

**ULAN COAL MINES LIMITED,
CENTRAL TABLELANDS OF NEW SOUTH WALES:
MODIFICATION 4 -
ABORIGINAL CULTURAL HERITAGE ASSESSMENT**



A report to

ULAN COAL MINES Limited

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by

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EXECUTIVE SUMMARY

Ulan Coal Mines Limited (UCML) is located approximately 38 kilometres north-northeast of Mudgee in the Central Tablelands of New South Wales, within the Mid-Western Regional Council Local Government Area. Coal mining has been undertaken in the Ulan area since the early 1920s, with the open cut and underground mining operations as known today commencing at UCML in 1982 and 1986 respectively.

UCML was granted Project Approval (PA) 08_0184 on 15 November 2010 under Part 3A of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act) for the Ulan Coal - Continued Operations Project (UCCO Project). This Project Approval provided a single, modern approval for continued operations, which enabled UCML to surrender a number of historical development consents and other approvals that the site had previously operated under. PA 08_0184 has since been modified on three occasions.

The UCCO Project comprises an extension of open cut mining west of the existing pit, underground mining of the Ulan Underground Mine (UUG) (formerly referred to as Ulan No.3) and Ulan West areas, and new infrastructure primarily associated with the operation of the Ulan West mine, along with continued use and/or modification of existing infrastructure.

UCML has identified that viable resources exist within the Project Approval Area that can be efficiently accessed through a modification to the existing mine plans, allowing maximisation of the resource recovery. This variation to PA 08_0184 is being sought via a modification under Section 75W of the EP&A Act (referred to herein as "the proposed Modification" or "Modification 4"). The NSW Department of Planning and Environment (DP&E) is the consent authority.

The proposed Modification 4 would involve extending eight longwall panels within existing mining leases, with an overall increase in the area of land subject to potential subsidence impacts by approximately 220 hectares. Ulan West Longwall (LW) panels LW7 and LW8 would be extended to the north, and Ulan Underground Mine Longwalls LWW7 and LWW8 would be extended to the west and LW30, LW31, LW32 and LW33 to the east. The proposed Modification would also involve minor changes to approved surface infrastructure, with up to two additional dewatering facilities above LW30-33 and associated service tracks. The Modification would not involve any other changes to approved surface infrastructure, mining methods, mine life, extraction limits or other aspects of the Approved Project.

This supplementary report has been prepared by South East Archaeology for UCML to address the potential impacts of the proposed Modification on Aboriginal cultural heritage.

Aboriginal heritage within the approved UCCO Project Area is managed in accordance with an approved Heritage Management Plan (HMP) (*ULN SD PLN 0013 Revision 6.0*). The HMP contains specific provisions relating to an assessment of a Modification such as that proposed, particularly under Section 3.7.7 (*Assessment of Future Mine Plan Alterations*) and Section 3.7.5 (*Survey of Areas Not Sampled During EA*). As such, this Aboriginal cultural heritage assessment of the proposed Modification has proceeded in accordance with the approved HMP, particularly Sections 3.7.5 and 3.7.7.

This investigation has also proceeded with reference to standard DP&E and Office of Environment and Heritage (OEH) policies, including the 2005 *Guidelines for Aboriginal Cultural Heritage Assessment and Community Consultation*, which reference the *Aboriginal Cultural Heritage Standards and Guidelines Kit* (DEC 1997) and *Interim Community Consultation Requirements for Applicants* (DEC 2004), along with the more recently introduced 2010 *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* and 2011 *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW*.

Consultation was undertaken with the Aboriginal community in accordance with the approved UCCO Project and Section 3.1 of the HMP. The *Interim Community Consultation Requirements for Applicants* (DEC 2004) had been applied for the UCCO Project. Consultation with the registered Aboriginal stakeholders (Warrabinga Native Title Claimants Aboriginal Corporation, North East Wiradjuri Company Ltd, Mudgee Local Aboriginal Land Council, Murong Gialinga Aboriginal and Torres Strait Islanders Corporation and Warranha Ngumbaay) continued for the proposed Modification. The Wellington Valley Wiradjuri Aboriginal Corporation was also consulted as an additional interested organisation, as part of wider consultation separate to the HMP requirements.

For the purposes of this assessment, the key areas for investigation within the Project Approval Area and relevant sections of the HMP in relation to the investigation methodology comprised:

- ❑ Modification 4 will result in an increase to the previously assessed/approved zone of potential subsidence impacts of approximately 220.3 hectares;
- ❑ Within this increased zone of potential subsidence impacts approximately 100 hectares has previously been subject to heritage survey to current standards and therefore only requires a reassessment of subsidence impacts on previously identified Aboriginal sites in accordance with the procedures in Section 3.7.7 of the HMP;
- ❑ Within this increased zone of potential subsidence impacts approximately 120.3 hectares has not been subject to heritage survey to current standards, and therefore where property access is available, archaeological survey will occur as a component of this Modification assessment in accordance with Sections 3.7.7 and 3.7.5 of the HMP. Where access is not currently available, archaeological survey will be addressed post-Modification approval in accordance with Sections 3.7.7 and 3.7.5 of the approved HMP; and
- ❑ Modification 4 will result in an increase to the previously assessed/approved zone of potential surface impacts of up to approximately 24.5 hectares (excluding around 1.2 hectares that overlaps with previously approved corridors). Almost all of this area has previously been subject to heritage survey to current standards in relation to underground impacts or is located within the increased zone of potential subsidence impacts for the Modification, and therefore where property access is available, archaeological survey will occur as a component of this Modification assessment in accordance with Sections 3.7.7 and 3.7.5 of the HMP (refer above).

A comprehensive field survey sampling 98.7 hectares of the 120.3 hectares that had not been subject to heritage survey to current standards within the increased zone of potential subsidence impacts was undertaken by South East Archaeology over four days in August 2017, assisted on every day by representatives of the Aboriginal stakeholders. An additional 22.8 hectares of adjacent land was also surveyed.

The survey resulted in the recording of an additional 14 Aboriginal sites, comprising nine artefact scatters and five isolated finds. One previously recorded artefact scatter (ID# 796) and a rock shelter with artefacts (ID# 187) were also re-recorded.

Other contemporary cultural values associated with the surveyed area have also been identified by the Aboriginal stakeholders, including:

- In general terms, the use of subsistence or other resources;
- In general terms, the traditional use of the area by north-eastern Wiradjuri people, and an ongoing cultural and spiritual connection to the land and resources of the study area by the north-eastern Wiradjuri; and
- In relation to the forested sandstone formations (survey area 2034) adjacent to the higher order Mona Creek, in the locality of rock shelters Mona Creek 23-30 (ID# 180-187), the Aboriginal stakeholders expressed a strong spiritual and cultural connection with this locality.

The predictive model of site location was reassessed in relation to the areas within the sampled zone that were not directly inspected. The predictions for the areas within the broader Ulan subsidence impact zones that have not been surveyed to current standards, or were not directly sampled during the survey, remains unchanged.

The significance of the Aboriginal heritage evidence identified during the survey was assessed. It is noted that all Aboriginal heritage is of interest and contemporary value to the Aboriginal community. Aboriginal heritage evidence represents a tangible link with the traditional past and with the lifestyle and values of community ancestors.

The potential impacts of the proposed Modification on Aboriginal sites and cultural areas/values has been assessed. In overall terms, the proposed Modification would result in a very minor (almost negligible) net overall increase in impacts to Aboriginal heritage, in relation to two rock shelter sites/Potential Archaeological Deposits (PADs) of low heritage significance and a minor increase in the overall subsidence impact area and consequent effect on cultural values. Significantly however, the proposed Modification will not result in any impacts to any Aboriginal sites of heritage significance, the Mona Creek 23-30 rock shelter sites (ID# 180-187), or any of the UCML Aboriginal heritage conservation areas.

The area of relevance to the proposed Modification is situated entirely within the UCCO Project Approval Area and notwithstanding DP&E approval requirements necessary for the Modification, can be managed in accordance with the existing HMP.

Consistent with PA 08_0184, the heritage assessment for the UCCO Project EA (Kuskie 2009) and the UCML HMP, and with consideration of legal requirements under the NSW *National Parks and Wildlife Act 1974* (NP&W Act) and EP&A Act, the results of the present investigation and consultation with the Aboriginal stakeholders, the following management and mitigation measures are proposed:

- 1) Provisions relating to Aboriginal heritage in the UCML HMP for the approved UCCO Project will continue to be implemented, with revisions and additional actions implemented where necessary that are relevant to the proposed Modification. In particular, these revisions and/or additional actions include:
 - a) Management strategies for individual sites as outlined here in Appendix 5, with the entries for each Aboriginal site replacing (or in the case of new sites, being added to) current entries in Appendix 2 of the HMP;

- b) Additional investigation involving the conduct of heritage surveys prior to any impacts occurring of the areas not sampled during the UCCO Project EA or subsequent investigations (consistent with Section 3.7.5 of the HMP) including;
- Minor gaps totalling approximately 21.6 hectares within the increased zone of potential subsidence impacts of the proposed Modification;
 - Other gaps within the previously approved subsidence impact zone within the UCCO Project Approval Area; and
 - Proposed surface infrastructure impact areas;
- c) Revision of the HMP within three months of any approval of the proposed Modification, and where amendments are required to Section 3 of the HMP, provision to the registered Aboriginal stakeholders of notification and a minimum 15 working days to comment on any proposed amendments, with copies of any updated version of the HMP distributed to the registered Aboriginal stakeholders within 30 working days of completion. Consultation over any amendments would also be required with the DP&E and the OEH and Mid-Western Regional Council (Section 6 of the HMP);
- 2) Under the terms of the NP&W Act it is an offence to harm or desecrate an object that the person knows is an Aboriginal object, or to harm an Aboriginal object ('strict liability offence'). Therefore, no activities or work should be undertaken within the Aboriginal site areas as described in this report without approval under Section 75W of Part 3A of the EP&A Act (or *in lieu* a valid Section 90 AHIP) and subsequent implementation of any relevant approval conditions, unless such impacts are already approved under the existing UCCO Project Approval and HMP and managed in accordance with the HMP; and
- 3) Copies of this final report should be forwarded to each registered Aboriginal stakeholder and the DP&E and the OEH within 30 working days of completion.

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ABBREVIATIONS

Term	Definition
AHIMS	Aboriginal Heritage Information Management System
AHIP	Aboriginal Heritage Impact Permit
BP	Before Present (ie. before 1950 AD)
calBP	calibrated years Before Present
DA	Development Approval
DEC	Department of Environment and Conservation
DECC	Department of Environment and Climate Change
DECCW	Department of Environment, Climate Change and Water
DP&E	Department of Planning and Environment (NSW)
DP&I	Department of Planning and Infrastructure
EA	Environmental Assessment
ECM	Environment and Community Manager
EIS	Environmental Impact Statement
EP	Extraction Plan
EP&A Act	<i>Environmental Planning and Assessment Act 1979</i>
GDA	Geodetic Datum of Australia
GIS	Geographic Information System
GPS	Global Positioning System
HMP	Heritage Management Plan
ICOMOS	International Council on Monuments and Sites
LALC	Local Aboriginal Land Council
LW	Longwall
MC	Mona Creek
MGA	Map Grid of Australia
MGATSIC	Murong Gialinga Aboriginal and Torres Straight Islander Corporation

Term	Definition
NEWCO	North East Wiradjuri Company Ltd
NP&W Act	<i>National Parks and Wildlife Act 1974</i>
NPWS	National Parks and Wildlife Service
NSW	New South Wales
OEH	Office of Environment and Heritage (NSW)
PA	Project Approval
PAD	Potential Archaeological Deposit
SEA	South East Archaeology
SMP	Subsidence Management Plan
UCCO	Ulan Coal Continued Operations (Project)
UCML	Ulan Coal Mines Limited
UUG	Ulan Underground Mine (formerly referred to as Ulan No.3)
WNTCAC	Warrabinga Native Title Claimants Aboriginal Corporation
WVWAC	Wellington Valley Wiradjuri Aboriginal Corporation

1. INTRODUCTION

1.1 Background and Overview of Proposed Modification

Ulan Coal Mines Limited (UCML) is a joint venture between Glencore Coal Assets Australia Pty Limited (formerly Xstrata Coal Pty Limited) (90 per cent) and Mitsubishi Development (10 per cent).

Operations at the UCML Complex are located approximately 1.5 kilometres east of the village of Ulan and entirely within the Mid-Western Regional Council Local Government Area (LGA). The UCML Complex is located approximately 38 kilometres north-north-east of Mudgee and 19 kilometres north-east of Gulgong in the Central Tablelands of New South Wales (refer to Figure 1).

Coal mining has been undertaken in the Ulan area since the early 1920s, with the open cut and underground mining operations as known today commencing at UCML in 1982 and 1986 respectively. Since the commencement of mining UCML have both modified their existing approvals and received approval for new mining operations and associated infrastructure.

UCML was granted Project Approval (PA) 08_0184 on 15 November 2010 under Part 3A of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act) for the Ulan Coal - Continued Operations Project (UCCO Project). This Project Approval provided a single, modern approval for continued operations, which enabled UCML to surrender a number of historical development consents and other approvals that the site had previously operated under.

The UCCO Project comprises an extension of open cut mining west of the existing pit, underground mining of the Ulan Underground Mine (UUG) (formerly referred to as Ulan No.3) and Ulan West areas, and new infrastructure primarily associated with the operation of the Ulan West mine, along with continued use and/or modification of existing infrastructure (refer to Figure 2).

An Environmental Assessment (EA) of the UCCO Project was prepared by Umwelt (Australia), with an Aboriginal heritage impact assessment completed by South East Archaeology:

- *Ulan Coal Continued Operations: Aboriginal Heritage Assessment (Volumes A and B)* (Kuskie 2009).

A Heritage Management Plan (HMP) subsequently approved by the then NSW Department of Planning and Infrastructure (DP&I)¹ was prepared to address the requirements of the EP&A Act, *National Parks and Wildlife Act 1974* (NP&W Act), *Heritage Act 1977* (NSW), *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and the Part 3A UCCO Project Conditions of Approval, with one of its primary goals being to guide the management of Aboriginal heritage within the UCCO Project Approval Area *in lieu* of a Section 90 Aboriginal Heritage Impact Permit (AHIP):

- *Heritage Management Plan (ULN SD PLN 0013)* (UCML 2011; currently Version 6.0, UCML 2015).

¹ Previously the Department of Planning and Infrastructure (DP&I) was known as the Department of Planning (DoP) and is currently known as the Department of Planning and Environment (DP&E).

Project Approval 08_0184 has since been modified on three occasions:

- 1) Modification No. 1 involved five new longwall panels for the underground extraction of coal, collectively referred to as the 'North 1 Panels', along with a Concrete Batching Plant (refer to Kuskie 2010);
- 2) Modification No. 2 involved minor modifications to blasting performance measures and construction blasting and a minor modification to Ulan West Longwalls 1-5 (refer to Kuskie 2011a); and
- 3) Modification No. 3 involved a change to the Ulan West mine plan that included extending seven underground mining panels between 900 and 1300 metres within existing mining and exploration leases (refer to Kuskie 2015a).

UCML has identified that viable resources exist within the Project Approval Area that can be efficiently accessed through a modification to the existing mine plans, allowing maximisation of the resource recovery. This variation to PA 08_0184 is being sought via a modification under Section 75W of the EP&A Act (referred to herein as "the proposed Modification" or "Modification 4"). The NSW DP&E is the consent authority.

The proposed Modification 4 would involve extending eight longwall panels between 155 and 1140 metres within existing mining leases (refer to Figure 3), with an overall increase in the area of land subject to potential subsidence impacts by approximately 220 hectares (refer to Figure 4). Ulan West Longwall (LW) panels LW7 and LW8 would be extended to the north, and Ulan Underground Mine Longwalls LWW7 and LWW8 would be extended to the west and LW30, LW31, LW32 and LW33 to the east, within existing mining leases. This would result in the extraction of additional coal.

The proposed Modification would also involve minor changes to approved surface infrastructure, with up to two additional dewatering facilities above LW30-33 and associated service tracks (refer to Figure 5).

The proposed Modification would not involve any other changes to approved surface infrastructure, mining methods, mine life, extraction limits or other aspects of the Approved Project.

1.2 Study Purpose and Scope

This Aboriginal cultural heritage assessment of the proposed Modification has been prepared by South East Archaeology Pty Ltd for UCML.

A Preliminary Environmental Assessment (PEA) prepared by UCML (2017) identified that Aboriginal cultural heritage is a key issue for the Modification and stated that an Aboriginal cultural heritage assessment of the proposal would be undertaken by South East Archaeology in consultation with the Aboriginal stakeholders, with the Project design continuing to avoid impacts to the Mona Creek (MC) 23-30 rock shelter sites.

Consistent with the previous Modification No. 3 assessment by South East Archaeology (Kuskie 2015a) the following requirements were identified as needing to be addressed:

- A description of the existing environment;
- Consideration of all relevant environmental planning instruments;
- An assessment of the potential impacts of the Modification;

- ❑ Effective consultation with the Aboriginal community in determining and assessing impacts, and developing and selecting mitigation options and measures;
- ❑ A description of the measures that would be implemented to avoid, minimise and if necessary, offset the potential impacts of the development; and
- ❑ An assessment taking into account relevant guidelines, policies and plans.

This report addresses the impacts of the proposed Modification on Aboriginal heritage, consistent with the aims and methodology of the Aboriginal heritage impact assessment completed for the UCCO Project (Kuskie 2009), the UCCO Project Approval and UCML's Heritage Management Plan. This report does not seek to repeat the information contained within the primary report for the UCCO Project (Kuskie 2009).

