide chronological information about past Wiradjuri use of the landscape. For this reason this site is considered to have moderate archaeological value.	Moderate	Low	Low	Moderate
39-4-0325	Lake Cowal 2017-013	Artefact	Isolated stone artefacts, or low number concentrations of stone artefacts are typical, common and well represented sites and many more are known to have existed at Lake Cowal, and are likely to exist in both the Subject Area and surrounding region. The site is therefore assessed to be of low archaeological value.	Low	Low	Low	Low
39-4-0326	Lake Cowal 2017-014	Artefact	Isolated stone artefacts, or low number concentrations of stone artefacts are typical, common and well represented sites and many more are known to have existed at Lake Cowal, and are likely to exist in both the Subject Area and surrounding region. The site is therefore assessed to be of low archaeological value.	Low	Low	Low	Low

AHIMS ID	Site Name	Features	Significance Statement	Research Potential	Representativeness	Rarity	Scientific Significance Rating
39-4-0329	Lake Cowal 2017-015	Heat Retainer	Isolated heat retainers, or low number concentrations of heat retainers are typical, common and well represented sites and many more are known to have existed at Lake Cowal, and are likely to exist in both the Subject Area and surrounding region. The site is therefore assessed to be of low archaeological value.	Low	Low	Low	Low
39-4-0330	Lake Cowal 2017-016	Heat Retainer	Isolated heat retainers, or low number concentrations of heat retainers are typical, common and well represented sites and many more are known to have existed at Lake Cowal, and are likely to exist in both the Subject Area and surrounding region. The site is therefore assessed to be of low archaeological value.	Low	Low	Low	Low
39-4-0331	Lake Cowal 2017-017	Heat Retainer	Isolated heat retainers, or low number concentrations of heat retainers are typical, common and well represented sites and many more are known to have existed at Lake Cowal, and are likely to exist in both the Subject Area and surrounding region. The site is therefore assessed to be of low archaeological value.	Low	Low	Low	Low
39-4-0332	Lake Cowal 2017-018	Heat Retainer	Isolated heat retainers, or low number concentrations of heat retainers are typical, common and well represented sites and many more are known to have existed at Lake Cowal, and are likely to exist in both the Subject Area and surrounding region. The site is therefore assessed to be of low archaeological value.	Low	Low	Low	Low
39-4-0328	Lake Cowal 2017-019	Heat Retainer	Isolated heat retainers, or low number concentrations of heat retainers are typical, common and well represented sites and many more are known to have existed at Lake Cowal, and are likely to exist in both the Subject Area and surrounding region. The site is therefore assessed to be of low archaeological value.	Low	Low	Low	Low
39-4-0327	Lake Cowal 2017-020	Artefact	Isolated stone artefacts, or low number concentrations of stone artefacts are typical, common and well represented sites and many more are known to have existed at Lake Cowal, and are likely to exist in both the Subject Area and surrounding region. The site is therefore assessed to be of low archaeological value.	Low	Low	Low	Low
39-4-0311	Lake Cowal 2017-021	Tree	Scarred trees are uncommon because of the amount of historical land clearing that has been done in the Subject Area and its surrounds. More scarred trees may be confidently predicted to occur in box tree communities around Lake Cowal. This site has moderate archaeological value.	Low	Moderate	Moderate	Moderate

AHIMS ID	Site Name	Features	Significance Statement	Research Potential	Representativeness	Rarity	Scientific Significance Rating
39-4-0312	Lake Cowal 2017-022	Artefact	Isolated stone artefacts, or low number concentrations of stone artefacts are typical, common and well represented sites and many more are known to have existed at Lake Cowal, and are likely to exist in both the Subject Area and surrounding region. The site is therefore assessed to be of low archaeological value.	Low	Low	Low	Low
39-4-0313	Lake Cowal 2017-023	Artefact	This is a site with a relatively high number of flaked stone artefacts in the unusual context (for the Subject Area) of the lake edge ridge micro-environment, and has been subject to relatively little disturbance The site has high potential for sub-surface archaeological deposits, which will have high research potential to provide chronological information that is otherwise not represented by the surface distribution of artefacts. The site has potential value as a comparison assemblage from the lake edge ridge micro-environment for sites on the back plains. As a relatively high number of artefacts on an area of relatively low disturbance on the edge of the lake, the site has moderate representativeness. For these reasons the site is assessed to be of moderate significance.	High	Moderate	Low	High
39-4-0314	Lake Cowal 2017-024	Artefact	Isolated stone artefacts, or low number concentrations of stone artefacts are typical, common and well represented sites and many more are known to have existed at Lake Cowal, and are likely to exist in both the Subject Area and surrounding region. The site is therefore assessed to be of low archaeological value.	Low	Low	Low	Low
39-4-0308	Lake Cowal 2017-025	Artefact	Isolated stone artefacts, or low number concentrations of stone artefacts are typical, common and well represented sites and many more are known to have existed at Lake Cowal, and are likely to exist in both the Subject Area and surrounding region. The site is therefore assessed to be of low archaeological value.	Low	Low	Low	Low
39-4-0309	Lake Cowal 2017-026	Artefact	Isolated stone artefacts, or low number concentrations of stone artefacts are typical, common and well represented sites and many more are known to have existed at Lake Cowal, and are likely to exist in both the Subject Area and surrounding region. The site is therefore assessed to be of low archaeological value.	Low	Low	Low	Low
39-4-0310	Lake Cowal 2017-027	Artefact	Isolated stone artefacts, or low number concentrations of stone artefacts are typical, common and well represented sites and many more are known to have existed at Lake Cowal, and are likely to exist in both the Subject Area and surrounding region. The site is therefore assessed to be of low archaeological value.	Low	Low	Low	Low

AHIMS ID	Site Name	Features	Significance Statement	Research Potential	Representativeness	Rarity	Scientific Significance Rating
39-4-0307	Lake Cowal 2017-028	Artefact	Isolated stone artefacts, or low number concentrations of stone artefacts are typical, common and well represented sites and many more are known to have existed at Lake Cowal, and are likely to exist in both the Subject Area and surrounding region. The site is therefore assessed to be of low archaeological value.	Low	Low	Low	Low
39-4-0306	Lake Cowal 2017-029	Artefact	Isolated stone artefacts, or low number concentrations of stone artefacts are typical, common and well represented sites and many more are known to have existed at Lake Cowal, and are likely to exist in both the Subject Area and surrounding region. The site is therefore assessed to be of low archaeological value.	Low	Low	Low	Low
39-4-0305	Lake Cowal 2017-030	Oven Heat Retainer	Ovens are not uncommon but they have high information potential because they are one of the few archaeological features around Lake Cowal, in the Subject Area and the region that can be dated to provide chronological information about past Wiradjuri use of the landscape. For this reason this site is considered to have moderate archaeological value.	Moderate	Low	Low	Moderate
39-4-0304	Lake Cowal 2017-031	Artefact Heat Retainer	Moderate number concentrations of stone artefacts are typical, common and well represented sites and many more are known to have existed at Lake Cowal, and are likely to exist in both the Subject Area and surrounding region. This site has relatively high numbers of artefacts within the sample recorded for the Subject Area, but is not noteworthy from a wider perspective. The site has multiple features as it includes heat retainers, which are also a common site feature. The site is therefore assessed to be of low archaeological value.	Low	Low	Low	Low
39-4-0303	Lake Cowal 2017-032	Artefact Heat Retainer	Isolated stone artefacts, or low number concentrations of stone artefacts are typical, common and well represented sites and many more are known to have existed at Lake Cowal, and are likely to exist in both the Subject Area and surrounding region. This site has multiple features as it includes heat retainers, which are also a common site feature. The site is therefore assessed to be of low archaeological value.	Low	Low	Low	Low
39-4-0302	Lake Cowal 2017-033	Heat Retainer	Isolated heat retainers, or low number concentrations of heat retainers are typical, common and well represented sites and many more are known to have existed at Lake Cowal, and are likely to exist in both the Subject Area and surrounding region. The site is therefore assessed to be of low archaeological value.	Low	Low	Low	Low