The proposed Modification entirely relates to land within the UCCO Project Approval Area. Much of the land has been subject to Aboriginal heritage survey to current standards, but portions of the land within the Project Approval Area have not been surveyed to current standards (provisions for which to do so are incorporated within the approved HMP) (refer to Figure 6).

The approved HMP (currently Version 6.0, UCML 2015) contains specific provisions relating to an assessment of a Modification such as that currently proposed, particularly:

- ❑ Section 3.7.7 (*Assessment of Future Mine Plan Alterations*); and
- ❑ Section 3.7.5 (*Survey of Areas Not Sampled During EA*).

As such, this Aboriginal cultural heritage assessment of the proposed Modification has proceeded in accordance with the approved HMP, particularly Sections 3.7.5 and 3.7.7.

The participation of the registered Aboriginal stakeholders has continued as per Section 3.1 (*Aboriginal Community Involvement*) of the HMP. The Wellington Valley Wiradjuri Aboriginal Corporation (WWAC) also expressed an interest in being involved and has been consulted as an additional interested organisation, as part of wider consultation separate to the HMP requirements.

For the purposes of this assessment, the key areas for investigation within the Project Approval Area and relevant sections of the HMP in relation to the investigation methodology comprise (refer to Figures 4 - 6):

- ❑ Modification 4 will result in an increase to the previously assessed/approved zone of potential subsidence impacts of approximately 220.3 hectares²;
- ❑ Within this increased zone of potential subsidence impacts approximately 100 hectares has previously been subject to heritage survey to current standards and therefore only requires a reassessment of subsidence impacts on previously identified Aboriginal sites in accordance with the procedures in Section 3.7.7 of the HMP;

² Minor reductions to the previously assessed/approved subsidence impact area associated with Modification 4 of approximately 31 hectares did not require further consideration at the request of UCML.

- ❑ Within this increased zone of potential subsidence impacts approximately 120.3 hectares has not been subject to heritage survey to current standards, and therefore where property access is available, archaeological survey will occur as a component of this Modification assessment in accordance with Sections 3.7.7 and 3.7.5 of the HMP. Where access is not currently available, archaeological survey will be addressed post-Modification approval in accordance with Sections 3.7.7 and 3.7.5 of the approved HMP; and
- ❑ Modification 4 will result in an increase to the previously assessed/approved zone of potential surface impacts of up to approximately 24.5 hectares (excluding around 1.2 hectares that overlaps with previously approved corridors), all of which is located within the Project Approval Area³. Almost all of this area has previously been subject to heritage survey to current standards in relation to underground impacts or is located within the increased zone of potential subsidence impacts for the Modification, and therefore where property access is available, archaeological survey will occur as a component of this Modification assessment in accordance with Sections 3.7.7 and 3.7.5 of the HMP (refer above).

The primary aims and tasks of this Aboriginal cultural heritage assessment have therefore been to:

- ❑ Building on the studies completed to date (eg. Kuskie 2009, 2010, 2015a, 2016a), undertake heritage register searches, research, Aboriginal community consultation and an archaeological survey to identify and record any Aboriginal heritage evidence or areas of potential evidence or cultural values within the investigation area, specifically areas that have not been surveyed to current standards for which property access is available, in accordance with Sections 3.1, 3.6, 3.7.5, 3.7.7, 5.1 and 5.5 of the HMP;
- ❑ Assess the potential impacts of the proposed Modification upon identified and potential Aboriginal heritage evidence and cultural values, including within areas already surveyed to current standards), following procedures in Section 3.7.7 of the HMP;
- ❑ Assess the significance of newly identified Aboriginal heritage evidence and cultural values, consistent with the procedures for the UCCO Project (Kuskie 2009);
- ❑ Provide details of any newly identified Aboriginal heritage evidence in accordance with the Office of Environment and Heritage (OEH)⁴ requirements (in accordance with Sections 3.6 and 5.1 of the HMP);
- ❑ Consult with the Aboriginal community in accordance with Section 3.1 of the HMP, with the inclusion of another interested party that have expressed a desire to be involved (WVWAC) as part of wider consultation separate to the HMP requirements;
- ❑ Present recommendations for the management of identified Aboriginal heritage evidence and potential heritage resources and cultural values, consistent with Section 3.6 of the approved HMP and in accordance with Sections 3.7.7 and 5.5 of the HMP;
- ❑ Prepare an Aboriginal heritage report to meet the requirements of UCML (primarily with reference to the *Aboriginal Heritage Standards and Guidelines Kit* {DEC 1997}) in accordance with Sections 3.7.7 and 5.5 of the HMP; and

³ Minor reductions to the currently approved surface impact area will also occur through relinquishment of infrastructure corridors above UUG, as shown on Figure 5. No identified Aboriginal sites are affected by this reduction in impacts, all of which relates to areas already subject to heritage survey.

⁴ Prior to April 2011 the NSW Office of Environment and Heritage (OEH) was known as the Department of Environment, Climate Change and Water (DECCW), and previously as the Department of Environment and Climate Change (DECC), Department of Environment and Conservation (DEC) and National Parks and Wildlife Service (NPWS).

- Update the UCML Aboriginal Site Database and GIS⁵ and Appendix 2 of the HMP in accordance with Sections 3.6 and 5.1 of the HMP.

It is noted that Department of Planning and Environment (DP&E) and OEH policies or guidelines that previously have applied and/or may currently be relevant include:

- The draft *Guidelines for Aboriginal Cultural Heritage Assessment and Community Consultation* (DEC 2005) which reference the *Aboriginal Cultural Heritage Standards and Guidelines Kit* (DEC 1997) and *Interim Community Consultation Requirements for Applicants* (DEC 2004):

The UCCO Project (Kuskie 2009) and subsequent HMP and heritage activities at UCML, including Aboriginal stakeholder involvement, have occurred in accordance with these policies and guidelines.

- *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW* OEH (2011a) and *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* (DECCW 2010b):

Heritage activities undertaken at UCML in accordance with the HMP have been and are currently being undertaken to a best-practice standard essentially consistent with these more recently introduced OEH guidelines.

- *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* policy (DECCW 2010c):

This policy supersedes the *Interim Community Consultation Requirements for Applicants* (DEC 2004) which had been applied for the UCCO Project, but is essentially very similar. Consultation with the registered Aboriginal stakeholders (Warrabinga Native Title Claimants Aboriginal Corporation, North East Wiradjuri Company Ltd, Mudgee Local Aboriginal Land Council, Murong Gialinga Aboriginal and Torres Strait Islanders Corporation and Warranha Ngumbaay) for the UCCO Project will continue for the proposed Modification in accordance with the Project Approval and Section 3.1 of the approved HMP, with WWAC also being consulted as an additional interested organisation as part of wider consultation separate to the HMP requirements.

1.3 Authorship

This assessment has been prepared by Peter Kuskie, an archaeologist with a BA (Honours) degree in Aboriginal archaeology and over 27 years experience in the conduct of Aboriginal cultural heritage assessments throughout Australia, including numerous similar projects and 17 years experience in the locality of the investigation area.

The field investigation was undertaken by Peter Kuskie and Birgitta Stephenson. Birgitta Stephenson holds a first class BA (Honours) degree in archaeology from the University of Queensland, along with a Bachelor of Pharmacy degree and has over five years experience in the conduct of Aboriginal heritage surveys, excavations and use-wear and residue analysis.

⁵ GIS - Geographic Information System, in reference to UCML's database of Aboriginal sites and archaeological survey coverage to current standards for the Project Approval Area.

Locality Plan

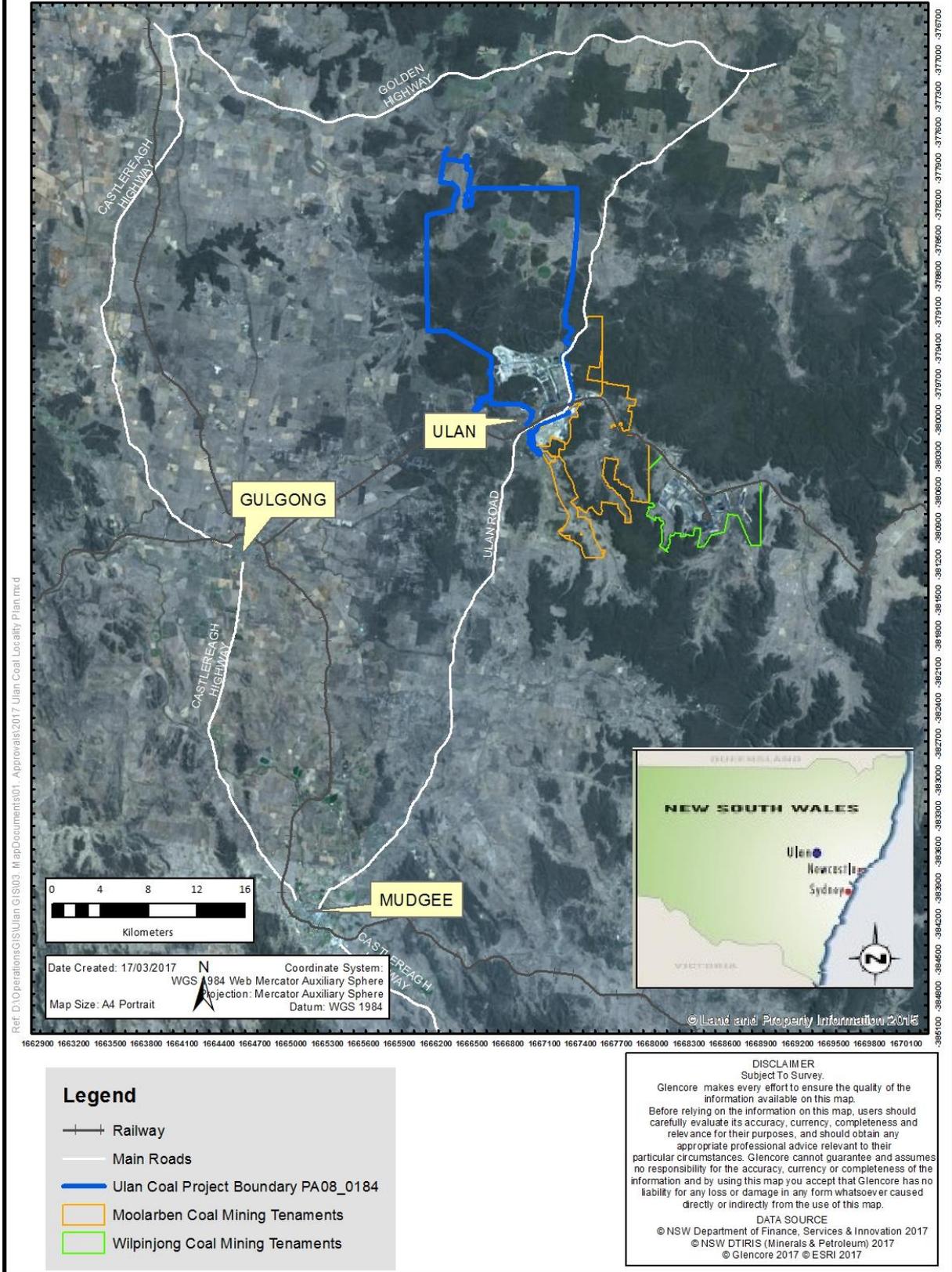


Figure 1: Location of Ulan Coal Mines Limited (courtesy UCML).

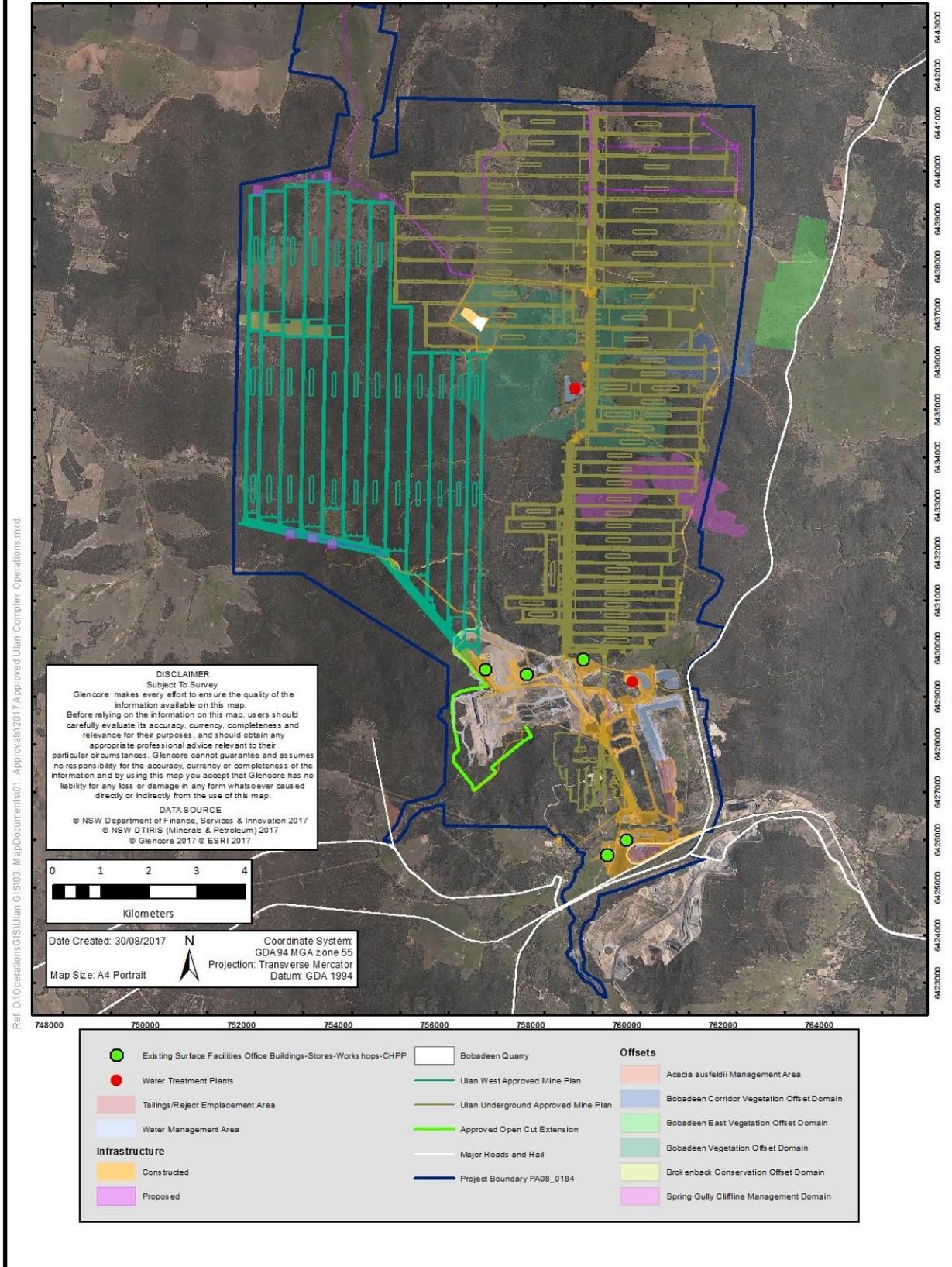


Figure 2: General arrangement of approved operations at UCML (courtesy UCML).

ULAN COAL MINES LIMITED

Ulan Coal Project Approval Modification 5 Heritage Assessment Area

**ULAN
COAL**
GLENORE

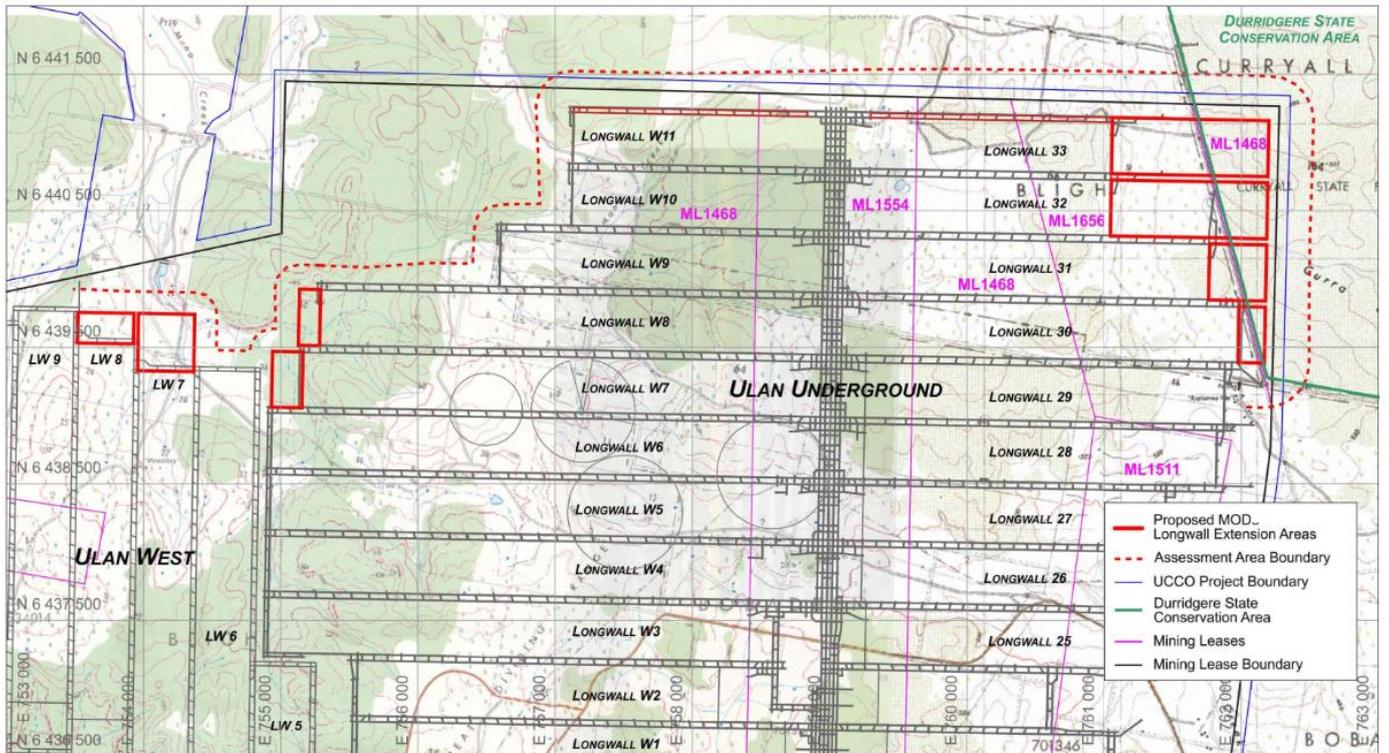
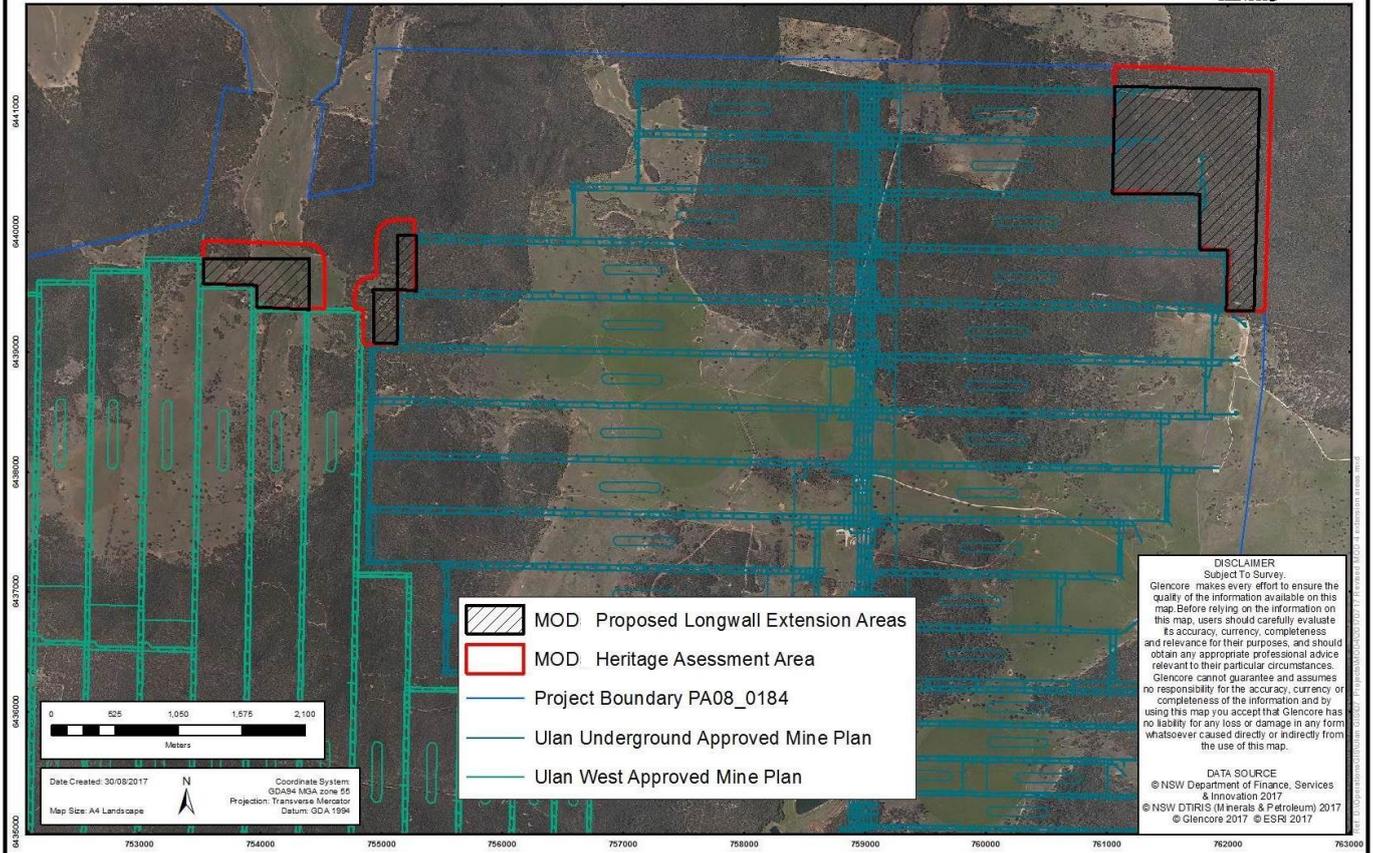


Figure 3: Proposed UCML Modification 4 (courtesy UCML - above, SCT Operations Pty Ltd - below).

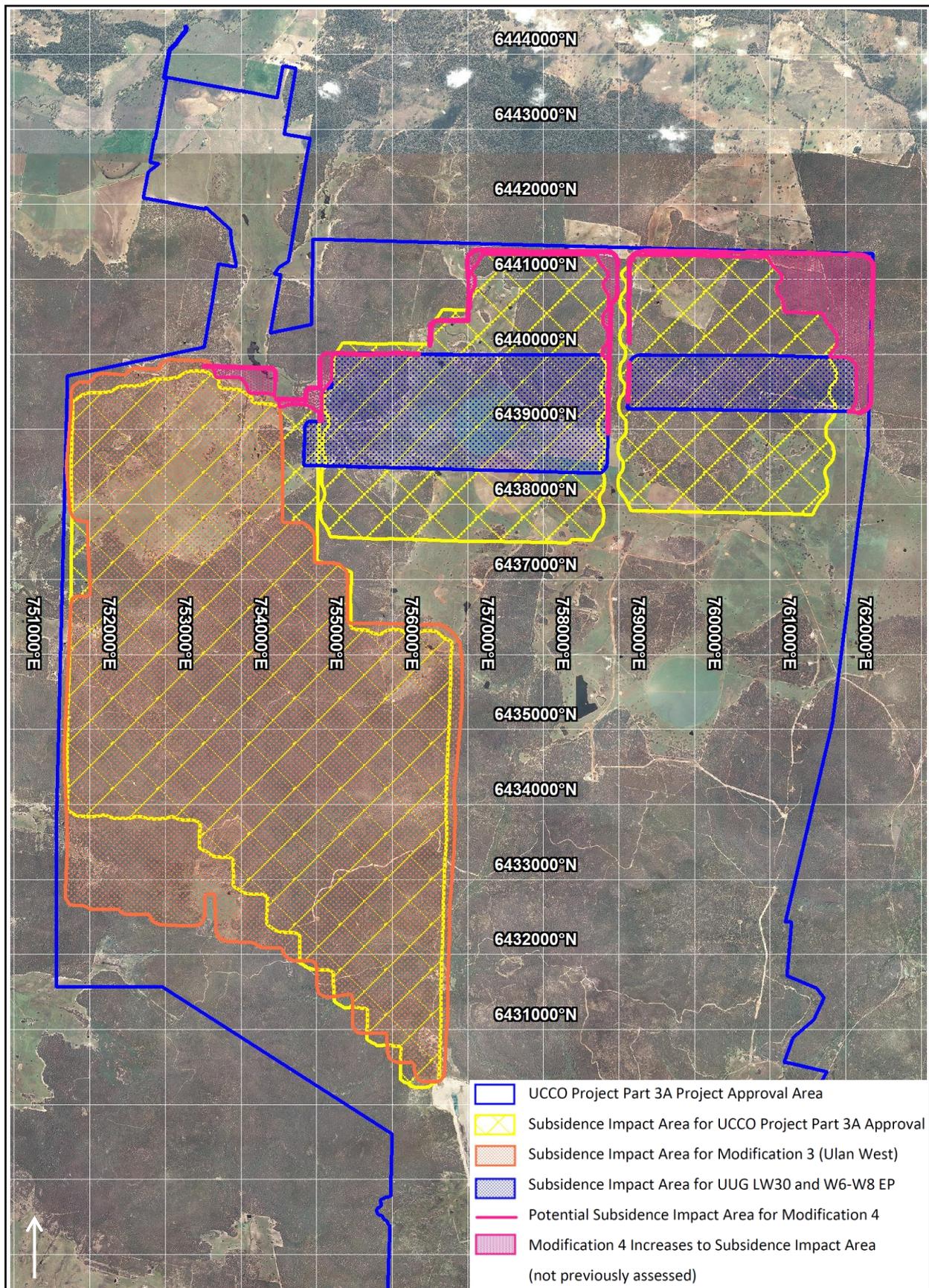


Figure 4: Proposed Modification 4 and key elements in relation to the Aboriginal heritage assessment of the proposed underground mine plan changes (aerial photograph courtesy UCML; one kilometre MGA grid).

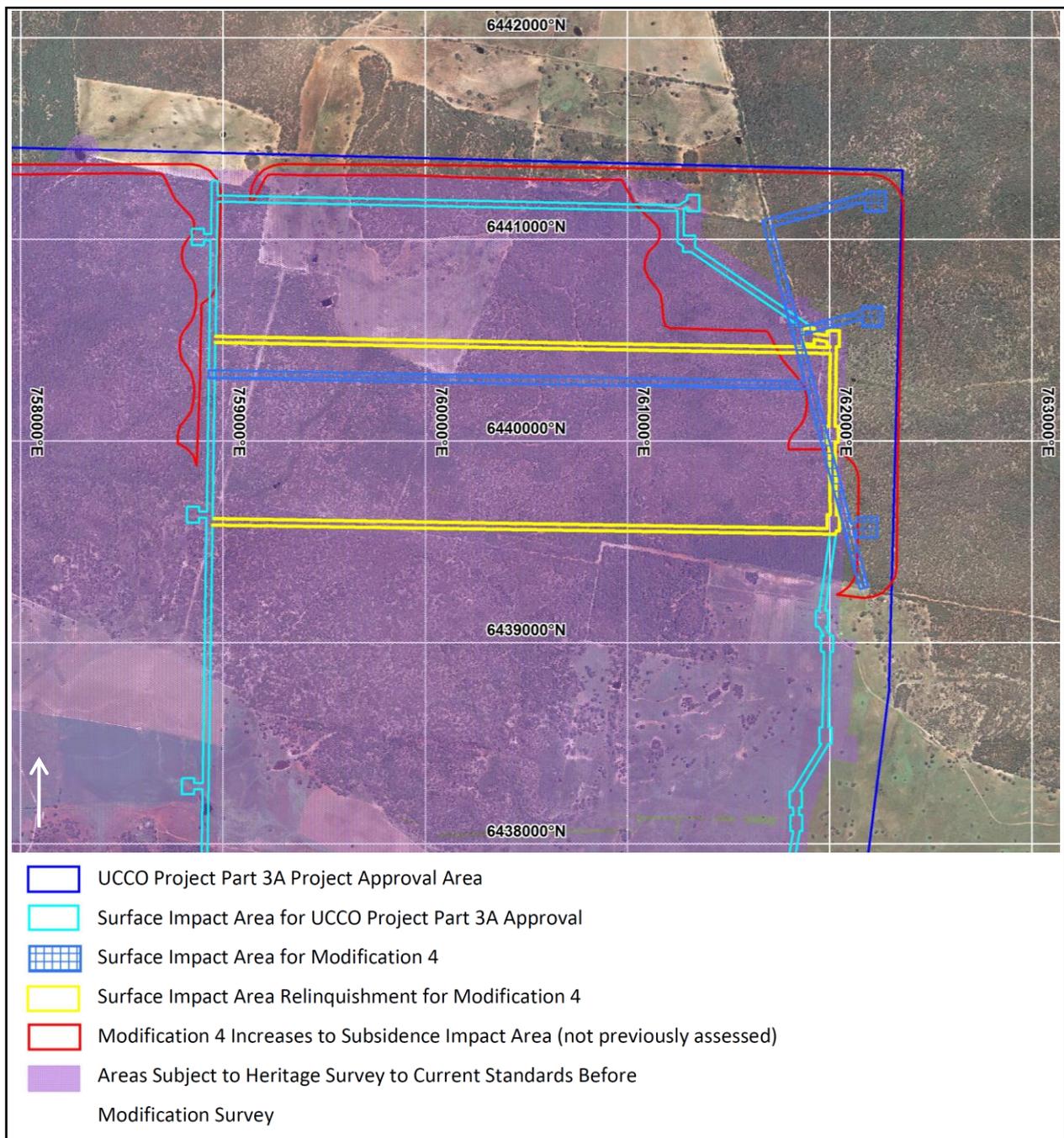


Figure 5: Proposed Modification 4 surface infrastructure changes and extent of previous heritage survey coverage to current standards (aerial photograph courtesy UCML; one kilometre MGA grid).

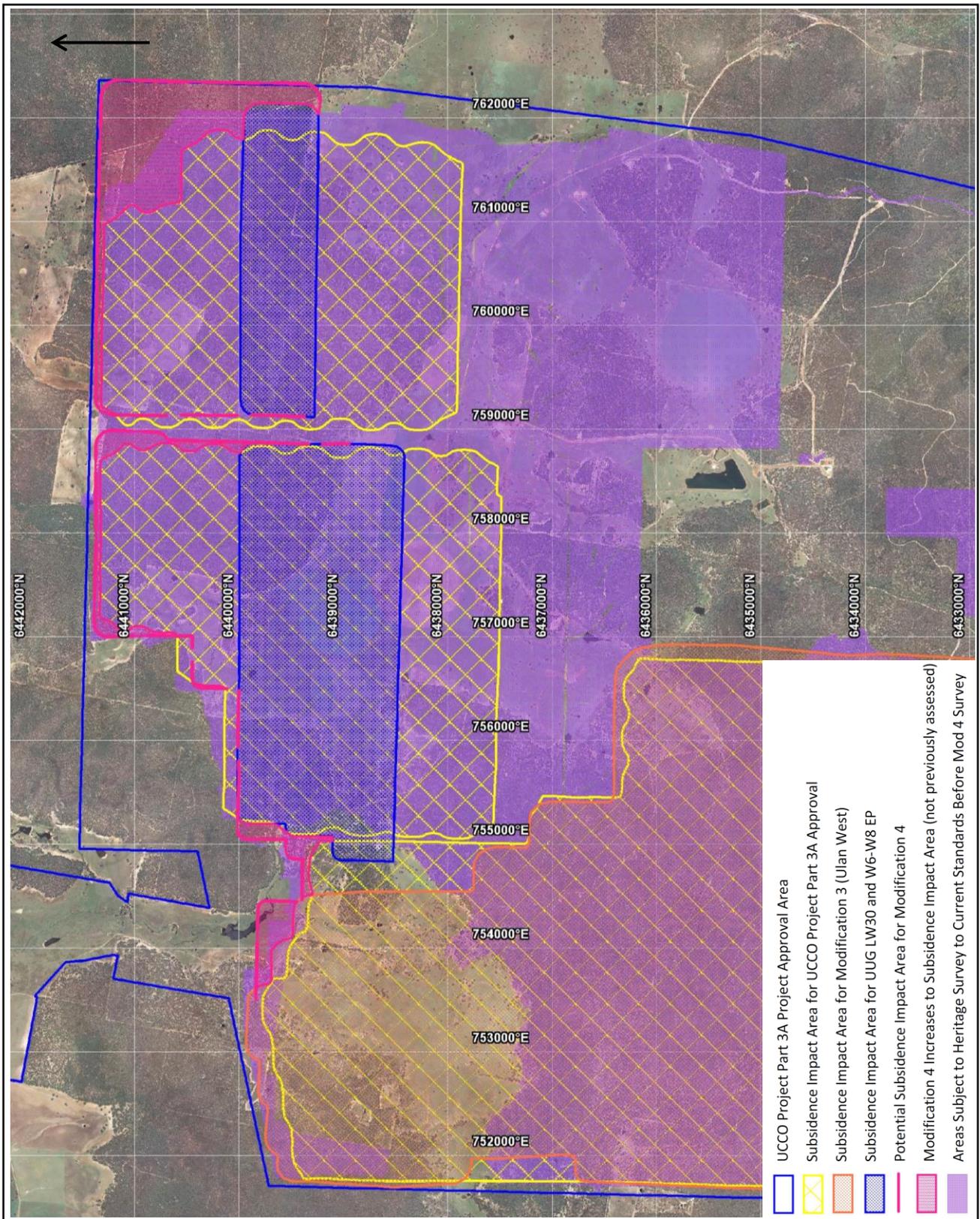


Figure 6: Proposed Modification 4 assessment area showing extent of previous heritage survey coverage to current standards (aerial photograph courtesy UCML; one kilometre MGA grid).

2. ENVIRONMENTAL CONTEXT

The natural environment of the approved mining area remains as described by Kuskie (2009 and 2015a).