AHIMS ID	Site Name	Features	Significance Statement	Research Potential	Representativeness	Rarity	Scientific Significance Rating
39-4-0301	Lake Cowal 2017-034	Heat Retainer	Isolated heat retainers, or low number concentrations of heat retainers are typical, common and well represented sites and many more are known to have existed at Lake Cowal, and are likely to exist in both the Subject Area and surrounding region. The site is therefore assessed to be of low archaeological value.	Low	Low	Low	Low
39-4-0299	Lake Cowal 2017-035	Artefact	Isolated stone artefacts, or low number concentrations of stone artefacts are typical, common and well represented sites and many more are known to have existed at Lake Cowal, and are likely to exist in both the Subject Area and surrounding region. The site is therefore assessed to be of low archaeological value.	Low	Low	Low	Low
39-4-0300	Lake Cowal 2017-036	Artefact Heat Retainer	This is a large site with a very high number of artefacts, and additional features of heat retainers. The artefacts represent a broad range of classes (flaked, ground-edge and grinding stones) and the location of the site on the margin of the gilgai suggests it has high research potential to add to Pardoe's model of back plains settlement, as a discrete example of this micro-environment, affording moderate representative value. The high number of artefacts indicates there is sub-surface potential at the locality. For these reasons the site is assessed to be of high archaeological value.	High	Moderate	Low	High
39-4-0298	Lake Cowal 2017-037	Oven	Ovens are not uncommon but they have high information potential because they are one of the few archaeological features around Lake Cowal, in the Subject Area and the region that can be dated to provide chronological information about past Wiradjuri use of the landscape. For this reason this site is considered to have moderate archaeological value.	Moderate	Low	Low	Moderate
39-4-0297	Lake Cowal 2017-038	Artefact	Isolated stone artefacts, or low number concentrations of stone artefacts are typical, common and well represented sites and many more are known to have existed at Lake Cowal, and are likely to exist in both the Subject Area and surrounding region. The site is therefore assessed to be of low archaeological value.	Low	Low	Low	Low
39-4-0293	Lake Cowal 2017-039	Artefact	Isolated stone artefacts, or low number concentrations of stone artefacts are typical, common and well represented sites and many more are known to have existed at Lake Cowal, and are likely to exist in both the Subject Area and surrounding region. The site is therefore assessed to be of low archaeological value.	Low	Low	Low	Low

AHIMS ID	Site Name	Features	Significance Statement	Research Potential	Representativeness	Rarity	Scientific Significance Rating
39-4-0294	Lake Cowal 2017-040	Artefact	Isolated stone artefacts, or low number concentrations of stone artefacts are typical, common and well represented sites and many more are known to have existed at Lake Cowal, and are likely to exist in both the Subject Area and surrounding region. The site is therefore assessed to be of low archaeological value.	Low	Low	Low	Low
39-4-0295	Lake Cowal 2017-041	Artefact Heat Retainer	Low number concentrations of stone artefacts are typical, common and well represented sites and many more are known to have existed at Lake Cowal, and are likely to exist in both the Subject Area and surrounding region. This site has relatively high numbers of artefacts within the sample recorded for the Subject Area, but is not noteworthy from a wider perspective. The site has multiple features as it includes heat retainers, which are also a common site feature. The site is therefore assessed to be of low archaeological value.	Low	Low	Low	Low
39-4-0296	Lake Cowal 2017-042	Artefact	Isolated stone artefacts, or low number concentrations of stone artefacts are typical, common and well represented sites and many more are known to have existed at Lake Cowal, and are likely to exist in both the Subject Area and surrounding region. The site is therefore assessed to be of low archaeological value.	Low	Low	Low	Low
39-4-0292	Lake Cowal 2017-043	Heat Retainer	Isolated heat retainers, or low number concentrations of heat retainers are typical, common and well represented sites and many more are known to have existed at Lake Cowal, and are likely to exist in both the Subject Area and surrounding region. The site is therefore assessed to be of low archaeological value.	Low	Low	Low	Low
39-4-0291	Lake Cowal 2017-044	Heat Retainer	Isolated heat retainers, or low number concentrations of heat retainers are typical, common and well represented sites and many more are known to have existed at Lake Cowal, and are likely to exist in both the Subject Area and surrounding region. The site is therefore assessed to be of low archaeological value.	Low	Low	Low	Low
39-4-0290	Lake Cowal 2017-045	Artefact Heat Retainer	Low number concentrations of stone artefacts are typical, common and well represented sites and many more are known to have existed at Lake Cowal, and are likely to exist in both the Subject Area and surrounding region. This site has relatively high numbers of artefacts within the sample recorded for the Subject Area, but is not noteworthy from a wider perspective. The site has multiple features as it includes heat retainers, which are also a common site feature. The site is therefore assessed to be of low archaeological value.	Low	Low	Low	Low

AHIMS ID	Site Name	Features	Significance Statement	Research Potential	Representativeness	Rarity	Scientific Significance Rating
39-4-0289	Lake Cowal 2017-046	Artefact Heat Retainer	Isolated stone artefacts, or low number concentrations of stone artefacts are typical, common and well represented sites and many more are known to have existed at Lake Cowal, and are likely to exist in both the Subject Area and surrounding region. This site has multiple features as it includes heat retainers, which are also a common site feature. The site is therefore assessed to be of low archaeological value.	Low	Low	Low	Low
39-4-0288	Lake Cowal 2017-047	Artefact Heat Retainer	Low number concentrations of stone artefacts are typical, common and well represented sites and many more are known to have existed at Lake Cowal, and are likely to exist in both the Subject Area and surrounding region. This site has relatively high numbers of artefacts within the sample recorded for the Subject Area, but is not noteworthy from a wider perspective. The site has multiple features as it includes heat retainers, which are also a common site feature. The site is therefore assessed to be of low archaeological value.	Low	Low	Low	Low
39-4-0284	Lake Cowal 2017-048	Heat Retainer	Isolated heat retainers, or low number concentrations of heat retainers are typical, common and well represented sites and many more are known to have existed at Lake Cowal, and are likely to exist in both the Subject Area and surrounding region. The site is therefore assessed to be of low archaeological value.	Low	Low	Low	Low
39-4-0286	Lake Cowal 2017-049	Artefact	Isolated stone artefacts, or low number concentrations of stone artefacts are typical, common and well represented sites and many more are known to have existed at Lake Cowal, and are likely to exist in both the Subject Area and surrounding region. The site is therefore assessed to be of low archaeological value.	Low	Low	Low	Low
39-4-0285	Lake Cowal 2017-050	Artefact Heat Retainer	Isolated stone artefacts, or low number concentrations of stone artefacts are typical, common and well represented sites and many more are known to have existed at Lake Cowal, and are likely to exist in both the Subject Area and surrounding region. This site has multiple features as it includes heat retainers, which are also a common site feature. The site is therefore assessed to be of low archaeological value.	Low	Low	Low	Low
39-4-0287	Lake Cowal 2017-051	Artefact	Isolated stone artefacts, or low number concentrations of stone artefacts are typical, common and well represented sites and many more are known to have existed at Lake Cowal, and are likely to exist in both the Subject Area and surrounding region. The site is therefore assessed to be of low archaeological value.	Low	Low	Low	Low

AHIMS ID	Site Name	Features	Significance Statement	Research Potential	Representativeness	Rarity	Scientific Significance Rating
39-4-0283	Lake Cowal 2017-052	Artefact	Isolated stone artefacts, or low number concentrations of stone artefacts are typical, common and well represented sites and many more are known to have existed at Lake Cowal, and are likely to exist in both the Subject Area and surrounding region. The site is therefore assessed to be of low archaeological value.	Low	Low	Low	Low
39-4-0282	Lake Cowal 2017-053	Artefact	Isolated stone artefacts, or low number concentrations of stone artefacts are typical, common and well represented sites and many more are known to have existed at Lake Cowal, and are likely to exist in both the Subject Area and surrounding region. The site is therefore assessed to be of low archaeological value.	Low	Low	Low	Low
39-4-0281	Lake Cowal 2017-054	Artefact	Isolated stone artefacts, or low number concentrations of stone artefacts are typical, common and well represented sites and many more are known to have existed at Lake Cowal, and are likely to exist in both the Subject Area and surrounding region. The site is therefore assessed to be of low archaeological value.	Low	Low	Low	Low
39-4-0271	Lake Cowal 2017-055	Artefact Oven	Ovens are not uncommon but they have high information potential because they are one of the few archaeological features around Lake Cowal, in the Subject Area and the region that can be dated to provide chronological information about past Wiradjuri use of the landscape. For this reason this site is considered to have moderate archaeological value.	Moderate	Low	Low	Moderate
39-4-0272	Lake Cowal 2017-056	Artefact Heat Retainer	Isolated stone artefacts, or low number concentrations of stone artefacts are typical, common and well represented sites and many more are known to have existed at Lake Cowal, and are likely to exist in both the Subject Area and surrounding region. This site has multiple features as it includes heat retainers, which are also a common site feature. The site is therefore assessed to be of low archaeological value.	Low	Low	Low	Low
39-4-0273	Lake Cowal 2017-057	Artefact Oven Heat Retainer	Lake Cowal 2017-057 is a complex of an oven, heat retainers and stone artefacts. Observations made during the assessment, and the presence in a stable alluvial landscape indicate there is high sub-surface potential at the site, and a high likelihood of recovering dating samples (possibly including multiple samples from different features at this one site). The site is moderately rare, moderately representative and has high research potential. Therefore, the site is determined to have high archaeological value.	High	Moderate	Moderate	High