The areas of proposed changes in subsidence impacts relating to the Modification (the assessment area for this Modification) are situated in the northern portion of the UCML Part 3A Project Approval Area. The key areas of change (increased zone of potential subsidence impacts) include:

- The north-eastern corner of the Project Approval Area, where UUG Longwalls LW30, LW31, LW32 and LW33 would be extended to the east; and
- The north-western portion of the Project Approval Area around Mona Creek, where UUG Longwalls LWW7 and LWW8 would be extended to the west and Ulan West Longwalls LW7 and LW8 would be extended to the north (Figures 4 - 6).

Much of the Modification assessment area has previously been subject to heritage surveys to current standards by South East Archaeology for the UCCO Project (Kuskie 2009), including approximately 100 hectares of the 220 hectare zone of potential increased subsidence impacts.

The areas that have not been subject to heritage survey to current standards within the increased zone of potential subsidence impacts for the Modification (which incorporates the proposed surface infrastructure changes) comprise approximately 120 hectares and are primarily located as described above, in the north-eastern corner of the Project Approval Area and the north-western portion of the Project Approval Area around Mona Creek (refer to Figures 5 and 6).

The northern portion of the Project Approval Area straddles the Great Dividing Range, which represents the watershed between the Goulburn River catchment to the east and the Talbragar River catchment to the west. The terrain is mostly elevated and gently undulating rounded hill tops, with some dissected sandstone terrain around the western margin in association with the Mona Creek catchment.

The north-western portion of the Project Approval Area around Mona Creek lies within the Mona Creek catchment, which drains into the Talbragar River to the north-west, while the north-eastern corner of the Project Approval Area lies within the Curra Creek catchment, which drains into the Goulburn River to the south-east.

Most of the first and second order tributaries in this location are unlikely to have retained standing water for any significant time, due in part to the colluvial sandy soils, notwithstanding that post-European land clearance and consequent gully erosion has created ponded water in places at present. However, Mona Creek in the vicinity of the present investigation area is a fourth-order watercourse and prior to the gully erosion associated with non-indigenous vegetation removal and land use, the presence of a chain of ponds and standing water cannot be discounted.

The geology of the north-western portion of the Project Approval Area around Mona Creek is dominated by Triassic era Narrabeen Group pebbly lithic-quartz to quartz sandstone, red-brown to green mudstone and sporadic lenses of quartz paraconglomerate and the Jurassic era Purlawaugh Formation (fine to medium grained lithic to labile sandstone thinly interbedded with siltstone, mudstone and thin coal seams). Quaternary Alluvium is also present around Mona Creek (Dubbo SI/55-4 1:250,000 geological map). Undifferentiated Tertiary Liverpool Range Volcanics also occur in nearby areas (with basalt, dolerite, polymictic conglomerate, quartzose sandstone and shale bole).

The geology of the north-eastern corner of the Project Approval Area is dominated by Jurassic era Pilliga Sandstone (medium to very coarse grained, well sorted, angular to subangular quartzose sandstone, with minor interbeds of mudstone, siltstone and fine grained sandstone and coal).

Outcrops of Narrabeen sandstone may form poorly consolidated layers and overhangs, resulting in largely unstable rock shelters with horizontal ceilings, sloping floors and protruding shelves comprised of thin layers of harder rock (Haglund 1999a).

Sandstone rock formations occur in the locality, including boulders, shelters, overhangs and open surfaces. Sandstone rock formations can host evidence of Aboriginal occupation, such as deposits of artefacts and cultural material in rock shelters or overhangs, rock art on surfaces of shelters or overhangs, and grinding grooves on exposed bedrock or isolated cobbles/boulders.

The soils of the north-western portion of the Project Approval Area around Mona Creek are dominated by the Ulan Soil Landscape and the Turill Soil Landscape.

The Ulan Soil Landscape comprises low undulating rises and flats with shale, sandstone conglomerate, chert, coal and torbanite seams. Yellow podsollic soils are present on lower slopes and drainage lines with patches of yellow solodic soils in association with salt sands. Yellow and brown earths are also present on footslopes with minor areas of earthy sands (Murphy and Lawrie 1998).

The Turill Soil Landscape comprises low undulating hills and small flats adjacent to creeks and contains Narrabeen Sandstone, mudstone and Jurassic shale and sandstone. On the upper and mid-slopes, yellow and brown earthy sands and siliceous sands are present, while on the lower slopes and flats, red podzolics occur. Yellow and grey podzolic soils are present along larger drainage lines. Grey duplex soils are present in isolated areas with laterite type soils which form ridges with gravelly red earths near the Goonoo Soil Landscape (Murphy and Lawrie 1998).

The soils of the north-eastern corner of the Project Approval Area are dominated by the Goonoo Soil Landscape. The Goonoo Soil Landscape comprises undulating rises and low hills, with Jurassic Pilliga Sandstone. Yellow solodic soils are present on lower slopes and drainage lines. Earthy sands, siliceous sands, sandy red earths and yellow and grey earths are present elsewhere (Murphy and Lawrie 1998).

The vegetation of the north-eastern corner of the Project Approval Area is dominated by an Ironbark Open Forest Complex, in association with the Goonoo Soil Landscape. Stringybark - Ironbark Open Forest and Rough Barked Apple Open Forest also occur within the Formation. Wattle, oak and Sifton Bush (*Cassinia arcuata*) commonly form an understorey (Umwelt 2009). A mix of Grassland Formation, Woodland Formation and Forest/Open Forest Formation is present in the north-western portion of the Project Approval Area around Mona Creek (Umwelt 2009).

The cover of vegetation acts to reduce ground surface visibility and thereby reduces the potential to identify archaeological evidence during a field survey, particularly stone artefacts. Widespread extraction of timber in historical times is evident throughout the investigation area and large portions of the standing vegetation represent regrowth. Nevertheless, a number of mature native trees are present and these have potential to host scars or carvings of Aboriginal origin.

The north-western portion of the Project Approval Area around Mona Creek comprises a mix of freehold land owned by UCML and other private landowners, and a small portion of mining leasehold Crown land. The north-eastern corner of the Project Approval Area comprises freehold land owned by UCML and the south-western portion of the Durridgere State Conservation Area (formerly Curryall State Forest) managed by the NSW National Parks and Wildlife Service (part of the OEH).

The investigation area has been subject to various recent land use impacts, including:

- ❑ Vegetation removal, associated with historical rural use and timber extraction;
- ❑ Pastoral activities (eg. grazing, fencing, rural residences and general rural land use);
- ❑ Agriculture (cultivation) potentially around Mona Creek; and
- ❑ Focalised impacts (such as those from mining, infrastructure, exploratory drilling, essential services, roads and other vehicle tracks).

Typically, should sub-surface deposits of artefacts occur, they may exhibit reasonable integrity. However, previous vegetation removal has greatly reduced the potential for scarred or carved trees to occur.

The north-eastern corner of the Project Approval Area and parts of the north-western portion distant from Mona Creek predominantly comprise only a single resource zone (woodland/forest). However, part of the north-western portion is traversed by the higher order watercourse of Mona Creek, and in the past, some retention of water in ponds may have occurred and a second resource zone may have been available.

In the late Pleistocene period, during the last glacial maximum from about 24,000 to 17,000 years ago, the climate was cooler (possibly 6-10° Celsius) and drier than at present. Potable water was probably not frequently available in the locality. In terms of subsistence resources and potable water, the investigation area would not have represented an environment conducive to Aboriginal occupation. After temperatures rose in the late Pleistocene/early Holocene, potable water may have been more frequently available in the locality, particularly in the higher order watercourses such as Mona Creek. As such, the locality was more conducive to occupation in the Holocene period, although occupation may have been focused around the higher order watercourses.

3. ABORIGINAL ARCHAEOLOGICAL CONTEXT

3.1 Heritage Register Searches

The UCML Aboriginal Site Database (*Revision 15, June 2016* current prior to the conduct of the present investigation) is maintained to document all known Aboriginal sites within the UCCO Project Approval Area, including the present Modification investigation area (which is wholly located within the Project Approval Area).

Within the overall UCCO Project Approval Area, there were 1,537 identified Aboriginal sites and Potential Archaeological Deposits (PADs), predominantly open artefact sites and rock shelters, known prior to the conduct of the present survey (refer to Table 1 and Figure 7).

Table 1: Summary of known Aboriginal sites within the UCCO Project Approval Area prior to the present heritage survey (based on UCML Aboriginal Site Database Revision 15, June 2016).

Aboriginal Site Type	Total Number
Artefact Scatter	569
Grinding Grooves	14
Grinding Grooves and Artefact Scatter	4
Isolated Find	354
Ochre Quarry	3
Rockshelter with Art	9
Rockshelter with Art and Artefacts	4
Rockshelter with Art and Grinding Grooves and Artefacts	1
Rockshelter with Artefacts	183
Rockshelter with Grinding Grooves	2
Rockshelter with Grinding Grooves and Artefacts	9
Rockshelter with PAD	368
Scarred Tree	8
Scarred Tree and Artefact Scatter	2
Stone Arrangement	6
Waterhole/Well	1
Total	1537

Searches were undertaken on 25 July 2017 of the OEH Aboriginal Heritage Information Management System (AHIMS) to encompass the proposed Modification investigation areas that required heritage survey. Search #292761 was undertaken between MGA grid coordinates 760700 and 762700 east and 6439200 and 6441700 north. Search #292762 was undertaken between MGA grid coordinates 753300 and 756300 east and 6439200 and 6441700 north. No sites are listed within these areas on the OEH AHIMS that are not also listed on the UCML Aboriginal Site Database⁶.

⁶ A total of 84 Aboriginal sites are listed on the OEH AHIMS within these search areas.

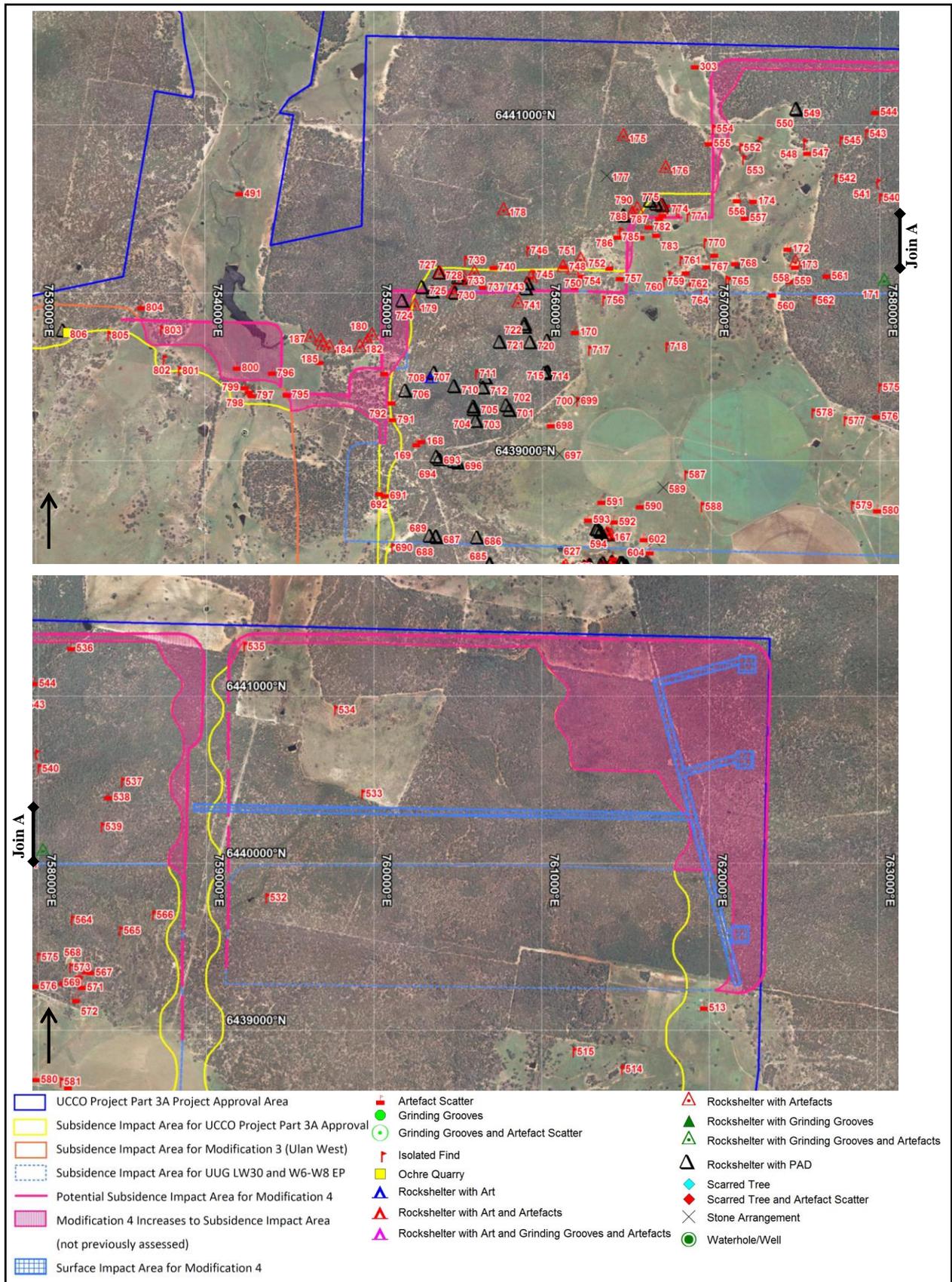


Figure 7: Modification area and previously recorded Aboriginal heritage sites (Aboriginal site data from UCML Aboriginal Site Database Revision 15, June 2016; only valid for UCCO Project Approval Area; aerial photograph courtesy UCML; one kilometre MGA grid; not all site labels visible).

Within the UCCO Project Approval Area, the proposed extensions of longwall mining associated with the Modification will extend the zone of subsidence impacts into portions of the Project Approval Area that were not proposed to be impacted under the UCCO Project (refer to different subsidence impact zones on Figure 4). As such, several Aboriginal sites that were recorded during the UCCO Project (Kuskie 2009) now require re-consideration in terms of potential subsidence impacts (refer to Figure 7). These sites comprise open artefact occurrences ID# 554, 793, 796, 800 and 803, along with a rock shelter with PAD (Potential Archaeological Deposit), ID# 724. Full descriptions of these sites are presented in Kuskie (2009).

A number of other sites recorded during the UCCO Project survey and reported in detail by Kuskie (2009) may require consideration if the mine plan results in changes to the assessed level of potential subsidence impacts (refer to Appendix 5 and Sections 9 - 11).

The Mona Creek 23-30 rock shelter sites (Ulan ID# 180-187) are situated outside of the increased zone of potential subsidence impacts associated with the Modification, although all sites lie within 250 metres of the boundary of this zone (Figure 7). These sites have not been surveyed or recorded to current standards. Consistent with the previous ML1468 DA 113-12-98 approval conditions and the UCCO Project Approval (PA 08_0184), the HMP (Section 3.4) specifies that:

- ❑ UCML will continue to ensure that development impacts are avoided to the Mona Creek 23-30 rock shelter sites (ID# 180-187);
- ❑ If in future UCML obtains ownership or control of the land on which sites ID# 180-187 are situated, UCML will engage an appropriately qualified expert to conduct a detailed archaeological survey and recording of the heritage evidence in those locations, in consultation with the registered Aboriginal stakeholders;
- ❑ If in future UCML obtains ownership or control of the land on which sites ID# 180-187 are situated, UCML will give consideration to the dedication of Conservation Areas around these sites and the preparation of a CMP for these locations.

No previously recorded Aboriginal sites are located within the area of potential surface impacts (either increases or reductions) associated with the Modification (Figure 7).

For a comprehensive discussion of the nature of the sites present within the Ulan area, including the Modification area, refer to Kuskie (2009, 2015a, 2016a).

No Aboriginal heritage sites are listed within the Modification investigation area on any other heritage registers or planning instruments, including the *Mid-Western Regional Local Environmental Plan 2012*, *Aboriginal and Torres Strait Islander Heritage Protection Act 1984* or the *EPBC Act 1999* (Commonwealth Heritage List or National Heritage List).

3.2 Previous Archaeological Research

3.2.1 UCML

A number of archaeological surveys and excavations have been undertaken within the UCML lease areas and surrounding locality, principally in relation to environmental impact assessments for the coal mining industry. Comprehensive details of the archaeological investigations undertaken to date at UCML are presented by Kuskie (2009, 2015a) and briefly summarised below.

Haglund and Associates had completed many of the heritage assessments at UCML prior to 2000 and South East Archaeology has undertaken investigations at UCML since that date. The key investigations are noted below (refer to Kuskie 2009, 2015a for further details):

- Haglund's (1980a) initial work involved a preliminary archaeological survey of the Ulan Colliery and No. 2 Underground Mine areas (lease CCL741). This survey resulted in the identification and recording of six sites and numerous isolated finds, largely within the area proposed for open cut mining;
- Further studies were conducted of this area by Haglund between 1980 and 1981 (Haglund 1981a, 1981b). These studies involved the collection of historical and ethnographic information for the region, an intended minimum 50% survey coverage of areas to be affected by the proposed open cut mining and associated works, sampling of sites to be directly impacted by the mining activities, and test excavations of rock shelters and other sites;
- Corkill (1991) surveyed a four kilometre route of a coal conveyor between the Run-Of-Mine (ROM) stockpile and just east of the Underground Office, and a 400 x 150 metre area to be impacted by mine infrastructure development northwest of the Underground Office, within CCL741. A proposed diversion channel for Ulan Creek was also investigated. Two artefact scatters and one isolated find were located;
- Haglund (1992) undertook further surveys in relation to a preliminary investigation of a northward extension of the Ulan No. 3 Underground Mine, a basalt quarry, a new access road and other infrastructure. Sixteen Aboriginal sites were recorded during these investigations, which included "intensive" survey of the areas of proposed surface facilities and access routes and "reconnaissance" inspection of the underground extension area;
- A shelter site recorded during Haglund's (1992) investigation, ID# 116 (OEH #36-3-177), was subsequently the focus of a salvage excavation in February 1996, with a total area of 20 m² excavated and 765 artefacts recovered at a density equating to 139 artefacts/m³ (Haglund 1996a);
- Haglund (1996b) recorded eight rock shelter sites and three artefact scatters during a survey of Ulan No. 3 Longwall Panels 11 and 12 and associated surface infrastructure;
- Edgar (1997) surveyed Ulan No. 3 Longwall Panels 13-17 in the Spring Gully area in 1996 and recorded an additional 16 sites (to those previously recorded by Haglund), including a number of rock shelters and an ochre quarry;
- The Spring Gully 5 (SG5) rock shelter site (ID# 132), above Ulan No. 3 Longwall Panel 13, was subject to an extensive salvage excavation in May 1998, prior to undermining. The results were reported by Haglund (2001a, 2001b) and White (2001a, 2001b), with use-wear and residue analysis by Therin (2000). A total of 37 m² was subject to salvage excavation and 10,002 stone artefacts recovered. Radiocarbon dates were obtained for a number of charcoal samples, including one of 4,147 ± 60 years Before Present (BP) (NZA 10766), which equates to an age calibrated to two standard deviations of 4840 - 4446 calBP;

- ❑ Further surveys were undertaken by Haglund from November 1995 to December 1997 as part of the preparation of an Environmental Impact Statement (EIS) for a second longwall mine (Ulan West) and additional lease area, now ML1468 (Haglund 1999a, 1999b). The survey focused on areas susceptible to subsidence impacts and areas of high archaeological potential, but the overall coverage involved a relatively small sample. A total of 59 rock shelters with archaeological deposits were found and at least seven shelters with rock art were also recorded (Haglund 1999a, 1999b). Five rock shelters were associated with grinding grooves, both portable and permanent. Sixteen artefact scatters were located, along with a grinding groove site in an open context;
- ❑ Haglund (1999c, 1999d) conducted further investigations for infrastructure in the northern Ulan No. 3 longwall panels, an irrigation area, earthworks at the aircraft landing strip south of Ulan Road and additional highwall trenches and associated water management measures west of the open cut mine (Open Cut Extension). A number of artefact scatters and potential Pleistocene creek terrace deposits were reported;
- ❑ Kuskie (2000a) investigated the grinding groove site Bobadeen 5 (BO5, ID# 202), within Ulan No. 3 Longwall Panels 25 and 26 and an offset site, Bobadeen 13 (ID# 323);
- ❑ The proposed basalt quarry was investigated in 2002 (Kuskie 2002);
- ❑ In 2003, as part of a proposal to consolidate existing development consents, South East Archaeology prepared a two volume report (Kuskie and Clarke 2003, Kuskie 2004) focused on the assessment of new works and a comprehensive review of all of the previous heritage assessments at UCML, along with preparation of a revised Aboriginal site database;
- ❑ Further investigations of the area west of the open cut were conducted by South East Archaeology (Kuskie 2004, Kuskie and Clarke 2005a), locating mainly open artefact sites, including evidence of tuff quarries;
- ❑ Kuskie and Clarke (2005a) undertook further investigations of the Open Cut Extension and irrigation area, confirming the probable presence of contexts suitable for the preservation of Pleistocene age evidence of Aboriginal occupation;
- ❑ Kuskie and Webster (2001) undertook a comprehensive survey of Ulan No. 3 Longwall Panels 18-22, with direct coverage of 57.8 hectares (12% of the 498 hectare study area) and 56 open artefact sites, one rock shelter with archaeological deposit and one ochre quarry located;
- ❑ Kuskie and Clarke (2005b) undertook a comprehensive survey of Ulan No. 3 Longwall Panels 23-26 and W1, with direct coverage of 85.8 hectares (10% of the 840 hectare study area) and 52 open artefact sites, seven rock shelters with artefacts, three grinding groove and artefact scatter sites, two other grinding groove sites and one scarred tree being recorded;
- ❑ Kuskie and Clarke (2007) undertook a comprehensive survey of Ulan No. 3 Longwall Panels W2 and W3, with direct coverage of 75.8 hectares (21% of the 351 hectare study area) and 22 open artefact sites, two rock shelters with grinding grooves and artefacts, two rock shelters with grinding grooves, and two rock shelters with artefacts reported (including several previously recorded sites);

- Kuskie (2009) investigated a large portion of the UCML lease area for the UCCO Project. An extensive field survey was conducted over 104 days in 2008, sampling an area of 4,785 hectares, and resulting in the development and refinement of a detailed model of occupation for the locality. During the survey 8,774 stone artefacts were recorded in detail and in total 709 Aboriginal sites and 296 rock shelters with Potential Archaeological Deposits (PADs) were recorded within the study area. These sites comprised 558 open artefact sites, nine open grinding groove sites, 128 rock shelters with artefacts, art and/or grinding grooves, five scarred trees, five stone arrangements, two ochre quarries, a waterhole/well and a combined groove and artefact scatter site.

Overall, artefacts occurred at a very low mean density of 0.0176 per square metre of effective survey coverage and the spatial distribution and nature of evidence was inferred to be largely consistent with background discard, interspersed by occasional focalised areas of higher artefact density where activities or repeated activities occurred. This evidence indicated that Aboriginal utilisation of the study area was generally of a low intensity, which was inferred to relate to the limited presence of higher order watercourses within the analysis area (being situated on and around the crest of the Great Divide) (Kuskie 2009);

- Kuskie (2010) investigated the North 1 Panels, in relation to Modification No. 1 to the UCCO Project Approval. A comprehensive field survey sampling almost the entire 236 hectare investigation area was undertaken in 2010, with 32 rock shelters with PADs, nine rock shelters with artefacts, one rock shelter with art, one rock shelter with grinding grooves and artefacts and seven open artefact sites recorded;
- Test excavation of rock shelter sites ID# 104, 105 and 1420 within the North 1 Panels was undertaken by South East Archaeology (Kuskie 2012a). A total of 2,896 stone artefacts were retrieved in the three square metres of test excavations, comprising 1,709 artefacts from ID# 104, 904 artefacts from ID# 105 and 283 artefacts from ID# 1420. An Aboriginal fireplace in ID# 105 was radiocarbon dated to around 3,200 to 3,500 years of age;
- Kuskie (2013a) prepared, in consultation with the registered Aboriginal stakeholders, the rock shelter test excavation sampling strategy required under Step 1 of Section 3.5.4 of the HMP. The representative sample for further investigation of the 82 rock shelters⁷ of low to moderate or higher significance that were susceptible to subsidence impacts was designed to include examples of the rock shelter sites/PADs specified in Appendix 2 of the HMP from different locations in the UCCO Project Area and with different characteristics (for example, size of habitable floor area and PAD, and nature of identified evidence and topographic context).

⁷ The tally stood at 82 at the time the sampling strategy was formulated (rather than the 77 known at the time of the 2009 EA) due to the inclusion of three shelters from the North 1 Modification and two shelters from a mine plan change. Over 553 rock shelter sites/PADs have been identified within the UCCO Project Approval Area, and of these, more than approximately 356 are potentially subject to underground mining induced subsidence impacts from the Project.

In the selection of the representative sample, detailed consideration was given to numerous variables which may have related to Aboriginal occupation and may have influenced the decisions people made in relation to on-site activities and behaviour, or the potential for evidence of that occupation to have survived (Kuskie 2013a). The assessment identified three potential *key variables* (size, distance to higher order water, and clustering), two *minor variables* (roof height and complexity) that also warranted consideration as a sub-set of the key variables, other variables not directly related to occupational choices that warranted consideration (for example, disturbance levels and geographic location), and several variables that were assessed as not being suitable for consideration (for example, distance to any order of watercourse, and aspect). Based on the three key variables, the 82 shelters were grouped within 11 basic shelter type profiles, and a representative sample of 18 rock shelters suitable for test excavation and potential salvage was selected (Kuskie 2013a)⁸;

- Kuskie (2015a) investigated a third proposed modification to the UCCO Project Approval, for a change to the Ulan West mine plan that included extending seven underground mining panels between 900 and 1300 metres within existing mining and exploration leases (later approved as Modification No. 3). A comprehensive field survey sampling the 123 hectares that had not been subject to heritage survey to current standards *within* the zone of potential subsidence impacts *outside of* the approved UCCO Project Area was undertaken by South East Archaeology in May 2014. An additional 51 hectares of adjacent land was also surveyed. The survey resulted in the recording of an additional 22 Aboriginal sites, comprising 13 artefact scatters, seven isolated finds and two rock shelters with artefacts, along with five rock shelter with PADs;
- Test excavation by South East Archaeology (Kuskie 2016b) of 12 rock shelter sites (ID# 163, 164, 165, 166, 470, 472, 473, 476, 646, 651 653 and 654) within Ulan No. 3 (UUG) Longwall Panels W3 and W4 was undertaken between 2010 and 2016, in relation to Condition 3.3(c)(iv) of DA 113-12-98, AHIP #1116123 and the HMP and *Ulan Coal Continued Operations: Aboriginal Rock Shelter Test Excavation Sampling Strategy* (Kuskie 2013a). Fieldwork was undertaken over 26 days in 2010 and 2015. A 2 x 0.5 metre trench was excavated within 0.5 x 0.5 metre units to bedrock in the central portion of the main habitable floor area of each of the shelters.

A total of 955 artefacts were recovered at a relatively low mean density of 79.6 per conflated m² or 172.5/m³. Four samples of charcoal, one from an apparent hearth/fireplace feature in ID# 164 and three from apparent hearth/fireplace features in ID# 166, were radiocarbon dated. At ID# 166, the dates between 4143–3730 calBP (calibrated to two standard deviations or 95.4% confidence) either represent the same event or more likely two temporally close events. The date obtained at ID# 166 is the second oldest secure date of Aboriginal occupation at Ulan and it was inferred that some of the evidence in ID# 166 is possibly up to 6,000 years of age (Kuskie 2016b). The feature in ID# 164 was dated between 2720 - 2380 calBP;

- An Extraction Plan (EP) was prepared by UCML for UUG Longwall Panels LW30 and and LWW6 - LWW8, with a reassessment of Aboriginal heritage by Kuskie (2016a). Over 93.2% of the 1,075 hectare EP Area had previously been surveyed, with 162 identified Aboriginal sites/PADs. A reassessment of potential subsidence impacts occurred and heritage management strategies were reassessed where required. As a result of mine plan changes, a material decrease in potential subsidence impacts had resulted for rock shelters ID# 726, 730, 731, 741 and 742. Consequently, several updates were applied to Appendix 2 of the HMP;

⁸ Subsequent approval of Modification No. 3 for the Ulan West extension has resulted in the addition of ID# 161, 162, 284 and 1580 to the sampling strategy (Kuskie 2015a).

- Numerous other heritage actions have occurred under the approved UCCO Project HMP and have been reported by South East Archaeology, including:
 - Monitoring of rock shelter sites after undermining (Kuskie 2013b);
 - Monitoring of grinding groove sites after undermining (Kuskie 2014e);
 - Monitoring in relation to open cut and box cut blasting (Kuskie 2011c, 2011d, 2012c, 2013c, 2014d, 2015b);
 - Reassessment of impacts and advice in relation to the Modification No. 2 mine plan alteration (Kuskie 2011a) and site ID# 1386 (Kuskie 2011b); and
 - Surveys of areas not sampled during the UCCO Project consistent with Section 3.7.5 of the HMP and small-scale impacts consistent with Section 3.7.4 of the HMP, such as roads, powerlines, water pipelines, conveyor routes, exploratory drilling sites and other minor infrastructure, with surface collections of artefact sites where required (Kuskie 2012b, 2013f, 2013i, 2013j, 2013k, 2013l, 2013m, 2014a, 2017a);
- Surveys consistent with the OEH *Due Diligence Code of Practice for the Protection of Aboriginal Objects in NSW* (DECCW 2010a) have been undertaken for exploratory drilling areas outside of the Project Approval Area (Kuskie 2013d, 2013e, 2013g, 2013h, 2014b, 2014c, 2015c) and for the Bobadeen East Offset Area (Kuskie 2012d); and
- Numerous ongoing actions have occurred under the approved UCCO Project HMP, with reporting pending completion, including:
 - Ongoing test and salvage excavation of rock shelter sites consistent with Section 3.5.4 of the HMP and the *Ulan Coal Continued Operations: Aboriginal Rock Shelter Test Excavation Sampling Strategy* (Kuskie 2013a), including:
 - ID# 104 and 105, in the North 1 Panels: Subsequent to the previous test excavations (Kuskie 2012a), salvage excavation of ID# 104 and 105 was undertaken by South East Archaeology over three weeks in June and July 2012, with excavation of 2 m² in ID# 105 and 6.75 m² in ID# 104. A total of 1,652 artefacts were recovered from ID# 105 at a density of 826 per conflated m². A total of 9,542 artefacts were recovered from ID# 104 at a density of 1,414 per conflated m². Analysis and reporting is pending completion;
 - ID# 112, in Ulan West Longwall Panel W3, was subject to an initial test excavation measuring 2 x 0.5 metres in September and October 2016. A total of 1,322 artefacts were identified in the single square metre, at a density of 1,944/m³, along with two hearth/fireplaces radiocarbon dated to around 1030-1180 AD and 360-540 AD. The significance of the site was reassessed, with ID# 112 confirmed as being of moderate significance within a local context. It was concluded that the imperative for partial or total salvage excavation was low. Any further excavation in immediately adjacent deposits was not anticipated to reveal significantly different evidence to that already identified by the test excavation. Consequently, more detailed salvage excavation was not required. A draft report has been prepared and is pending finalisation after receipt of comments from the Aboriginal stakeholders;
 - ID# 164 in UUG Longwall Panel LWW4: Subsequent to the previous test excavations (Kuskie 2016b), salvage excavation of ID# 164 was undertaken by South East Archaeology in July - September 2017. Analysis and reporting is pending completion;

- ID# 166 in UUG Longwall Panel LWW4: Subsequent to the previous test excavations (Kuskie 2016b), salvage excavation of ID# 164 was undertaken by South East Archaeology in July - September 2017. Analysis and reporting is pending completion;
 - ID# 483, in UUG Longwall Panel LWW4, was subject to an initial test excavation measuring 2 x 0.5 metres, followed by additional salvage excavation, in July - September 2017. Analysis and reporting is pending completion;
 - ID# 485, in UUG Longwall Panel LWW4, was subject to an initial test excavation measuring 2 x 0.5 metres in July - September 2017. It was concluded that the imperative for partial or total salvage excavation was low and more detailed salvage excavation was not undertaken. Analysis and reporting is pending completion;
 - ID# 1054, in Ulan West Longwall Panel W2, was subject to an initial test excavation measuring 2 x 0.5 metres in February 2015. A total of 49 artefacts were identified in the single square metre. The significance of the site was reassessed, with ID# 1054 revised downward. It was concluded that the imperative for partial or total salvage excavation was low and more detailed salvage excavation was not undertaken. Analysis and reporting is pending completion;
 - ID# 1134, in Ulan West Longwall Panel W4, was subject to an initial test excavation measuring 2 x 0.5 metres, followed by additional salvage excavation, in July - October 2017. Analysis and reporting is pending completion;
 - ID# 1148, in Ulan West Longwall Panel W5, was subject to an initial test excavation measuring 2 x 0.5 metres, followed by additional salvage excavation, in July - September 2017. Analysis and reporting is pending completion;
 - ID# 1149, in Ulan West Longwall Panel W5, was subject to an initial test excavation measuring 2 x 0.5 metres, followed by additional salvage excavation, in July - November 2017. Analysis and reporting is pending completion;
 - ID# 1353, in Ulan West Longwall Panel W3, was subject to an initial test excavation measuring 2 x 0.5 metres in September and October 2016. A total of 77 stone artefacts were identified in the single square metre, at a density of 266/m³. The significance of the site was reassessed, with ID# 1353 revised downward to low significance within a local context. It was concluded that the imperative for partial or total salvage excavation was low, as the deposit proved to be shallow and highly bioturbated, and consequently of low research potential. Consequently, more detailed salvage excavation was not required. A draft report has been prepared and is pending finalisation after receipt of comments from the Aboriginal stakeholders;
- Additional surveys within the Bobadeen East Offset Area;
 - Surveys of areas not sampled during the UCCO Project consistent with Section 3.7.5 of the HMP and small-scale impacts consistent with Section 3.7.4 of the HMP, with surface collections of artefact sites where required, including for site ID# 1386, No. 1 vent fan, Main Gate 29 infrastructure, Ulan West subsidence lines, valve station pipelines, Main Gate 22-28 pipeline and various roads including Old Ulan Road, Brokenback Road, Box Road, Trig Road, Grass Tree Lane, Valley Way and Quarry Road;
 - Survey and assessment of options for the Longwall LW6 Infrastructure corridor; and

- Surveys of areas not sampled for the Open Cut Extension and salvage by collection, surface scrapes and hand excavation of sites within the Open Cut Extension area, with recovery of over 800 artefacts from ID# 65, 650 artefacts from ID# 400, and over 350 artefacts from ID# 1394.