AHIMS ID	Site Name	Features	Significance Statement	Research Potential	Representativeness	Rarity	Scientific Significance Rating
39-4-0274	Lake Cowal 2017-058	Heat Retainer	Isolated heat retainers, or low number concentrations of heat retainers are typical, common and well represented sites and many more are known to have existed at Lake Cowal, and are likely to exist in both the Subject Area and surrounding region. The site is therefore assessed to be of low archaeological value.	Low	Low	Low	Low
39-4-0275	Lake Cowal 2017-059	Heat Retainer	Isolated heat retainers, or low number concentrations of heat retainers are typical, common and well represented sites and many more are known to have existed at Lake Cowal, and are likely to exist in both the Subject Area and surrounding region. The site is therefore assessed to be of low archaeological value.	Low	Low	Low	Low
39-4-0276	Lake Cowal 2017-060	Heat Retainer	Isolated heat retainers, or low number concentrations of heat retainers are typical, common and well represented sites and many more are known to have existed at Lake Cowal, and are likely to exist in both the Subject Area and surrounding region. The site is therefore assessed to be of low archaeological value.	Low	Low	Low	Low
39-4-0277	Lake Cowal 2017-061	Heat Retainer	Isolated heat retainers, or low number concentrations of heat retainers are typical, common and well represented sites and many more are known to have existed at Lake Cowal, and are likely to exist in both the Subject Area and surrounding region. The site is therefore assessed to be of low archaeological value.	Low	Low	Low	Low
39-4-0278	Lake Cowal 2017-062	Artefact	Isolated stone artefacts, or low number concentrations of stone artefacts are typical, common and well represented sites and many more are known to have existed at Lake Cowal, and are likely to exist in both the Subject Area and surrounding region. The site is therefore assessed to be of low archaeological value.	Low	Low	Low	Low
39-4-0279	Lake Cowal 2017-063	Artefact	Isolated stone artefacts, or low number concentrations of stone artefacts are typical, common and well represented sites and many more are known to have existed at Lake Cowal, and are likely to exist in both the Subject Area and surrounding region. The site is therefore assessed to be of low archaeological value.	Low	Low	Low	Low
39-4-0280	Lake Cowal 2017-066	Heat Retainer	Isolated heat retainers, or low number concentrations of heat retainers are typical, common and well represented sites and many more are known to have existed at Lake Cowal, and are likely to exist in both the Subject Area and surrounding region. The site is therefore assessed to be of low archaeological value.	Low	Low	Low	Low

AHIMS ID	Site Name	Features	Significance Statement	Research Potential	Representativeness	Rarity	Scientific Significance Rating
43-4-0054	Lake Cowal 2017-067	Heat Retainer	Isolated heat retainers, or low number concentrations of heat retainers are typical, common and well represented sites and many more are known to have existed at Lake Cowal, and are likely to exist in both the Subject Area and surrounding region. The site is therefore assessed to be of low archaeological value.	Low	Low	Low	Low
43-4-0055	Lake Cowal 2017-068	Heat Retainer	Isolated heat retainers, or low number concentrations of heat retainers are typical, common and well represented sites and many more are known to have existed at Lake Cowal, and are likely to exist in both the Subject Area and surrounding region. The site is therefore assessed to be of low archaeological value.	Low	Low	Low	Low

11.3 Cultural Significance Assessment of Aboriginal Heritage Sites

The *Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW* (OEH 2011: 18) requires that a "clear description of the heritage values present across the area of the proposed activity" be presented, and be articulated back to the information collected during the assessment process, in particular to any submissions received from RAPs. The *Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW* (OEH 2011: 18) advises that "the assessment of values is a discussion of what is significant and why". The purpose of the statement of significance is to create a comprehensive assessment of values and significance by considering and stating the values identified under each of the value categories defined by the Burra Charter, namely, social values, historic values, scientific values, and aesthetic values. The *Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW* (OEH 2011:10) states:

> *"The assessment and justification in the statement of significance must discuss whether any value meets the following criteria (NSW Heritage Office 2001):*
>
> - *does the Subject Area have a strong or special association with a particular community or cultural group for social, cultural or spiritual reasons? – social value*
> - *is the Subject Area important to the cultural or natural history of the local area and/or region and/or state? – historic value*
> - *does the Subject Area have potential to yield information that will contribute to an understanding of the cultural or natural history of the local area and/or region and/or state? – scientific (archaeological) value*
> - *is the Subject Area important in demonstrating aesthetic characteristics in the local area and/or region and/or state? – aesthetic value."*

11.4 Statement of Significance

Statements of significance for the Subject Area are presented in the following sub-sections. These statements of significance will be further updated in consideration of comments received from the RAPs during the consultation process, including those comments relating to the cultural significance of all sites and the interrelationships between the cultural and spiritual values with the natural landscape. All comments received from RAPs are considered in Section 4.

11.4.1 Social Value

The Subject Area is of social significance to the Wiradjuri Aboriginal community because it contains traditional and historical associations that help define the Wiradjuri's history and the communities' identity. The Subject Area has a rich prehistory as demonstrated by the archaeological record.

11.4.2 Aesthetic Value

Lake Cowal has aesthetic values as a natural landscape feature of importance to the Wiradjuri community. However, the Subject Area has no identified aesthetic values. It is a mostly heavily modified landscape, sitting adjacent to a major mine development and rural infrastructure.

11.4.3 Historical Value

The Subject Area contains no identified historical values.

11.4.4 Scientific (Archaeological) Value

The Subject Area contains 65 identified Aboriginal archaeological sites, including open stone artefact sites, a culturally modified tree, ovens and heat retainers. The archaeological sites in the Subject Area have been assessed as predominantly of low scientific (archaeological) value (approximately 88% of the sites), with five sites of moderate scientific (archaeological) value (approximately 8% of the sites) and three sites of high scientific (archaeological) value (approximately 5% of the sites).[3]

The Subject Area sits adjacent to an area that has seen a significant amount of archaeological study over the last decade (Pardoe 2009a, 2013) and therefore can be confidently described as being in a local context that is very well known in terms of archaeology and cultural heritage. The Subject Area has the potential to add information to the story of Wiradjuri settlement around Lake Cowal, particularly in the back plains and gilgai plains micro-environments. Of particular value is the potential to show the relationship between past Aboriginal land use and the available resources, particularly those associated with the gilgai area and the lake edge ridge, and the potential to add chronological information to this story through dating of archaeological deposits and ovens.

[3] Numbers don't add up to 100% due to rounding.

12. Impact Assessment

12.1 Potential Impacts

The *Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW* (OEH 2011) requires that both direct and indirect harm to Aboriginal objects and Aboriginal places be considered.

Generally direct harm refers to occasions where an activity physically impacts a site or objects, thereby affecting the heritage values possessed by the site or objects. Indirect harm is usually taken to mean harm stemming from secondary consequences of the activity, and may affect sites or objects as an indirect consequence of the activity. Examples of such indirect harm are increased visitors to a site, or increased erosion in an area as a result of an activity.

There are several components of the Modification, some of which will cause direct and certain harm to identified Aboriginal objects within the surface disturbance area, while other components will only cause harm if additional disturbance is required due to future contingencies. The Modification components are summarised in Table 17, and shown in Figure 8, Figure 9 and Figure 10).

Table 17. Modification Components and Description of Harm to Aboriginal Objects

Modification Component	Description of Harm
Pipeline Duplication	Clearing of easement and excavation of the ground
Relocated D10 Dam	Clearing and excavation of the ground
Relocated Explosives Compound	Clearing and preparation of the ground
Relocated Magazine Location	Clearing and preparation of the ground
Soil Stockpile	Clearing and preparation of the ground, soil emplacement
Southern Soil Stockpile	Clearing and preparation of the ground, soil emplacement
Integrated Waste Landform	Clearing and preparation of the ground, waste emplacement
Realigned Up-Catchment Diversion	Excavation of the ground for diversion channels
Realigned Lake Cowal Road	Clearing of the ground and construction of a road
Realigned TSR	Erection of fencing
Mining Lease (ML 1535) Boundary	Potential for future development if needed
Mining Lease Application Area	Potential for future development if needed

In addition to impacts on the known sites (those sites identified during this assessment) the proposed Modification components, and any ancillary works, have the potential to harm Aboriginal objects which may exist in the soil profile or which may be exposed on the ground surface subsequent to survey, but prior to impact occurring. Predominantly these Aboriginal objects will be part of the "background scatter" or continuous low density distribution of artefacts across the landscape, but there may also be concentrations of artefacts representing the past traces of more intensive or deliberate Aboriginal land use. The topsoil monitoring program has resulted in the collection of many hundreds of artefacts from the pre-existing approved development footprint, demonstrating that this is indeed the case (Pardoe 2009a: 51).

A total of 65 Aboriginal heritage sites were identified within the Subject Area.

As described above, the direct harm associated with surface disturbance activities of the Modification is anticipated to cause either a total or partial loss of heritage value at affected sites, and would have a cumulative or landscape impact of partial loss of values for the area as a whole. The activities that may cause harm to Aboriginal objects or areas of cultural value would include:

- vegetation clearance and topsoil stripping;
- disturbance of soil units or the ground surface with Aboriginal objects on the surface or within the soil profile;
- changes to a site or place's context that has secondary impacts to the site or place, resulting in the loss of cultural values; and
- excavation works and the removal and redistribution of soil by heavy machinery during site regrading or development of suitable surface conditions for various construction activities.