Specifically within the assessment area for this Modification, extensive heritage surveys have been conducted by South East Archaeology for the UCCO Project (refer to Figures 5 and 6 of previous survey coverage, and Kuskie 2009 for complete details). Approximately 100 hectares of the 220 hectare zone of potential increased subsidence impacts for the Modification has been surveyed for the UCCO Project. Much of the area of potential surface impacts associated with the Modification has also been surveyed for the UCCO Project, albeit typically to a low intensity consistent with proposed subsidence impacts, rather than to a higher intensity consistent with potential surface impacts. Details of the survey coverage are presented by Kuskie (2009).

Haglund (1999a, 1999b) also undertook surveys within the assessment area for this Modification between November 1995 and December 1997 as part of the ML1468 EIS. Small portions of the present investigation area were subjected to "systematic" survey (25-50% inspection), with other areas subject to "simple transects" or "visited or walked through".

3.2.2 Other Relevant Regional Investigations

In the broader Ulan area, there have been a number of relevant archaeological investigations, including (refer to Kuskie 2009 for further discussion):

- Initial surveys in the Gulgong - Ulan - Cassilis area were undertaken by the Australian Museum in the period 1965 - 1967. A small rock shelter, BOB/1, was excavated in 1967, with the results reported by Moore (1970). A relatively high total of 16,609 artefacts were recovered from the small shelter, at a density of around 4,260 artefacts/m³. Moore (1981) concluded that occupation of the site began about 6,000 years BP;
- Pearson (1981) undertook a broad-ranging PhD study of Aboriginal settlement in the Bathurst - Mudgee - Wellington region and more recent non-indigenous settlement. This included sample surveys for Aboriginal sites in various locations, including the "Mudgee - Cooyal area", extending across the Moolarben, Cooks Gap and Cooyal localities, along with test excavation of the Botobolar 5 rock shelter;
- McBryde conducted an archaeological survey that sampled portions of an area of 5,000 km² in the region of Dunedoo, Gulgong, Wollar and Coolah. Thirty Aboriginal heritage sites were located during this investigation, which was part of research focusing on rock art within the western slopes of the New England region (Haglund 1981a);
- Haglund (1985) undertook a desktop assessment of the Aboriginal heritage resources of Mudgee Shire;
- Haglund (1980b, 1981c) undertook a heritage study for the Kerrabee Dam proposal, across much of the area that is now conserved as the Goulburn River National Park. A total of 343 Aboriginal sites were recorded, including rock shelters with deposits and/or art, artefact scatters and grinding grooves;
- Purcell (2002) undertook a broad regional cultural heritage study of the Brigalow Belt South Bioregion, which stretches west from the Ulan area to Dubbo and north to Moree and measures over 52,000 square kilometres in area. In a wide-ranging project, over 110 oral history interviews were conducted, 60 traditionally used plant species documented, extensive landform mapping was undertaken, and 1,110 Aboriginal sites were located and recorded;

- ❑ Moolarben Coal Mine, located immediately east of UCML, has been subject to several detailed heritage investigations, including the initial assessments involving surveys by Hamm (2006, 2008) of the 3,480 hectare Stage 1 and 3,700 hectare Stage 2, and major salvages by Hamm and Foley (2010) and O'Driscoll and Kuskie (2015) within Stage 1; and
- ❑ Wilpinjong Coal Mine, located further south-east of UCML and Moolarben, has also been subject to several detailed heritage investigations, including the initial assessment involving surveys by Navin Officer (2005), Modification and Extension Project assessments by Kuskie (2013n, 2015d), and salvages by Navin Officer (2006) and Kuskie (2017b).

3.2.3 Synthesis

Part of the area to which the proposed Modification relates (approximately 100 hectares of the 220 hectare zone of potential increased subsidence impacts) has been investigated during the UCCO Project, with archaeological survey occurring to current standards (Kuskie 2009). Haglund (1999a, 1999b) has also previously undertaken heritage survey sampling within portions of the present investigation area.

The information from AHIMS was cross-checked against the UCML Aboriginal Site Database (*Revision 15, June 2016*) to accurately document all known Aboriginal sites within the UCCO Project Area and the proposed zones of potential subsidence and surface impacts associated with the Modification. Known sites (prior to the conduct of the present survey) are marked on Figure 7.

In relation to known Aboriginal sites, the key area of interest in relation to the proposed Modification is the increased zone of potential subsidence impacts of 220 hectares for the Ulan West and UUG longwall panel extensions (refer to Figures 4 - 7). Three potential *changes* to Aboriginal sites relating to subsidence impacts may occur from the proposed Modification:

- a) Subsidence impacts that may have occurred under the approved UCCO Project will no longer occur under the proposed Modification (decrease in impacts);
- b) Subsidence impacts that would not have occurred under the approved UCCO Project will now occur under the proposed Modification (increase in impacts);
- c) Subsidence impacts that may have occurred under the approved UCCO Project will also occur under the proposed Modification, but with an altered level of potential impact.

Modification 4 will also result in an increase to the potential surface impact area of up to 24.5 hectares, which may result in surface impacts to Aboriginal heritage that would not have occurred under the approved UCCO Project now occurring under the proposed Modification (increase in impacts).

Archaeological investigations at UCML and in the nearby Wilpinjong and Moolarben coal leases and elsewhere in the locality have resulted in the identification of a large number of rock shelter sites with archaeological deposits and/or rock art or grinding grooves, along with many shelters with potential deposits. The large numbers of shelter sites partly reflects the focus of the underground mining related surveys, which have predominantly targeted sandstone rock formations within elevated terrain. These sites have been identified in isolated rock formations (such as boulders and pagodas) and more commonly along more extensive rock formations (such as scarps and cliffs).

The shelter sites vary widely in terms of topographical context (eg. distance to watercourse, size/order of watercourse and aspect), contents, nature (eg. size of shelter and extent of habitable floor area) and research potential (eg. depth and extent of potential artefact deposits). Apart from several major sites such as the "Hands on Rock" complex, rock art occurs relatively infrequently in the recorded shelters and tends to comprise red ochre hand stencils (Kuskie 2009).

Numerous open artefact occurrences have also been identified in the locality. The numbers of artefacts vary from minor scatters and numerous isolated finds, for which details have not often been recorded in earlier studies, to dense concentrations of lithic material with hundreds of artefacts present.

A conservative conclusion is that artefact evidence is distributed in a widespread manner across the locality, in generally low densities equating to background discard (manuport and artefactual material which is insufficient either in number or in association with other material to suggest focused activity in a particular location; *cf.* Rich 1993, Kuskie and Kamminga 2000), with occasional higher densities representing more focused occupation (eg. encampments, or events of longer duration or involving larger numbers of people) or repeated occupation in favourable environmental contexts. Such contexts appear to include elevated, well-drained and low gradient flats, terraces, spur crests, ridge crests and simple slopes adjacent to watercourses, particularly higher order watercourses and/or multiple subsistence resource zones.

The identified artefact evidence tends to predominantly comprise items associated with non-specific stone flaking, on quartz and to a lesser extent tuff, chert and other stone materials. Other activities are also represented, such as microblade and microlith production, discard of microliths and discard of non-microlith tools, many of which are associated with working of plant and/or animal materials, food preparation or tool maintenance (Kuskie 2009).

Grinding groove sites in the locality are typically located in sedimentary bedrock along watercourses, but also occur on open surfaces of sandstone in other contexts (eg. simple slopes) and on smaller sandstone slabs or surfaces in rock shelters.

Other Aboriginal site types have been recorded in low numbers within the Ulan locality, including scarred trees, ochre quarries, lithic quarries, stone arrangements and a possible burial. Sites of traditional or historical cultural significance to Aboriginal people (excluding the contemporary significance attached to the site types noted above), have also been reported within the locality.

Excavations of rock shelters provide valuable information about the nature and chronology of Aboriginal occupation in the locality. Moore's (1970, 1981) investigations of the Bobadeen 1 site provide a basal date of about 6,000 years BP for the locality, while Pearson (1981) recovered an occupation date of 5,500 years BP from a shelter at Botobolar, towards Mudgee. The oldest evidence of occupation directly dated at UCML is around 4,500 - 4,800 (calibrated) years BP at ID# 132 (Haglund 2001a). Nevertheless, a number of contexts have been identified within the locality that could host older evidence of Aboriginal occupation extending back into the Pleistocene period (ie. over 10,000 years of age), including rock shelter sites and creek terrace deposits covered by colluvial slopewash.

3.3 Local Aboriginal Culture

The UCCO Project Area lies within the north-eastern portion of the territory of the Wiradjuri people as defined by Tindale (1974) and Horton (1994, 2000), close to the boundary with the Kamilaroi to the north, and the Geawegal and Wonnarua further to the east.

Pearson (1981:75-76) inferred from the ethnohistorical evidence of Gunther, Lawson, Cox and others, that the upper Macquarie was inhabited by large localised groups of Aboriginal people, who in the normal course of life were divided into small groups of up to 20 people. These groups could easily come together for short periods for subsistence, ceremonial or social reasons and form larger groups of 80 to 150 people.

Pearson (1981:81) inferred that the Wiradjuri in the Upper Macquarie River region was probably subdivided into three groups, one centred in the general Mudgee-Rylstone area and the others in the general areas of Bathurst and Wellington. Haglund (1999a) noted that these groups may have comprised several clans each, with descendants of one of at least two clans in the Mudgee-Rylstone group still living in the locality.

Pearson's (1981:81a) map of the hypothetical group distributions places the Mudgee-Rylstone group in the vicinity of the Ulan locality, albeit on the fringe of other (probable Kamilaroi) territory to the north.

A wide variety of subsistence resources were available in the past to the local Aboriginal people. Ethnohistorical and other evidence suggests that the diet of the local Aboriginal people would have included amongst other foods, possum, kangaroo, wallaby, wombat, kangaroo rat, platypus, lizards, snakes, goanna, tortoise, fish, mussels, crayfish, various birds, insects, and various plants (Pearson 1981:335). More than 20 species of native mammals, various reptiles and over 100 species of native birds have been recorded at Ulan, many of which would have been utilised as food resources.

The material culture of the local Aboriginal population would have included a range of items related to subsistence, cultural and social activities and shelter. However, in the archaeological record, few of these items are preserved. Stone, bone and shell are the materials most frequently represented in archaeological sites.

The influx of non-indigenous settlers into the region had profound effects upon the Wiradjuri, as the newcomers sought to gain the land for agricultural and pastoral utilisation and later for mining the valuable mineral resources present (Clayton and Barlow 1997). In the Ulan area, fighting between non-indigenous and Aboriginal people occurred in the 1820s as settlers sought to establish grazing runs, with hostilities peaking between 1824 and 1826 (Haglund 1999a). The dramatic increase in the number of non-indigenous settlers around Mudgee, Bathurst and Gulgong from the 1850s to the 1870s, during the gold rush, resulted in the displacement of the Aboriginal people and further incidents of warfare (Burless 1997).

Despite all this, the Wiradjuri people survived. A vibrant Aboriginal population remains in the region today and takes an active interest in the management of their heritage. Ongoing involvement of the Aboriginal community in the management of heritage at UCML has been a core element of the HMP (refer to Section 6 for details of consultation with the Aboriginal community in relation to the present Modification assessment).

3.4 Occupation Model and Predictive Model of Site Location

A detailed occupation model for the Ulan locality and a predictive model of site location were devised and reassessed during the UCCO Project and subsequent Modifications (Kuskie 2009, 2010, 2015a).

In general terms, the nature of occupation at each Aboriginal site could represent a variety of circumstances (Kuskie and Kamminga 2000; refer to Kuskie 2009: Section 5.1 for details), for example:

- ❑ Transitory movement;
- ❑ Ceremonial activity;
- ❑ Hunting and/or gathering (without camping);
- ❑ Camping by small hunting and/or gathering parties;
- ❑ Nuclear/extended family base camp;
- ❑ Community base camp; or
- ❑ Larger congregation of groups.

The evidence could represent a single episode or multiple episodes of one or more of the above types of occupations. The episodes of occupations could have occurred at different times over the entire time-span of occupation in the region. Each episode of occupation could also have been for a different duration of time.

A predictive model of site location was constructed and tested by Kuskie (2009: refer to Sections 5.2 and 7.9) to identify areas of archaeological sensitivity (ie. locations where there is a potential of archaeological evidence occurring), so it can be used as a basis for the planning and management of Aboriginal heritage. Predictive modelling involves reviewing existing literature to determine basic patterns of site distribution. These patterns are then modified according to the specific environment of the investigation area to form a predictive model of site location. A sampling strategy is employed to test the predictive model and the results of the survey used to confirm, refute or modify aspects of the model.

The use of land systems and environmental factors in predictive modelling is based upon the assumption that they provided distinctive sets of constraints that influenced Aboriginal land use patterns. Following from this is the expectation that land use patterns may differ between each zone, because of differing environmental constraints, and that this may result in the physical manifestation of different spatial distributions and forms of archaeological evidence (Hall and Lomax 1993:26).

The predictive model was based on information from the following sources:

- ❑ Identification of land systems and landform units;
- ❑ Previous archaeological surveys conducted within the region;
- ❑ Distribution of recorded sites and known site density;
- ❑ Traditional Aboriginal land use patterns; and
- ❑ Known importance of any parts of the investigation area to the local Aboriginal community.

In certain circumstances, such as where low surface visibility or recent sediment deposition precludes effective assessment of the potential archaeological resource, sub-surface testing may be a viable alternative for further testing the predictive model and assessing the investigation area.

The following is a brief description of the site types that may occur within the Modification area and broader UCML Project Area, including in areas that have not yet been subject to heritage survey to current standards, and areas within the sampled zone that were not directly inspected.

Artefact Scatters:

In most archaeological contexts, an artefact scatter has been defined as either the presence of two or more stone artefacts within 50 or 100 metres of each other, or a concentration of artefacts at a higher density than surrounding low density 'background scatter'. The definition of an artefact scatter 'site' is often an arbitrary one, which can offer benefits from a heritage management perspective but is a source of theoretical/analytical debate for heritage practitioners.

Due to the nature of the underlying evidence, its identification only within exposures created by erosion or disturbance, and the limited suitability of existing definitions, artefact scatter sites are defined within this study as the presence of one or more stone artefacts within a *survey area* (cf. Kuskie 2000b). The boundaries of the site are defined by the boundaries of the visible extent of artefacts within the survey area.

The survey areas are based on discrete, repeated *environmental contexts* or *archaeological terrain units* (eg. a particular combination of landform unit and class of slope). It is generally assumed that there is a similar probability for comparable evidence to occur elsewhere within the same survey area. As such, while the visible site boundaries are defined by the extent of visible evidence (consistent with the definition of an Aboriginal object under the NP&W Act), across the entire survey area in which a site is identified there exists a *potential resource* of comparable evidence.

An artefact scatter may consist of surface material only, which has been exposed by erosion, or it more typically involves a sub-surface deposit of varying depth. Other features may be present within artefact scatter sites, including hearths or stone-lined fireplaces, and heat treatment pits.

Artefact scatters may represent the evidence of:

- ❑ Camp sites, where everyday activities such as habitation, maintenance of stone or wooden tools, manufacturing of stone or wooden tools, management of raw materials, preparation and consumption of food and storage of tools has occurred;
- ❑ Hunting or gathering events;
- ❑ Other events spatially separated from a camp site (eg. tool production or maintenance); or
- ❑ Transitory movement through the landscape.

The detection of artefact scatters depends upon conditions of surface visibility and ground disturbance and whether recent sediment deposition has occurred (cf. Dean-Jones and Mitchell 1993). Vegetation cover and deposition of sediments generally obscures artefact scatter sites and prevents their detection during surface surveys. High levels of ground disturbance can also obscure or remove evidence of a site.

Artefact scatters are a common site type in the Ulan locality and the broader Central Tablelands region. There is a high potential for stone artefact evidence to occur in the Modification area and Project Area wherever A unit soil is present, apart from in areas which have been substantially impacted by recent land-use (ie. areas in which the A unit or upper soil horizon has been totally removed). Kuskie (2009: Section 7.9) concluded that in the portions of the study area that have not been sampled, there remains a very high potential for additional open artefact sites to occur. The potential for additional open artefact sites to occur within the portions of the study area that have been sampled also remains very high.

In general, the stone artefact evidence may be of a low to very low density consistent with background discard, interspersed by a low number of activity areas (with consequent higher artefact density). The artefact evidence may involve a broad range of artefact and stone types, but will predominantly comprise evidence associated with non-specific stone flaking, on quartz and tuff stone materials.

However, a higher artefact density and potentially deposits of research significance may occur where more focused occupation (eg. encampments, or events of longer duration or involving larger numbers of people) and/or repeated Aboriginal occupation has occurred. These contexts may comprise elevated, well-drained and low gradient flats, terraces, spur crests, ridge crests and simple slopes adjacent to watercourses, particularly higher order watercourses (such as Mona Creek).

The potential for deposits of research significance may be enhanced by the presence of a relatively deeper A unit soil (eg. along drainage depressions, basal slopes and flats) and lower levels of ground disturbance. In certain circumstances, the impacts of post-depositional processes can also be identified and controlled for (*cf.* Koettig 1989, Kuskie and Kamminga 2000).

Bora/Ceremonial Sites:

Bora grounds are a type of ceremonial site associated with initiation ceremonies. They are usually made of two circular depressions in the earth, sometimes edged with stone. Bora grounds can occur on soft sediments in river valleys and elsewhere, although occasionally they are located on high, rocky ground where they may be associated with stone arrangements. Pearson (1981:104-105) identified that the location of ceremonial sites appears to have related to a desire to isolate the site in a secret or seldom visited location.

The potential for bora/ceremonial sites to occur within the study area was assessed by Kuskie (2009) as low, but could not be discounted. The presence of "Bora Creek", east of UCML, was noted, as was a reported bora/ceremonial ground on the ridge immediately north of Wilpinjong Creek (Mathews 1894). The potential for bora/ceremonial sites to occur within the study area was reassessed by Kuskie (2009: Section 7.9) as low, but cannot be discounted, for the portions of the study area that have not been sampled. However, the potential for additional bora/ceremonial sites to occur within the portions of the study area that have been sampled has been reassessed as very low or negligible, given the comprehensive nature of the survey and the obtrusive nature of this type of evidence (Kuskie 2009).

Burials:

Human remains tended to be placed in hollow trees, caves, rock shelters or sand deposits. The location of burials may once have been marked by carved trees (eg. Etheridge 1918:85), although subsequent tree clearing and the long passage of time since the disruption of this practice has rendered these markers extremely rare.

Pearson (1981:102-104) noted on the basis of recorded burials and ethnohistorical observations that burials in the region took place relatively close to encampments, due to the fact that most people, unless killed by hunting accidents or in warfare, tended to die in or close to camp, and movement of bodies over long distances by foot was problematic. A number of these observations (eg. by Reverend Gunther and Dr Curtis) identify burials within a mile of a campsite, in soft ground, with carved trees around.

Usually burials are only identified when eroding out of sand deposits or creek banks, or when disturbed by development. The probability of detecting burials during archaeological fieldwork is extremely low.

The potential for burial sites to occur within the study area was assessed by Kuskie (2009) as low, but cannot be discounted in either sandy soils or rock shelters. One rock shelter "with possible burial" has previously been recorded in the broader UCML lease area (Ulan ID# 314, Haglund 1999a). This assessment remains valid for the entire study area, given the limited potential of identifying this form of evidence through surface survey techniques alone (Kuskie 2009).

Carved Trees:

Carved trees were still relatively common in NSW in the early 20th century (Etheridge 1918). They were commonly used as markers for ceremonial or symbolic areas, including burials.

Both vegetation removal and the long passage of time since the practice of tree carving was prevalent have rendered this site type rare. Given these factors and the extent of recent land use impacts, the potential for carved trees to occur within the study area was assessed by Kuskie (2009) as very low, but cannot be discounted. This assessment remains valid for the portions of the study area that have not been sampled. However, the potential for carved trees sites to occur within the portions of the study area that have been sampled is very low or negligible, given the comprehensive nature of the survey and the obtrusive nature of this type of evidence (Kuskie 2009).

Cultural Significant Sites or Areas:

Sites of cultural significance to Aboriginal people (excluding the contemporary significance attached to the other site types listed here) can take three forms:

- ❑ Sites or places associated with ceremonies, spiritual/mythological beliefs and traditional knowledge, which date from the pre-contact period and have persisted until the present time;
- ❑ Sites or places associated with historical associations, which date from the post-contact period and are remembered by people today (for example, plant and animal resource use areas and known camp sites); and
- ❑ Sites or places of contemporary significance (apart from those areas for which Aboriginal objects remain, which are discussed elsewhere here), for which the significance has been acquired in recent times.

Although these sites do not qualify as Aboriginal objects under the NP&W Act they can be declared as Aboriginal places under the Act.

Mythological sites, or other sites of traditional, historical or contemporary significance to Aboriginal people, can occur in any location. Often natural landscape features may be related to important mythological stories. Consultation with the local Aboriginal community is essential to identify the presence of such cultural significant sites. Physical evidence of historical contact can occur in the form of artefacts manufactured from introduced materials (eg. porcelain or glass).

During the UCCO Project survey, the Aboriginal representatives did not disclose any specific knowledge of sites or places associated with ceremonies, spiritual/mythological beliefs or traditional knowledge, which date from the pre-contact period and have persisted until the present time, within the study area. The representatives also did not disclose any specific knowledge of sites or places associated with historical associations, which date from the post-contact period and are remembered by people today, within the study area.

The possibility cannot be excluded however, that traditional or historical Aboriginal values or associations may exist that were not divulged by the persons consulted. It was not feasible to contact every single knowledge holder in the north-eastern Wiradjuri community. Nevertheless, Haglund's (1997) conclusion that "for various reasons, mainly relating to actions by authorities and settlers, cultural knowledge relating to features of the landscape (eg. mythological aspects) appears to have been totally lost, at least for the Ulan area", is noted.

The stakeholders did however disclose a number of associations with the UCCO Project Area of contemporary significance. The potential for further associations of contemporary significance within the portions of the study area that have not been sampled cannot be discounted. However, sites of traditional or historical significance are not anticipated to occur (Kuskie 2009).

Physical evidence of historical contact can occur in the form of artefacts manufactured from introduced materials (eg. porcelain or glass). Several probable artefacts manufactured on bottle glass have been identified within the UCML area, and further items may occur.

Grinding Grooves:

Grinding grooves are typically elongated narrow depressions in soft rocks (particularly sedimentary) and are generally associated with watercourses. The depressions are created by the shaping and sharpening of ground-edge axes or hatchets and grinding of seeds and processing of other plant matter and animal foods.

Grinding grooves are typically located in sedimentary bedrock along watercourses, but also occur in the Ulan locality on open surfaces of sandstone in other contexts (eg. simple slopes) and on smaller sandstone slabs or surfaces in rock shelters. Sandstone rock formations are common within the study area and the potential for additional grinding grooves sites to occur, both in association with rock shelters and in open contexts, was assessed by Kuskie (2009) as very high.

This initial assessment of a high potential for additional grinding groove sites to occur within the study area, both in association with rock shelters and in open contexts, was confirmed by the UCCO Project survey. Additional grinding groove sites have a high potential to occur in the portions of the study area that have not been sampled, in either rock shelters or open contexts where suitable rock formations are present. The potential for additional grinding groove sites to occur within the portion of the study area that have been sampled has been reassessed as low, given the comprehensive nature of the survey and the relatively obtrusive nature of this site type. However, sites may still occur in areas that were not directly sampled or are currently obscured by sediment or vegetation/leaf litter. Similarly, additional grooves may be present at the recorded sites, which are currently obscured by sediment or vegetation/leaf litter (Kuskie 2009).

Quarry Sites:

A lithic quarry is the location of an exploited stone source (Hiscock and Mitchell 1993:32). Sites will only be located where exposures of a stone type suitable for use in artefact manufacture occurs.

Stone materials suitable for manufacturing Aboriginal artefacts were anticipated to be present in various locations throughout the study area, including pebbles of quartz, along with other fine-grained materials (eg. chert and volcanics), basalt and tuff. The potential for evidence of lithic procurement within the study area was assessed by Kuskie (2009) as moderate to high.

Ochre quarry sites are an uncommon site type, however, several have been previously recorded in the UCML lease areas (eg. ID# 152 and 158 by Edgar 1997). Ochre quarries take the form of circular depressions or tunnels and are frequently associated with artefacts utilised in the process of extracting ochre (Hiscock and Mitchell 1993:62). The potential for evidence of ochre quarries within the study area was assessed by Kuskie (2009) as moderate.

Two ochre quarries were identified within the UCCO Project study area, confirming initial predictions of a moderate potential for this site type. Additional ochre quarries may occur in the portions of the study area that have not been sampled, where suitable sources exist. The potential for additional ochre quarries to occur within the portions of the study area that have been sampled can be reassessed as low, given the comprehensive nature of the survey and the relatively obtrusive nature of this site type (Kuskie 2009).

Direct evidence of the procurement and reduction of stone from colluvial gravel sources (lithic quarries) was identified in at least two open artefact sites, ID# 580 (with quartz and chert) in the UUG area and ID #804 (with quartz, quartzite, acidic volcanics and chert) (Kuskie 2009). These and similar sources, particularly the widespread distribution of quartz, quartzite and other pebbles from the decomposed conglomerate within the study area, would have enabled casual, opportunistic procurement of much of the stone material utilised at Ulan, without the need for special-purpose trips or particular effort. Hence, initial predictions of a moderate to high potential for this site type, where suitable stone sources are present, were confirmed during the UCCO Project survey.

Additional lithic quarries may occur in the portions of the study area that have not been sampled, where suitable sources exist. The potential for additional lithic quarry evidence (in the broad sense of 'procurement from a stone source') to occur within the portions of the study area that have been sampled has been reassessed as high, both within identified open artefact sites where stone sources occur, and in other locations where stone sources occur. For example, quartzite pebbles and cobbles were reported in various sites and in many survey areas. Quartz pebbles were noted in even more numerous locations across the study area (Kuskie 2009).

Two sites in the open cut extension, ID# 400 and 412, have been noted as possible tuff lithic quarries/procurement areas. Tuff occurs widely in the Ulan locality, as seams exposed in the scarps and slopes of the dissected sandstone terrain (including occasional manifestation within rock shelters) and as tabular colluvial gravels on the slopes and also in the drainage depressions where it has migrated further downwards. Significant outcrops of tuff occur in the southern portion of the open cut extension area, including seams several metres thick on the steep slopes and upper drainages around the 490 metre contour, and as a widespread distribution of tabular pieces on the surrounding slopes. These sources contain both high quality tuff and lower quality, coarser tuff and tuffaceous material. Outcrops were also noted in the Ulan West area, particularly around the elevated margins of the Valley Way tributary of Ulan Creek. Hence, the potential for additional lithic quarry evidence relating to tuff to occur within the portions of the study area that have been sampled is very high (Kuskie 2009).

Rock Engravings:

Rock engravings include outlines or filled-in figures, created on rock surfaces (typically sedimentary stone) by pecking, hammering or scraping.

Rock engravings are more common on exposed sandstone bedrock on ridge and spur crests than in the bases of valleys or margins of steep slopes. Although rock engravings have not been recorded within the Ulan locality, suitable sandstone bedrock may be present in the investigation area and engravings are known to occur elsewhere in the region (Haglund 1985, Navin 1990).

The potential for rock engravings was assessed by Kuskie (2009) as very low, but cannot be discounted. This assessment remains valid for the portions of the study area that have not been sampled. However, the potential for rock engravings to occur within the portions of the study area that have been sampled is very low or negligible, given the comprehensive nature of the UCCO Project survey (Kuskie 2009).

Rock Shelters With Art, Deposits and/or Grinding Grooves:

Rock shelters include rock overhangs, shelters or caves which were used by Aboriginal people. Rock shelter sites may contain artefacts, deposits and/or rock art or grinding grooves. These sites will only occur where suitable geological formations are present.

Numerous rock shelter sites have been identified in the Ulan locality, many with artefacts and some with art and/or grinding grooves. Numerous other rock shelters have been noted with PADs. Although artefacts may not have been visible at the time of recording, these shelters have some probability of containing artefact deposits, which can be confirmed or refuted by test excavation. These sites have been recorded in isolated rock formations (such as boulders and pagodas) and along more extensive rock formations (such as scarps and cliffs)

Rock shelter sites in the locality vary widely in terms of contents (eg. containing artefacts, potential deposits, painted art and/or grinding grooves), location (eg. topographic context, distance to watercourse, size/order of watercourse and aspect), nature (eg. size of shelter, extent of habitable floor area, number and types of artefacts and stone materials) and research potential (eg. depth and extent of potential artefact deposits). Stone artefacts would be the primary form of expected evidence within the rock shelters, in anything from very low to very high densities. Charcoal from fireplaces/hearths may also occur, as may bones and/or shell from fauna used by Aboriginal people for subsistence (or incorporated into the deposit by other means, such as animal activity or natural processes). The presence of other evidence, such as the remains of wooden implements, cannot be discounted, even though their occurrence has rarely been documented in the region.

Apart from several major sites such as the "Hands on Rock" complex adjacent to the UCCO Project Area, rock art occurs relatively infrequently in the recorded shelters and tends to comprise red ochre hand stencils. Hand stencils were part of a complex form of communication and utilised in the representation of signatures, special occasions, individuals, messages, stories, myths and spiritual events.

Sandstone rock formations occur widely in the and Project Area, including boulders, shelters and overhangs. Kuskie (2009) concluded that in the portions of the study area that have not been sampled, there remains a high potential for additional rock shelter sites to occur where suitable rock formations exist, potentially including artefacts, deposits, art and/or grinding grooves. The potential for additional rock shelter sites to occur within the portions of the study area that have been sampled was reassessed as very low to negligible, given the comprehensive nature of the UCCO Project survey and the obtrusive nature of this site type. However, excavation of any of the identified PADs may reveal artefact deposits, which are presently obscured by sediment and/or leaf litter (Kuskie 2009).

Scarred Trees:

Scarred trees contain scars caused by the removal of bark for use in manufacturing canoes, containers, shields or shelters. Mature trees, remnants of stands of the original vegetation, have the potential to contain scars.

Six scarred trees had previously been recorded within the UCML lease area, prior to the UCCO Project survey. Considering the long period of time that has elapsed since this practice was prevalent and the extent of vegetation removal in the substantially cleared portions of the study area, the potential for scarred tree sites to occur within these cleared areas was assessed by Kuskie (2009) as low, but cannot be discounted where mature native trees remain. The potential for scarred trees to occur in the majority of the study area, which retains mature native vegetation, was assessed as low to moderate (Kuskie 2009).

Five scarred trees were identified during the UCCO Project survey, confirming initial predictions of a low to moderate potential where mature native vegetation remains. Additional scarred trees may occur in the portions of the study area that have not been sampled, where mature native vegetation exists. The potential for additional scarred trees to occur within the portions of the study area that have been sampled was reassessed as low to very low, given the comprehensive nature of the survey and the obtrusive nature of this site type (Kuskie 2009).

Stone Arrangements:

Stone arrangements include circles, mounds, lines or other patterns of stone arranged by Aboriginal people. Some were associated with bora grounds or ceremonial sites and others with mythological or sacred sites.

Hill tops and ridge crests which contain stone outcrops or surface stone, and have been subject to minimal impacts from recent land use practices, are potential locations for stone arrangements. Pearson (1981:105-106) noted that no ethnographic records from the upper Macquarie River region pertain to the use of stone arrangements, even though their existence was recorded as early as 1815 (Macquarie's visit to the Mt Pleasant cairns near Bathurst). Pearson (1981:106) noted that stone arrangements in the region typically occur as lines or cairns on bare, exposed hill crests in the plateau/isolated hill areas, or on bare areas of flat land where flatter land predominates. The stone arrangements on hill crests are noted as being often a considerable distance from water, and therefore not within close proximity of any camp sites.

One stone arrangement site had previously been recorded within the UCML lease area (ID# 177, Haglund 1999a) prior to the UCCO Project survey. The potential for stone arrangements to occur within the study area was initially assessed by Kuskie (2009) as low to moderate in the forested areas, and low to very low in the cleared areas. Five stone arrangements were identified during the UCCO Project survey, four in cleared areas (all within the UUG Area). As such, the potential for further stone arrangements to occur within the remainder of the study area (predominantly cleared land) was revised upward to 'low to moderate'. The potential for additional stone arrangement sites to occur within the portions of the study area that have been sampled was reassessed as low to very low. Consistent with the predictive model, most of the stone arrangements comprised lines of stone, were located on hill tops and ridge crests, and were a considerable distance from higher order watercourses (Kuskie 2009).

4. METHODOLOGY

During the initial stages of the investigation, research was conducted into the environmental, cultural and archaeological background of the investigation area, building on the substantial work already completed by South East Archaeology at UCML (refer to Section 3). Searches were undertaken of the OEH AHIMS to encompass the proposed Modification investigation areas that required heritage survey and cross-checked against the UCML Aboriginal Site Database (*Revision 15, June 2016* current prior to the conduct of the present investigation; refer to Section 3.1).

As noted in Section 1, this report seeks to address the impacts of the proposed Modification on Aboriginal heritage, consistent with the aims and methodology of the Aboriginal heritage impact assessment completed for the UCCO Project (Kuskie 2009), the Part 3A UCCO Project Approval and UCML's HMP (currently Version 6.0, November 2015; UCML 2015), particularly Sections 3.7.7 (*Assessment of Future Mine Plan Alterations*) and 3.7.5 (*Survey of Areas Not Sampled During EA*), which specifically relate to a Modification such as that proposed.

For the purposes of this Modification 4 assessment, the key areas for investigation within the Project Approval Area and relevant sections of the HMP in relation to the investigation methodology comprise (refer to Figures 4 - 6):

- Modification 4 will result in an increase to the previously assessed/approved zone of potential subsidence impacts of approximately 220.3 hectares;
- Within this increased zone of potential subsidence impacts approximately 100 hectares has previously been subject to heritage survey to current standards and therefore only requires a reassessment of subsidence impacts on previously identified Aboriginal sites in accordance with the procedures in Section 3.7.7 of the HMP;
- Within this increased zone of potential subsidence impacts approximately 120.3 hectares has not been subject to heritage survey to current standards, and therefore where property access is available, archaeological survey will occur as a component of this Modification assessment in accordance with Sections 3.7.7 and 3.7.5 of the HMP. Where access is not currently available, archaeological survey will be addressed post-Modification approval in accordance with Sections 3.7.7 and 3.7.5 of the approved HMP; and
- Modification 4 will result in an increase to the previously assessed/approved zone of potential surface impacts of up to approximately 24.5 hectares (excluding around 1.2 hectares that overlaps with previously approved corridors). Almost all of this area has previously been subject to heritage survey to current standards in relation to underground impacts or is located within the increased zone of potential subsidence impacts for the Modification, and therefore where property access is available, archaeological survey will occur as a component of this Modification assessment in accordance with Sections 3.7.7 and 3.7.5 of the HMP (refer above).