The Modification is also likely to harm as yet unidentified sites, and may have the potential in the future to harm known sites within the ML 1535 area and Mining Lease Application Area should future contingencies require further ancillary developments.

The Modification has the potential to harm Aboriginal objects and Aboriginal cultural values during both the development phase and the operational phase. During the development phase potential harm and impacts may result from the development of surface infrastructure, which will involve (as examples) land clearing and ground disturbance for the establishment of transport corridors and facilities, administration buildings and mine access, storage and stockpile areas. During the operational phase of the Modification potential harm may be derived from activities such as earthworks for the establishment of additional infrastructure or transport ways, or for the maintenance of roads and tracks.

As required by the *Code of Practice for the Archaeological Investigation of Aboriginal Objects in NSW* (DECCW 2010b), the likely impacts (and partial loss of value) to Aboriginal heritage sites as a result of the Modification is presented in Table 18. For the purposes of Table 18, indirect harm includes sites where development will take place within 50 m of identified site features. Those sites that are within the mining lease or mining lease application area have been classified as having no harm, as there is no certainty of harm for these sites arising from the Modification itself, but future design additions may result in harm to some of these sites. In summary the proposed Modification will directly harm 22 sites, indirectly harm 5 sites, and cause no harm to 38 sites. Table 18 also summarises the sites that will be impacted, their scientific significance rating and the Modification component of the disturbance footprint that each site is affected by. The assessment results and the Modification components are shown in Figure 8, Figure 9 and Figure 10.

Table 18. Impact Assessment Summary Table

AHIMS ID	Name	Scientific Significance	Infrastructure/Area	Type of harm (Direct/ Indirect/ None)	Degree of harm (Total/ Partial/ None)	Consequence of harm (Total Loss of value/ Partial loss of value/ No loss of value)
39-4-0333	Lake Cowal 2017-001	Low	Soil stockpile	Direct	Total	Total loss of value
39-4-0315	Lake Cowal 2017-003	Low	Soil stockpile	Direct	Partial	Partial loss of value
39-4-0316	Lake Cowal 2017-004	Low	Within mining lease application area	None	None	No loss of value
39-4-0317	Lake Cowal 2017-005	Low	Realigned Lake Cowal Road	Direct	Partial	Partial loss of value
39-4-0318	Lake Cowal 2017-006	Low	Realigned Lake Cowal Road	Direct	Total	Total loss of value
39-4-0319	Lake Cowal 2017-007	Low	Within mining lease application area	None	None	No loss of value
39-4-0320	Lake Cowal 2017-008	Low	Within mining lease application area	None	None	No loss of value
39-4-0321	Lake Cowal 2017-009	Low	Within mining lease application area	None	None	No loss of value
39-4-0322	Lake Cowal 2017-010	Low	Within mining lease application area	None	None	No loss of value
39-4-0323	Lake Cowal 2017-011	Low	Soil stockpile	Direct	Total	Total loss of value
39-4-0324	Lake Cowal 2017-012	Moderate	Soil stockpile	Direct	Partial	Partial loss of value
39-4-0325	Lake Cowal 2017-013	Low	Soil stockpile	Direct	Total	Total loss of value
39-4-0326	Lake Cowal 2017-014	Low	Within mining lease application area	None	None	No loss of value
39-4-0329	Lake Cowal 2017-015	Low	Realigned Lake Cowal Road	Indirect	Partial	Partial loss of value
39-4-0330	Lake Cowal 2017-016	Low	Realigned Lake Cowal Road	Indirect	Partial	Partial loss of value
39-4-0331	Lake Cowal 2017-017	Low	Realigned Lake Cowal Road	Indirect	Partial	Partial loss of value
39-4-0332	Lake Cowal 2017-018	Low	Realigned Lake Cowal Road	Indirect	Partial	Partial loss of value
39-4-0328	Lake Cowal 2017-019	Low	Within mining lease application area	None	None	No loss of value
39-4-0327	Lake Cowal 2017-020	Low	Within mining lease boundary	None	None	No loss of value
39-4-0311	Lake Cowal 2017-021	Moderate	Within mining lease boundary	None	None	No loss of value
39-4-0312	Lake Cowal 2017-022	Low	Within mining lease boundary	Direct	Partial	Partial loss of value
39-4-0313	Lake Cowal 2017-023	High	Within mining lease boundary	None	None	No loss of value
39-4-0314	Lake Cowal 2017-024	Low	Within mining lease boundary	None	None	No loss of value
39-4-0308	Lake Cowal 2017-025	Low	Within mining lease boundary	None	None	No loss of value
39-4-0309	Lake Cowal 2017-026	Low	Within mining lease boundary	Indirect	Partial	Partial loss of value
39-4-0310	Lake Cowal 2017-027	Low	Within mining lease application area	None	None	No loss of value
39-4-0307	Lake Cowal 2017-028	Low	Within mining lease application area	None	None	No loss of value
39-4-0306	Lake Cowal 2017-029	Low	Within mining lease application area	None	None	No loss of value
39-4-0305	Lake Cowal 2017-030	Moderate	Realigned Lake Cowal Road	Direct	Partial	Partial loss of value
39-4-0304	Lake Cowal 2017-031	Low	Integrated waste landform	Direct	Total	Total loss of value
39-4-0303	Lake Cowal 2017-032	Low	Integrated waste landform	Direct	Total	Total loss of value
39-4-0302	Lake Cowal 2017-033	Low	Within mining lease application area	None	None	No loss of value

AHIMS ID	Name	Scientific Significance	Infrastructure/Area	Type of harm (Direct/ Indirect/ None)	Degree of harm (Total/ Partial/ None)	Consequence of harm (Total Loss of value/ Partial loss of value/ No loss of value)
39-4-0301	Lake Cowal 2017-034	Low	Within mining lease application area	None	None	No loss of value
39-4-0299	Lake Cowal 2017-035	Low	Within mining lease boundary	None	None	No loss of value
39-4-0300	Lake Cowal 2017-036	High	Integrated waste landform/realigned up-catchment diversion	Direct	Partial	Partial loss of value
39-4-0298	Lake Cowal 2017-037	Moderate	Integrated waste landform	Direct	Total	Total loss of value
39-4-0297	Lake Cowal 2017-038	Low	Soil stockpile	Direct	Total	Total loss of value
39-4-0293	Lake Cowal 2017-039	Low	Soil stockpile	Direct	Total	Total loss of value
39-4-0294	Lake Cowal 2017-040	Low	Within mining lease boundary	None	None	No loss of value
39-4-0295	Lake Cowal 2017-041	Low	Within mining lease boundary	None	None	No loss of value
39-4-0296	Lake Cowal 2017-042	Low	Within mining lease boundary	None	None	No loss of value
39-4-0292	Lake Cowal 2017-043	Low	Within mining lease boundary	None	None	No loss of value
39-4-0291	Lake Cowal 2017-044	Low	Within mining lease boundary	None	None	No loss of value
39-4-0290	Lake Cowal 2017-045	Low	Within mining lease boundary	None	None	No loss of value
39-4-0289	Lake Cowal 2017-046	Low	Within mining lease boundary	None	None	No loss of value
39-4-0288	Lake Cowal 2017-047	Low	Within mining lease boundary	None	None	No loss of value
39-4-0284	Lake Cowal 2017-048	Low	Within mining lease boundary	None	None	No loss of value
39-4-0286	Lake Cowal 2017-049	Low	Within mining lease boundary	None	None	No loss of value
39-4-0285	Lake Cowal 2017-050	Low	Integrated waste landform	Direct	Total	Total loss of value
39-4-0287	Lake Cowal 2017-051	Low	Within mining lease boundary	None	None	No loss of value
39-4-0283	Lake Cowal 2017-052	Low	Within mining lease boundary	None	None	No loss of value
39-4-0282	Lake Cowal 2017-053	Low	Within mining lease boundary	None	None	No loss of value
39-4-0281	Lake Cowal 2017-054	Low	Within mining lease boundary	None	None	No loss of value
39-4-0271	Lake Cowal 2017-055	Moderate	Integrated waste landform	Direct	Total	Total loss of value
39-4-0272	Lake Cowal 2017-056	Low	Integrated waste landform	Direct	Total	Total loss of value
39-4-0273	Lake Cowal 2017-057	High	Integrated waste landform	Direct	Total	Total loss of value
39-4-0274	Lake Cowal 2017-058	Low	Integrated waste landform	Direct	Total	Total loss of value
39-4-0275	Lake Cowal 2017-059	Low	Within mining lease boundary	None	None	No loss of value
39-4-0276	Lake Cowal 2017-060	Low	Within mining lease boundary	None	None	No loss of value
39-4-0277	Lake Cowal 2017-061	Low	Integrated waste landform	Direct	Partial	Partial loss of value
39-4-0278	Lake Cowal 2017-062	Low	Within mining lease boundary	None	None	No loss of value
39-4-0279	Lake Cowal 2017-063	Low	Within mining lease boundary	None	None	No loss of value
39-4-0280	Lake Cowal 2017-066	Low	Within mining lease boundary	None	None	No loss of value
43-4-0054	Lake Cowal 2017-067	Low	Within mining lease boundary	None	None	No loss of value
43-4-0055	Lake Cowal 2017-068	Low	Realigned Lake Cowal Road	Direct	Partial	Partial loss of value

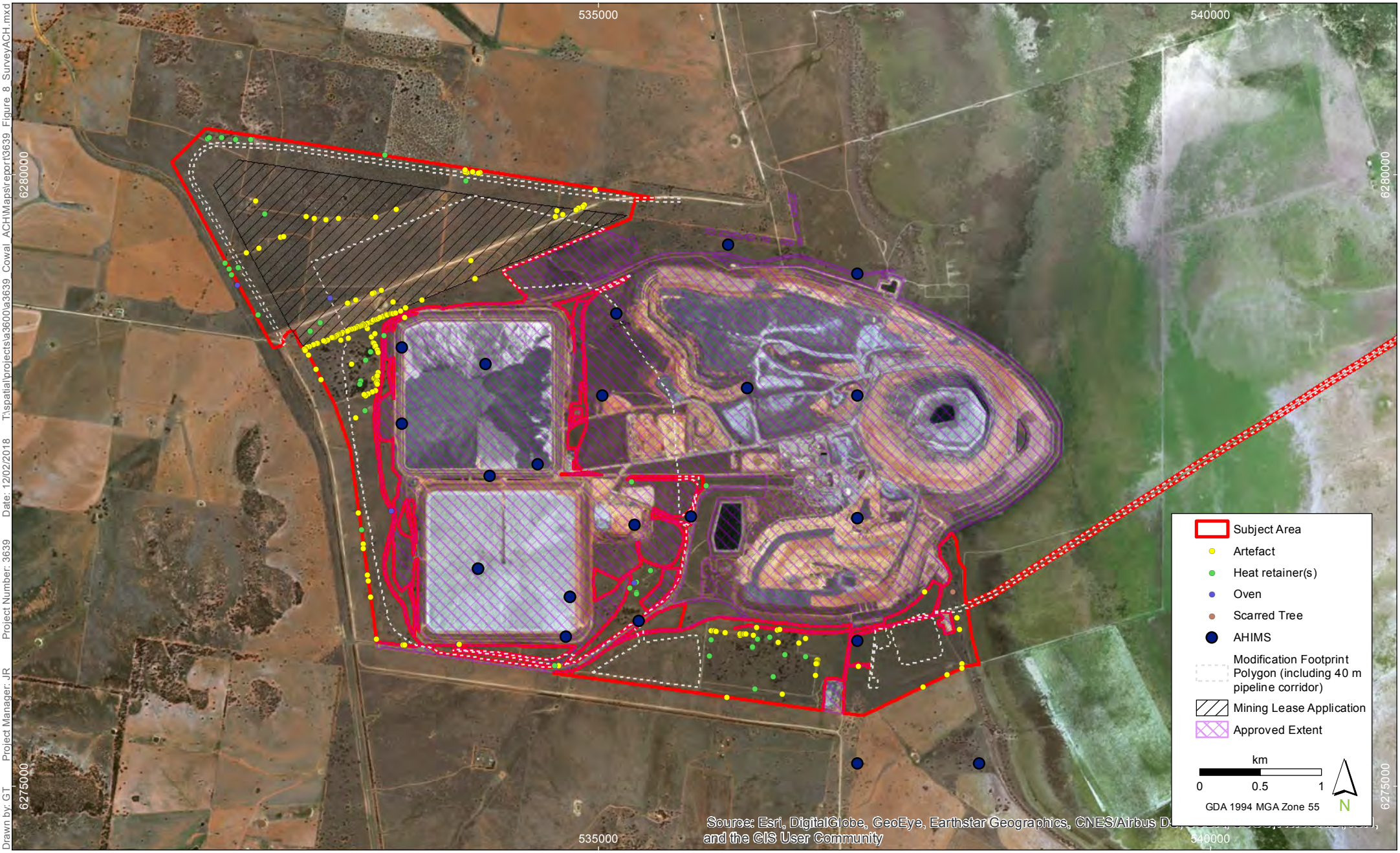
12.2 Potential Cumulative Impacts

The Modification would cause an increase to the cumulative development impact on the Aboriginal cultural heritage of the region and local area. Regionally the cumulative impact is considered to be quite minor, given the size of the region and its diversity of archaeological sites compared to the relatively small Subject Area. Locally the Aboriginal heritage of the area is already considerably impacted, given the intensity of rural and agricultural development in the region (Witter 2004), but at this level the cumulative impact is somewhat more.

The *Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW* (OEH 2011) defines ecologically sustainable development and inter-generational equity as follows,

> *"the principle of intergenerational equity holds that the present generation should make every effort to ensure the health, diversity and productivity of the environment – which includes cultural heritage – is available for the benefit of future generations."*

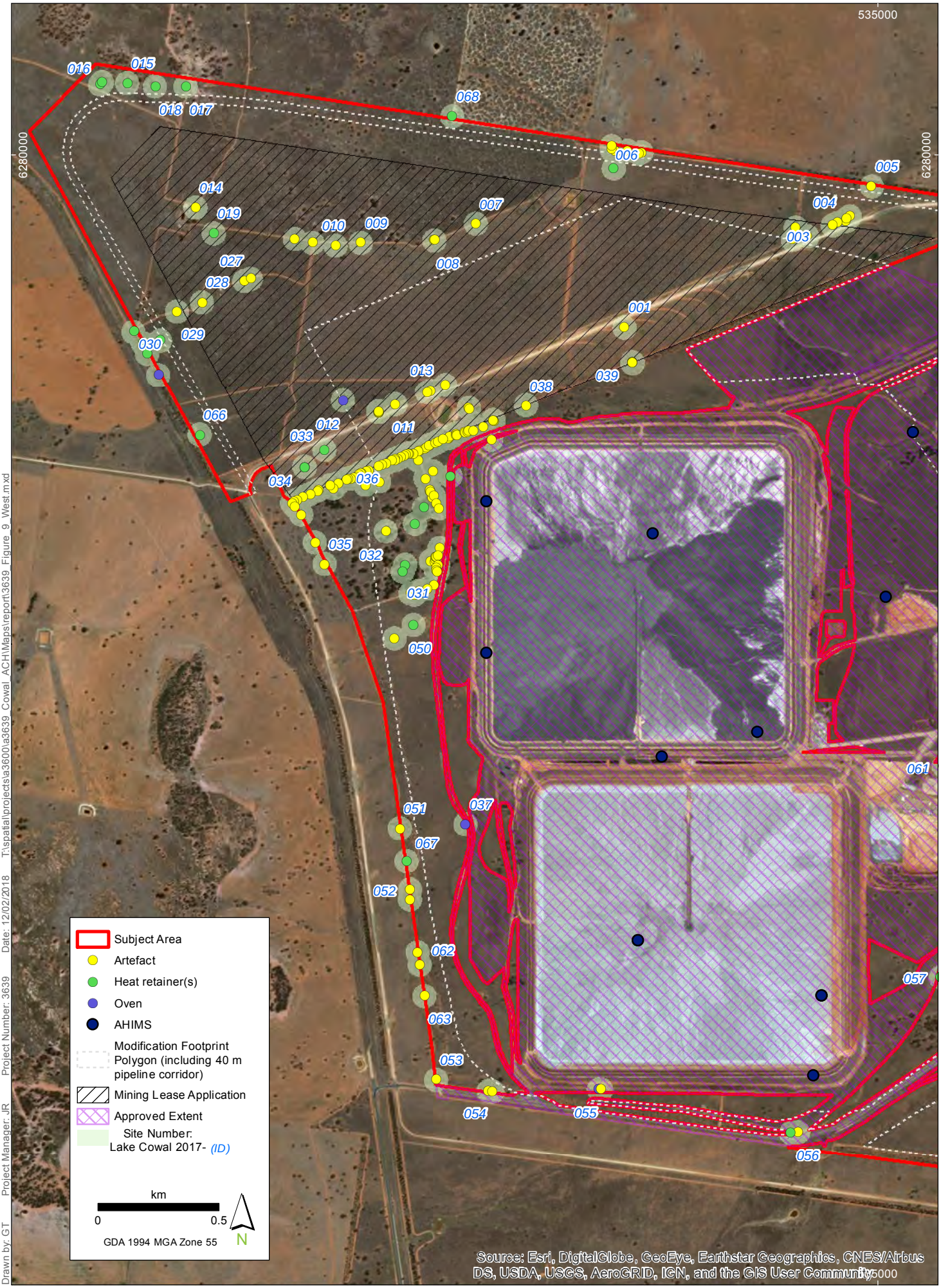
When considered against the principles of inter-generational equity and ecologically sustainable development the potential impacts of the Modification can be considered relatively minor. Although they directly harm a number of sites, most are of low scientific value and comprise the "background scatter" of artefacts. There is no significant detrimental effect to quality or benefit that the Aboriginal history and archaeology of the Subject Area may provide to future generations. Mitigation measures implemented in accordance with the IACHMP will further contribute to the knowledge and understanding of past Wiradjuri use of the Lake Cowal landscape and prehistory which provides some amelioration of adverse impacts, and which provides knowledge and information that may be shared with future generations.



Assessment results and Modification Components - Overview

Cowal Gold Operations Processing Rate Modification - Aboriginal Cultural Heritage Assessment

FIGURE 8



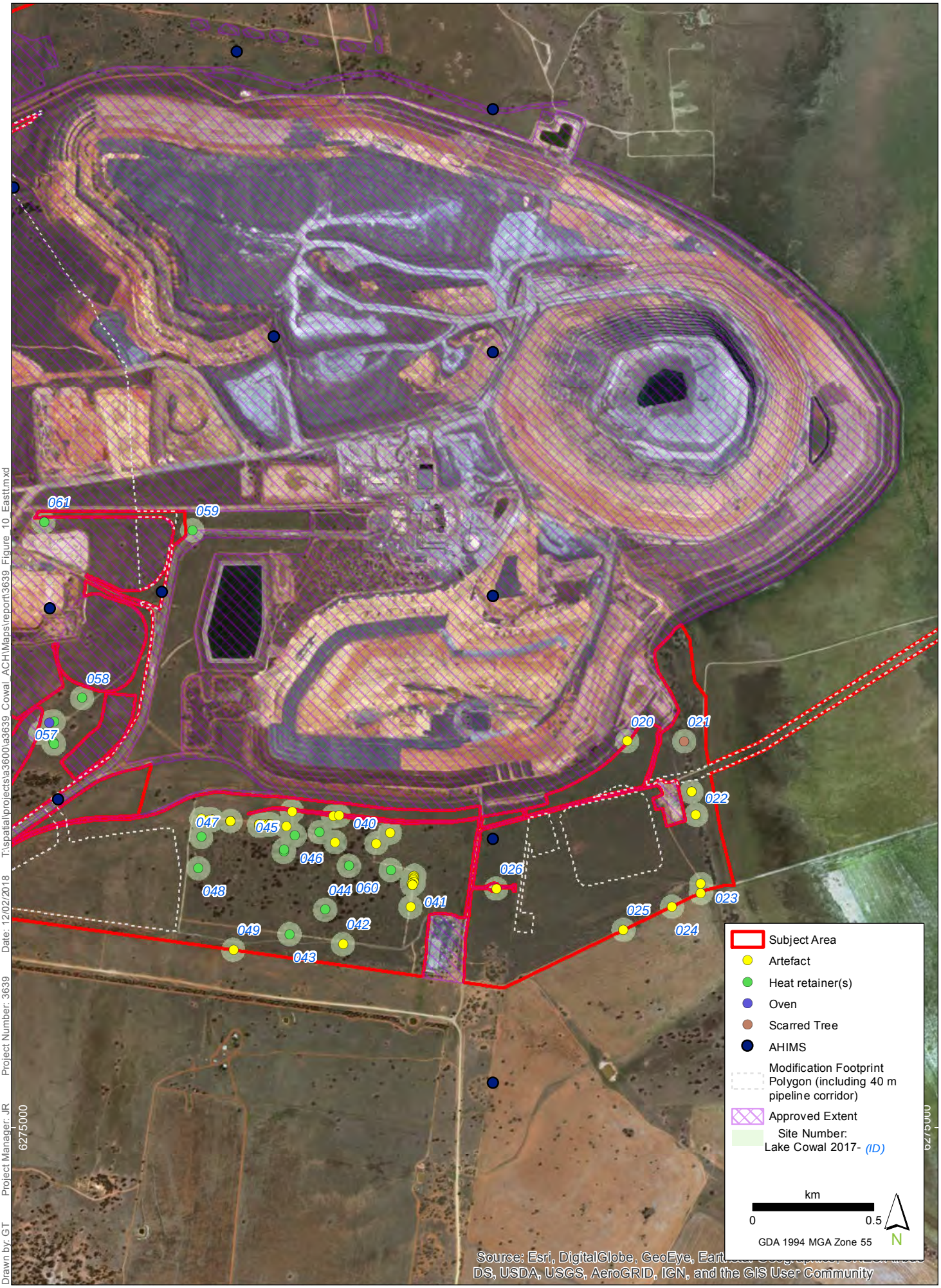
Assessment Results and Modification Components - West

Cowal Gold Operations Processing Rate Modification - Aboriginal Cultural Heritage Assessment

niche Environment and Heritage

FIGURE 9

Imagery: (c) DigitalGlobe 2015-08-02



Assessment Results and Modification Components - East

Cowal Gold Operations Processing Rate Modification - Aboriginal Cultural Heritage Assessment

FIGURE 10

Imagery: (c) DigitalGlobe 2015-08-02

13. Management and Mitigation Measures

13.1 Conservation Principles and Management Framework

The two founding principles behind the *Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW* (OEH 2011:12) are ecologically sustainable development and intergenerational equity. These principles hold that "the present generation should make every effort to ensure the health, diversity and productivity of the environment – which includes cultural heritage – is available for the benefit of future generations".

As in the Burra Charter, this strong emphasis strives to quantify and understand the heritage values of a place, a site, or an object and exhaust avenues of avoiding harm to those values. If harm cannot be avoided then there must be consideration and implementation of strategies to minimise harm (OEH 2011:13).

It follows that the hierarchy for consideration in regards to management strategies available for surface stone artefacts and subsurface stone artefacts and areas of archaeological potential, fall into four general categories, in order of preference from a conservation perspective:

- avoidance and *in-situ* conservation;
- partial avoidance and partial *in-situ* conservation (includes partial harm);
- harm caused with mitigating circumstances such as collection or salvage; and
- unmitigated harm.

The four general categories (described above) have been considered in the following subsections with regard to direct impacts (e.g. surface disturbance).

The management and mitigation measures have been prepared in consideration of comments received from the RAPs during the consultation process. These comments include those related to cultural considerations surrounding salvage works and the handling of artefactual materials, as well as the cultural significance of all sites. All comments received from the RAPs are considered in Section 4.

13.1.1 Detailed Design to Avoid Harm

The preliminary results of this assessment have been used by CGO in the design of the surface infrastructure, with sites avoided wherever possible. In particular, the cultural importance of the scarred tree (Lake Cowal 2017-021) has been recognised through the consultation process and the Modification design avoids harm to this site. During further detailed design of surface infrastructure within the Modification area, CGO will give further consideration to the known Aboriginal heritage sites identified by this and previous studies.

This process should include a consideration of whether or not surface infrastructure can be designed in a way that avoids harm, and if harm cannot be avoided that harm be caused to as few sites as possible, within existing design and operational constraints.

This approach is consistent with the OEH requirements of ecologically sustainable development and intergenerational equity.

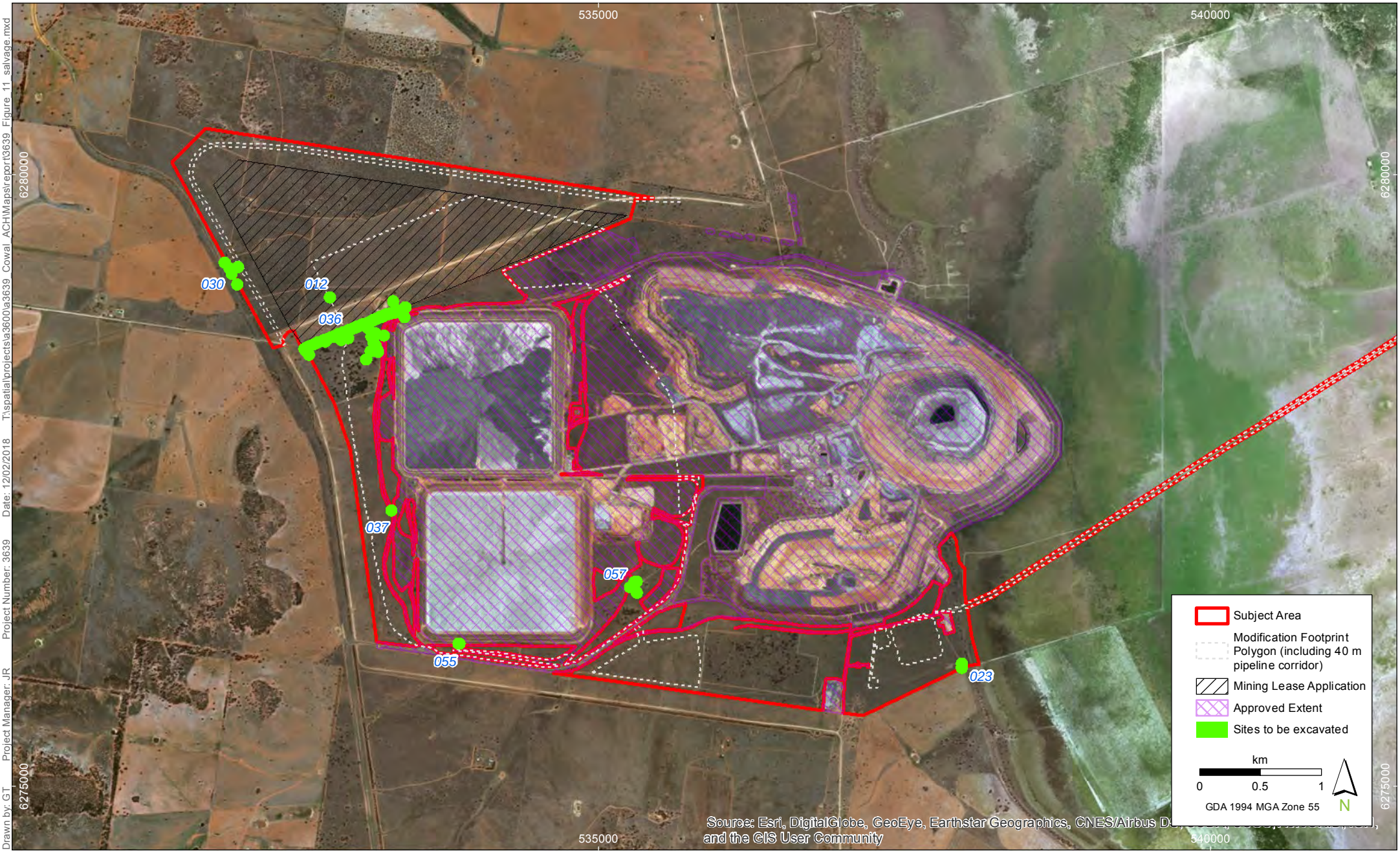
13.1.2 Site Avoidance

Sites that can be avoided by the proposed Modification works should be considered on a progressive basis in the context of each site's extent and the proximity of nearby works. Practical measures such as temporary fencing may be used to assist with site avoidance if required. CGO currently use an internal ground disturbance permit process which will include any instructions for avoidance of Aboriginal cultural heritage sites.

13.1.3 Sites that Cannot be Avoided

For those sites where harm cannot be avoided, mitigation measures as described in the recommendations, and consistent with the IACHMP should be implemented. These mitigation measures should include but not be limited to:

- archaeological salvage excavation of sites of high archaeological significance (Figure 11);
  - At Lake Cowal 2017-057, a large open area excavation that seeks to reveal further features of the feature complex, and recover information on the contents of and dating samples from the oven(s) present.
  - At Lake Cowal 2017-036, an excavation that is within the surface impact footprint and in an undisturbed area adjacent to the highest density of artefacts present on the vehicle track. The excavation should start as a test program seeking high densities of subsurface artefacts, and extend into trenches or open areas to reveal artefact concentrations or site features (such as ovens).
  - At Lake Cowal 2017-023, if this area is to be disturbed by future infrastructure the excavation of trenches will be required to understand the depth and age of Aboriginal occupation on the Lake Edge Ridge and to provide comparative assemblage for results so far obtained, and to be obtained, from the Back Plains and Gilgai Plains.
- surface collection and salvage of all visible artefacts at all known site locations prior to disturbance;
- for scarred trees, the option to salvage, relocate and conserve the tree in a manner agreed by the RAPs;
- archaeological excavation of known ovens for the purpose of collecting dating samples (i.e. sites Lake Cowal 2017-012, Lake Cowal 2017-030, Lake Cowal 2017-037, Lake Cowal 2017-055) (Figure 11)(Figure 11);
- for background scatter areas and surface sites that have been collected, continued management in accordance with the praxis established by the Consent 1467/Permit 1468 and Consent 1680/Permit 1681 and the IACHMP, being:
  - topsoil stripping by shallow grader scraping forming windrows;
  - collection of exposed artefacts; and
  - salvage excavation of ovens for the purpose of collecting dating samples.
- It is recommended that a short period of time be left between the grader scraping and collection, as this greatly improves visibility of artefacts and ovens in the graded areas.
- provision for analyses of salvaged artefacts that may include technological analysis of the stone artefacts assemblage, geochemical characterization of raw material types, use-wear and residue analyses and radiocarbon dating.



Sites Requiring Salvage Excavation

Cowal Gold Operations Processing Rate Modification - Aboriginal Cultural Heritage Assessment

FIGURE 11

Imagery: (c) DigitalGlobe 2015-08-02

13.1.4 Summary of Site Specific Management Measures

The proposed management measures for each of the sites recorded during this assessment are provided in Table 19.

Table 19. Summary of Site Specific Management Measures

AHIMS ID	Name	Scientific Significance	Type of harm	Management Measures
39-4-0333	Lake Cowal 2017-001	Low	Direct	Salvage via surface collection and grader scrape
39-4-0315	Lake Cowal 2017-003	Low	Direct	Salvage via surface collection and grader scrape
39-4-0316	Lake Cowal 2017-004	Low	None	Salvage via surface collection and grader scrape if required
39-4-0317	Lake Cowal 2017-005	Low	Direct	Salvage via surface collection and grader scrape
39-4-0318	Lake Cowal 2017-006	Low	Direct	Salvage via surface collection and grader scrape
39-4-0319	Lake Cowal 2017-007	Low	None	Salvage via surface collection and grader scrape if required
39-4-0320	Lake Cowal 2017-008	Low	None	Salvage via surface collection and grader scrape if required
39-4-0321	Lake Cowal 2017-009	Low	None	Salvage via surface collection and grader scrape if required
39-4-0322	Lake Cowal 2017-010	Low	None	Salvage via surface collection and grader scrape if required
39-4-0323	Lake Cowal 2017-011	Low	Direct	Salvage via surface collection and grader scrape
39-4-0324	Lake Cowal 2017-012	Moderate	Direct	Salvage excavation
39-4-0325	Lake Cowal 2017-013	Low	Direct	Salvage via surface collection and grader scrape
39-4-0326	Lake Cowal 2017-014	Low	None	Salvage via surface collection and grader scrape if required
39-4-0329	Lake Cowal 2017-015	Low	Indirect	Salvage via surface collection and grader scrape
39-4-0330	Lake Cowal 2017-016	Low	Indirect	Salvage via surface collection and grader scrape
39-4-0331	Lake Cowal 2017-017	Low	Indirect	Salvage via surface collection and grader scrape
39-4-0332	Lake Cowal 2017-018	Low	Indirect	Salvage via surface collection and grader scrape
39-4-0328	Lake Cowal 2017-019	Low	None	Salvage via surface collection and grader scrape if required
39-4-0327	Lake Cowal 2017-020	Low	None	Salvage via surface collection and grader scrape if required
39-4-0311	Lake Cowal 2017-021	Moderate	None	Salvage if required, otherwise avoidance
39-4-0312	Lake Cowal 2017-022	Low	Direct	Salvage via surface collection and grader scrape
39-4-0313	Lake Cowal 2017-023	High	None	Salvage excavation if required, otherwise avoidance
39-4-0314	Lake Cowal 2017-024	Low	None	Salvage via surface collection and grader scrape if required
39-4-0308	Lake Cowal 2017-025	Low	None	Salvage via surface collection and grader scrape if required
39-4-0309	Lake Cowal 2017-026	Low	Indirect	Salvage via surface collection and grader scrape
39-4-0310	Lake Cowal 2017-027	Low	None	Salvage via surface collection and grader scrape if required

AHIMS ID	Name	Scientific Significance	Type of harm	Management Measures
39-4-0307	Lake Cowal 2017-028	Low	None	Salvage via surface collection and grader scrape if required
39-4-0306	Lake Cowal 2017-029	Low	None	Salvage via surface collection and grader scrape if required
39-4-0305	Lake Cowal 2017-030	Moderate	Direct	Salvage excavation
39-4-0304	Lake Cowal 2017-031	Low	Direct	Salvage via surface collection and grader scrape
39-4-0303	Lake Cowal 2017-032	Low	Direct	Salvage via surface collection and grader scrape
39-4-0302	Lake Cowal 2017-033	Low	None	Salvage via surface collection and grader scrape if required
39-4-0301	Lake Cowal 2017-034	Low	None	Salvage via surface collection and grader scrape if required
39-4-0299	Lake Cowal 2017-035	Low	None	Salvage via surface collection and grader scrape if required
39-4-0300	Lake Cowal 2017-036	High	Direct	Collection, and salvage excavation
39-4-0298	Lake Cowal 2017-037	Moderate	Direct	Salvage excavation
39-4-0297	Lake Cowal 2017-038	Low	Direct	Salvage via surface collection and grader scrape
39-4-0293	Lake Cowal 2017-039	Low	Direct	Salvage via surface collection and grader scrape
39-4-0294	Lake Cowal 2017-040	Low	None	Salvage via surface collection and grader scrape if required
39-4-0295	Lake Cowal 2017-041	Low	None	Salvage via surface collection and grader scrape if required
39-4-0296	Lake Cowal 2017-042	Low	None	Salvage via surface collection and grader scrape if required
39-4-0292	Lake Cowal 2017-043	Low	None	Salvage via surface collection and grader scrape if required
39-4-0291	Lake Cowal 2017-044	Low	None	Salvage via surface collection and grader scrape if required
39-4-0290	Lake Cowal 2017-045	Low	None	Salvage via surface collection and grader scrape if required
39-4-0289	Lake Cowal 2017-046	Low	None	Salvage via surface collection and grader scrape if required
39-4-0288	Lake Cowal 2017-047	Low	None	Salvage via surface collection and grader scrape if required
39-4-0284	Lake Cowal 2017-048	Low	None	Salvage via surface collection and grader scrape if required
39-4-0286	Lake Cowal 2017-049	Low	None	Salvage via surface collection and grader scrape if required
39-4-0285	Lake Cowal 2017-050	Low	Direct	Salvage via surface collection and grader scrape
39-4-0287	Lake Cowal 2017-051	Low	None	Salvage via surface collection and grader scrape if required
39-4-0283	Lake Cowal 2017-052	Low	None	Salvage via surface collection and grader scrape if required
39-4-0282	Lake Cowal 2017-053	Low	None	Salvage via surface collection and grader scrape if required

AHIMS ID	Name	Scientific Significance	Type of harm	Management Measures
39-4-0281	Lake Cowal 2017-054	Low	None	Salvage via surface collection and grader scrape if required
39-4-0271	Lake Cowal 2017-055	Moderate	Direct	Salvage excavation
39-4-0272	Lake Cowal 2017-056	Low	Direct	Salvage via surface collection and grader scrape
39-4-0273	Lake Cowal 2017-057	High	Direct	Open area salvage excavation of oven features
39-4-0274	Lake Cowal 2017-058	Low	Direct	Salvage via surface collection and grader scrape
39-4-0275	Lake Cowal 2017-059	Low	None	Salvage via surface collection and grader scrape if required
39-4-0276	Lake Cowal 2017-060	Low	None	Salvage via surface collection and grader scrape if required
39-4-0277	Lake Cowal 2017-061	Low	Direct	Salvage via surface collection and grader scrape
39-4-0278	Lake Cowal 2017-062	Low	None	Salvage via surface collection and grader scrape if required
39-4-0279	Lake Cowal 2017-063	Low	None	Salvage via surface collection and grader scrape if required
39-4-0280	Lake Cowal 2017-066	Low	None	Salvage via surface collection and grader scrape if required
43-4-0054	Lake Cowal 2017-067	Low	None	Salvage via surface collection and grader scrape if required
43-4-0055	Lake Cowal 2017-068	Low	Direct	Salvage via surface collection and grader scrape

13.1.5 Approved Indigenous Archaeology and Cultural Heritage Management Plan

The IACHMP should be updated to include information on the sites recorded during this assessment, and amended as necessary to accommodate the recommendations of this ACHA.

14. Recommendations

Based on the scientific significance of the Aboriginal heritage sites presented in Section 11, the impact assessment presented in Section 12 and the suggested management and mitigation measures outlined in Section 13, the following recommendations are made regarding the Aboriginal heritage sites within the Subject Area.

The approved CGO IACHMP should be updated to include information on the sites recorded during this assessment, and amended as necessary to accommodate the recommendations of this assessment report, which are:

- All newly recorded sites in the Subject Area should be recorded on AHIMS in the prescribed manner.
- CGO apply for an area based AHIP(s) (or variation to an existing AHIP[s]) for Aboriginal cultural heritage sites that will be affected by the Modification.
- The pre-existing management regime established by Consent 1467/Permit 1468 and Consent 1680/Permit 1681 and the IACHMP should continue to be implemented for this Modification via a new AHIP or modification to the existing Consents/Permits, including:
  - surface collection of visible stone artefacts at known sites prior to any disturbance; and
  - grader scraping of representative areas and collection of exposed artefacts and excavation of exposed ovens in all areas where infrastructure is developed.
- Should previously unrecorded sites be discovered within the Subject Area these sites should be:
  - recorded on AHIMS, including significance assessment; and
  - incorporated into the management regime presented by these recommendations, being – salvage of scarred trees or collection of surface artefacts or excavation of ovens.
- The known oven sites (Lake Cowal 2017-057, Lake Cowal 2017-030, Lake Cowal 2017-012, Lake Cowal 2017-055 and Lake Cowal 2017-037) should be excavated to collect dating samples prior to disturbance.
- Archaeological salvage excavations should be undertaken at the sites Lake Cowal 2017-057 and Lake Cowal 2017-036. Lake Cowal 2017-023 should be subject to archaeological salvage excavation prior to any future disturbance in this location.
- Wherever possible sites should be avoided, regardless of their archaeological significance.
- Provision should be made to conduct informative analyses on suitable artefacts and/or materials including:
  - Radiocarbon dating of charcoal samples from ovens or salvage excavations.
  - Geochemical characterisation of stone artefact raw materials.
  - Residue and use-wear analysis.
  - Technological analysis of the salvaged flaked stone artefact assemblage.

- Procedures must be put in place for the discovery of Aboriginal ancestral remains during the Modification. These procedures must include, but not be limited to:
  - ensuring no further harm to the remains;
  - immediately ceasing all work in the particular location;
  - securing the area to avoid further harm to the remains;
  - notifying the CGO Environmental Manager, local police and OEH as soon as practicable; and
  - not recommence any work at the particular location unless authorised in writing by OEH.

Glossary

Term	Definition
Aboriginal cultural heritage	The tangible (objects) and intangible (dreaming stories, legends and places) cultural practices and traditions associated with past and present day Aboriginal communities.
Aboriginal object(s)	The legal definition for material Aboriginal cultural heritage under the NSW *National Parks and Wildlife Act 1974.*
Aboriginal stakeholders	Members of a local Aboriginal land council, registered holders of Native Title, Aboriginal groups or other Aboriginal people who may have an interest in the Modification.
Archaeology	The scientific study of human history, particularly the relics and cultural remains of the distant past.
Archaeological deposit	A layer of soil material containing archaeological remains.
Archaeological investigation	The process of assessing the archaeological potential of an impact area by a qualified archaeologist.
Archaeological site	A site with material evidence of past Aboriginal or non-Aboriginal activity in which material evidence (artefacts) of past activity is preserved.
Artefact	An object made by human agency (e.g. stone artefacts).
Assemblage	1. A group of stone artefacts found in close association with one another. 2. Any group of items designated for analysis - without any assumptions of chronological or spatial relatedness.
Avoidance	A management strategy that protects Aboriginal sites within an impact area by avoiding them totally in development.
Catchment	The area from which a surface watercourse or a groundwater system derives its water.
Cumulative impacts	Combination of individual effects of the same kind due to multiple actions from various sources over time.
Development	The operations involved in preparing a mine for extraction, including cutting roadways and headings. Also includes tunnelling, sinking, crosscutting, drifting, and raising.
Drainage	Natural or artificial means for the interception and removal of surface or subsurface water.
Exploration	The work done to prove or establish the extent of the coal resource.
Flake	A piece of stone detached from a core, displaying a bulb of percussion and striking platform.
Harm	With regard to Aboriginal objects this has the same meaning as the NSW *National Parks and Wildlife Act 1974*.
Impact	Influence or effect exerted by a project or other activity on the natural, built and community environment.
Impact area	An area that requires archaeological investigation and management assessment.
In situ	Latin words meaning 'on the spot, undisturbed'.
Isolated find	A single artefact found in an isolated context.

Term	Definition
Landscape character	The aggregate of built, natural and cultural aspects that make up an area and provide a sense of place. Includes all aspects of a tract of land – built, planted and natural topographical and ecological features.
Land unit	An area of common landform, and frequently with common geology, soils and vegetation types, occurring repeatedly at similar points in the landscape over a defined region. It is a constituent part of a land system.
Landform	Any one of the various features that make up the surface of the earth.
Management plans	Conservation plans which identify short and long term management strategies for all known sites recorded within a (usually approved) Subject Area.
Methodology	The procedures used to undertake an archaeological investigation.
Mitigation	To address the problem of conflict between land use and site conservation.
Site recording	The systematic process of collecting archaeological data for an archaeological investigation.
Site	A place where past human activity is identifiable.
Survey coverage	A graphic and statistical representation of how much of an impact area was actually surveyed and therefore assessed.

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