Consultation with the registered Aboriginal stakeholders for the UCCO Project (Warrabinga Native Title Claimants Aboriginal Corporation, North East Wiradjuri Company Ltd, Mudgee Local Aboriginal Land Council, Murong Gialinga Aboriginal and Torres Strait Islanders Corporation and Warranha Ngumbaay) has continued for the proposed Modification in accordance with the UCCO Project Approval and Section 3.1 of the approved HMP, with WWAC also being consulted as an additional interested organisation as part of wider consultation separate to the HMP requirements (refer to Section 6). The UCCO Project (Kuskie 2009) involved a comprehensive program of Aboriginal community consultation in accordance with the *Interim Community Consultation Requirements for Applicants* (DEC 2004) and ongoing consultation has subsequently occurred in accordance with the HMP.

This report addresses the requirements of Sections 3.7.7, 3.7.5 and 5.5 of the HMP and has been prepared with reference to the DEC (1997) *Aboriginal Heritage Standards and Guidelines Kit*, draft *Guidelines for Aboriginal Cultural Heritage Assessment and Community Consultation* (DEC 2005), and more recently introduced *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW* OEH (2011a) and *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* (DECCW 2010b). This report builds on the previous heritage assessments (particularly Kuskie 2009) and does not seek to repeat background information contained within those reports.

The registered Aboriginal parties and WWAC were provided details of the proposed Modification and invited on 17 July 2017 to attend the archaeological survey.

Heritage survey of the portions of the investigation area as marked on Figures 8 - 13 was undertaken over four days (31 July to 3 August 2017) by Peter Kuskie and Birgitta Stephenson of South East Archaeology, assisted by archaeologists Michael Marsh and Glenn Van der Kolk, and representatives of the Aboriginal stakeholders (refer to Section 6). Full details of the Aboriginal community involvement in the survey are presented in the consultation database in Appendix 4. During the course of the survey, assistance was provided by the following individuals:

- ❑ North-East Wiradjuri Company Ltd (NEWCO) - Coral Williams and Brooke Williams;
- ❑ Warrabinga NTCAC (Warrabinga) - Wendy Lewis and Brooke Williams;
- ❑ Murong Gialinga Aboriginal and Torres Strait Islanders Corporation (MGATSIC) - Steven Flick and Larry Foley;
- ❑ Mudgee Local Aboriginal Land Council (Mudgee LALC) - Tammy Peterson, James Williams and Debbie Foley; and
- ❑ Wellington Valley Wiradjuri Aboriginal Corporation - Stephan Lamb.

All registered parties were invited to attend (and participated in) a Heritage Review Meeting on 3 August 2017 to discuss the proposed Modification and proposed changes to the mine plan (refer to Section 6 and Appendix 4). Another Heritage Review Meeting was also held on 9 November 2017, with all registered parties invited to attend, at which an update on the progress of the Modification assessment was provided.

All registered parties were provided the draft version of this report on 15 February 2018 with an invitation to comment. Comments were received from two stakeholders prior to finalisation of the report on 20 March 2018, both supporting the findings and recommendations (refer to Section 6 and Appendix 4).

As outlined in Section 1.2, a total of 121.5 hectares was subject to detailed archaeological sampling during the present survey (refer to Figures 8 - 13), including:

- a) Approximately 98.7 hectares that had not been subject to heritage survey to current standards within the increased zone of potential subsidence impacts of the proposed Modification (focus of present survey); and
- b) Approximately 22.8 hectares that had not been subject to heritage survey to current standards *outside of* the increased zone of potential subsidence impacts of the proposed Modification (this area was included within the initial study area, but subsequent refinements meant that it will no longer be subject to subsidence impacts).

It is also noted in relation to potential subsidence impacts that:

- i) Approximately 21.6 hectares *within* the increased zone of potential subsidence impacts of the proposed Modification was not surveyed due to access constraints or other issues and will be addressed under Section 3.7.5 of the HMP post-approval; and
- ii) The remaining areas *within* the zone of potential subsidence impacts of the Modification have previously been subject to heritage survey to current standards and therefore only require a reassessment of subsidence impacts on previously identified Aboriginal sites in accordance with the procedures in Section 3.7.7 of the HMP.

In relation to the increased zone of potential surface impacts (Figure 5), almost all of this area (apart from approximately 0.3 hectares) was either previously subject to heritage survey to current standards in relation to underground impacts or is located within the increased zone of potential subsidence impacts for the Modification and was inspected during the present survey. However, the surface impact area was not defined until after completion of the heritage survey. Hence, all survey coverage obtained within the surface impact area (either for the present assessment or the previous UCCO Project) was typically to a low intensity consistent with proposed subsidence impacts, rather than to a higher intensity consistent with potential surface impacts. Measures to address this are presented in Section 11.

Consistent with the UCCO Project (Kuskie 2009), the investigation area was divided into particular combinations of environmental variables that are assumed to relate to Aboriginal usage of the area (refer to Figures 11 - 13). These *archaeological terrain units* or *environmental contexts* were defined on the basis of landform element and class of slope (following McDonald *et al* 1984). They are discrete, recurring areas of land for which it is assumed that the Aboriginal land use and resultant heritage evidence in one location may be extrapolated to other similar locations. Therefore *survey areas* were defined as the individual environmental context that is bounded on all sides by different environmental contexts (*cf.* Kuskie 2000b).

Detailed recording of the archaeological *survey areas* was made on survey recording forms, including environmental variables and heritage resources identified or potentially present. Each *survey area* was initially assigned a unique sequential number after the Modification (Mod 4) initials and subsequently relabelled in sequential order from the overall Ulan survey coverage database (Survey Areas 2004 to 2035; refer to survey coverage database in Appendix 1).

Within each *survey area*, the areas inspected on foot correspond to the OEH (DECCW 2010b) definition of *survey units*. The *survey units* typically comprised general transects through vegetated terrain, or coverage of and separate recording of specific exposure types, such as vehicle tracks. Data for each *survey unit* was recorded separately on the survey area recording forms and representative photographs of survey units and survey areas were taken and are included in Appendix 3 where relevant and informative (refer also to site photographs in Appendix 2).

For the purposes of the analysis, *survey unit* data from each *survey area* are combined (refer to Appendix 1), and data from each survey area can be combined with comparable survey areas to analyse coverage and artefact density with respect to environmental variables such as landform element and slope (refer to Table 2). For a thorough discussion of the rationale for use of the individual artefact as the basic unit of analysis, including the problems with open artefact site definitions due to exposure/obscurement issues, and the margins of error, variables and constraints associated with the data collection procedures and analysis, refer to the comprehensive discussion in Kuskie (2000b).

The general survey procedure involved working together as a single team or separation of the crew into two teams, each comprising one or more archaeologists and several Aboriginal community representatives, inspecting each survey area.

The survey teams were equipped with high resolution 1:3,000 scale mapping of the investigation area, with one metre contours, a 100 metre MGA grid and an aerial photograph underlay. Along with the use of hand-held Global Positioning System (GPS) units (generally accurate to within five metres), these features assisted with defining survey areas and survey units and accurately establishing the location of Aboriginal sites and marking the above onto the detailed base mapping (refer to Figures 8 - 10 and Appendix 2).

The extent of the sample and nature of survey coverage is discussed in Section 5.1.

Within each survey area:

- ❑ Inspection was made widely for the obtrusive site types, such as rock shelters with deposit and/or art, grinding grooves and scarred trees; and
- ❑ Inspection was also made for stone artefacts and other cultural evidence, focusing on areas with ground surface visibility.

Aboriginal heritage site recording forms for each identified site were also completed. Spatially separate locations of heritage evidence were recorded as separate site loci named after the sequential "landform patterns" system of Haglund (1999a) (effectively, watercourse catchment areas). Newly recorded sites were located within the Mona Creek (MC) and Curra Creek (CU) catchments. The Ulan Aboriginal site Identifier (ID) numbering system was applied to the newly identified sites (Ulan ID# 1601 - 1614).

Detailed descriptions of all newly identified sites are presented in Appendix 2, along with re-recordings or extensions of several previously reported sites (Haglund 1999a, Kuskie 2009). Descriptions of sites recorded during the UCCO Project are reported by Kuskie (2009) and not repeated here.

As required under Section 89A of the NP&W Act, Aboriginal Site Recording Forms have been completed for all new sites recorded during this assessment and lodged with the OEH.

Stone artefacts were recorded on a lithic item recording form, including details about provenance, stone material type, artefact type, size class, cortex and other relevant attributes (refer to Appendix 2).

During the survey and throughout the consultation process registered Aboriginal stakeholders were also asked of their knowledge of any areas of cultural significance within the investigation area, for example:

- ❑ Sites or places associated with ceremonies, spiritual/mythological beliefs and traditional knowledge, which date from the pre-contact period and have persisted until the present time;
- ❑ Sites or places associated with historical associations, which date from the post-contact period and are remembered by people today (for example, plant and animal resource use areas and known camp sites); and
- ❑ Sites or places of contemporary significance (apart from those areas for which Aboriginal objects remain, which are discussed above), for which the significance has been acquired in recent times.

The results of the investigation are presented in Section 5. Photographs of the identified sites are presented in Appendix 2 for newly recorded sites and additional photographs of survey areas and the general investigation area are presented in Appendix 3.

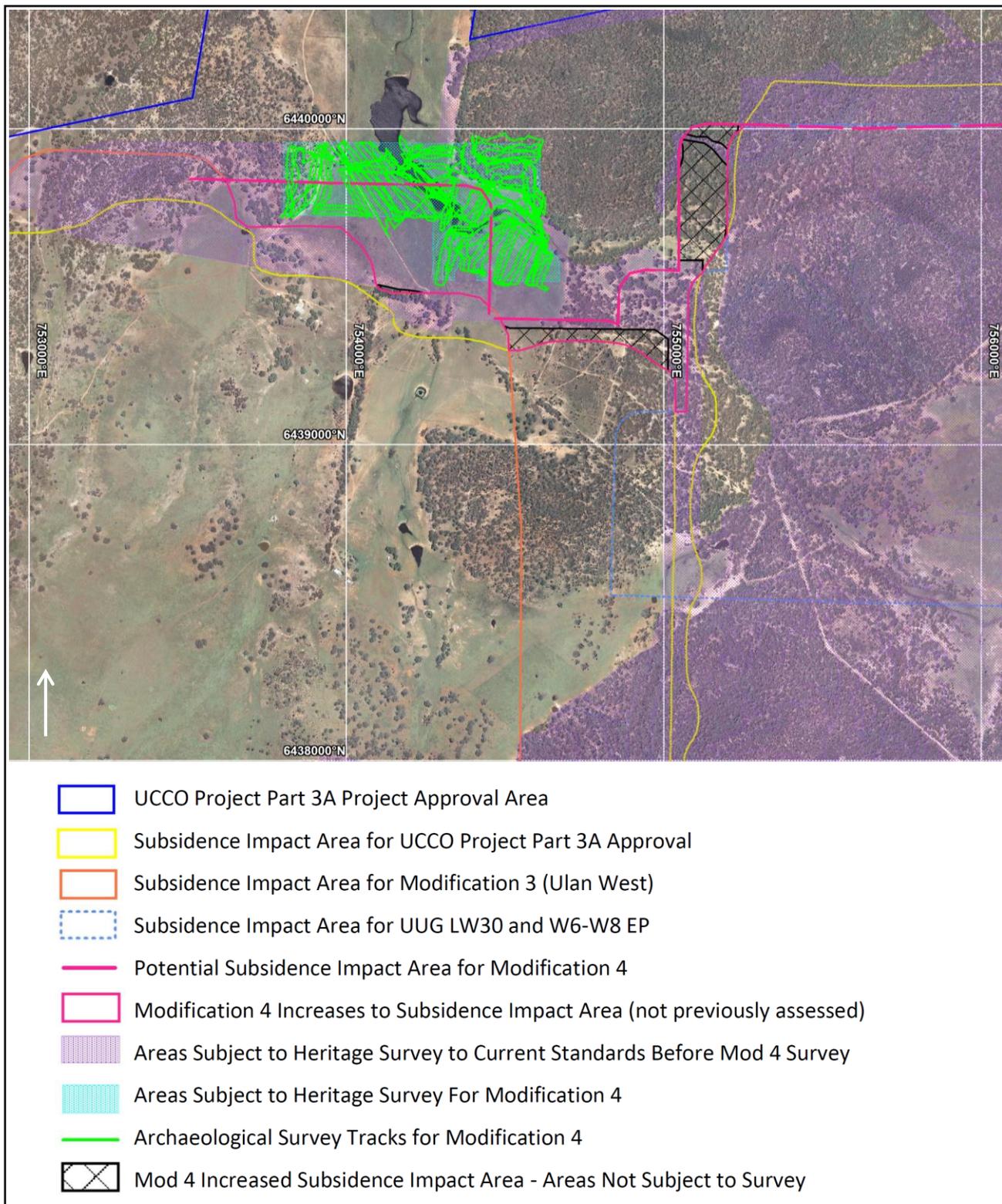


Figure 8: Approximate location of GPS recorded archaeological survey transects within the north-western portion of the investigation area and extent of heritage survey coverage (noting that vegetation cover limited the effectiveness and accuracy of the hand-held GPS units at times; that the field teams involved a number of participants, only one of which in each team typically carried a GPS unit; aerial photograph courtesy UCML; one kilometre MGA grid).

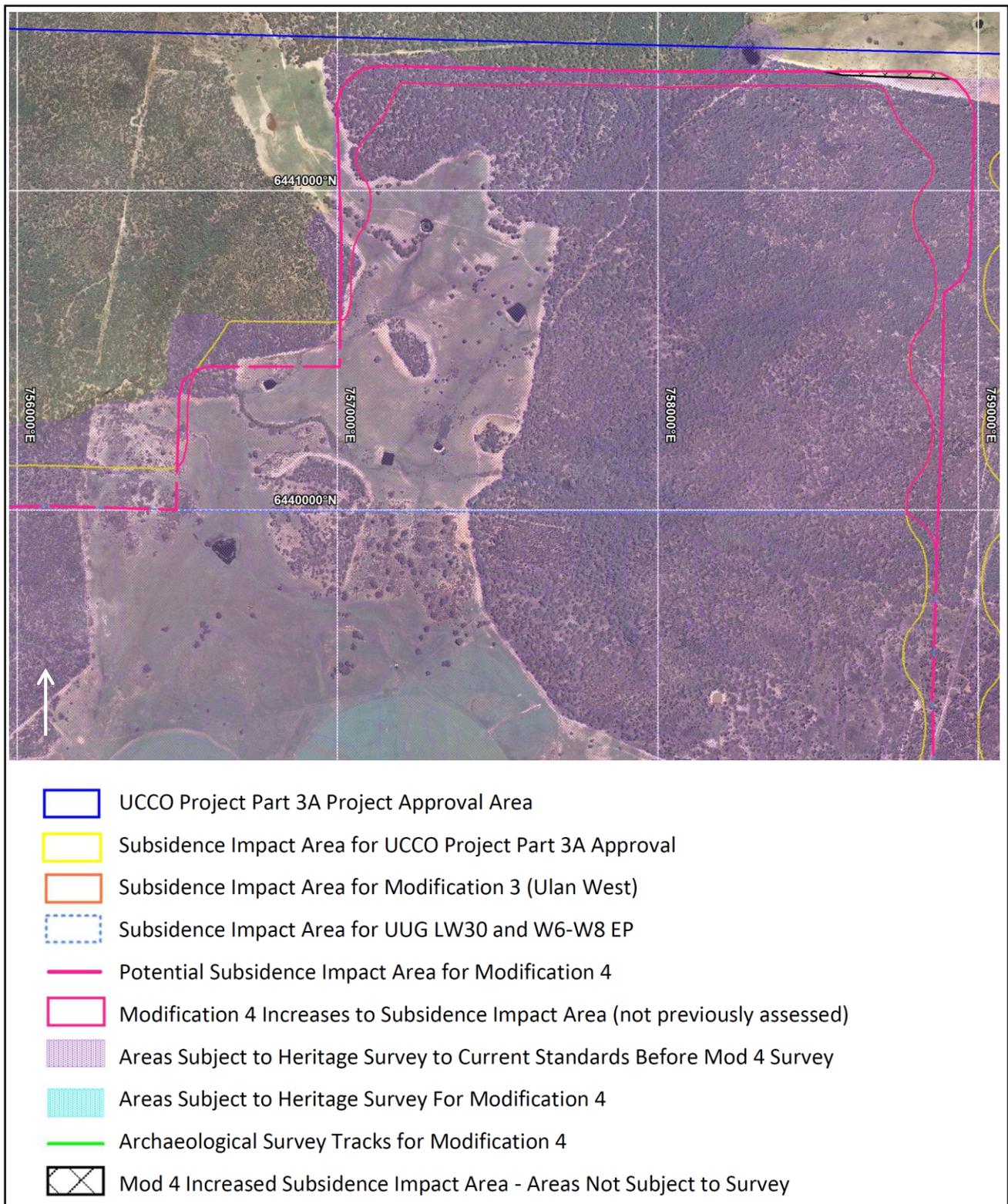


Figure 9: Approximate location of GPS recorded archaeological survey transects within the north-central portion of the investigation area and extent of heritage survey coverage (noting that vegetation cover limited the effectiveness and accuracy of the hand-held GPS units at times; that the field teams involved a number of participants, only one of which in each team typically carried a GPS unit; aerial photograph courtesy UCML; one kilometre MGA grid).

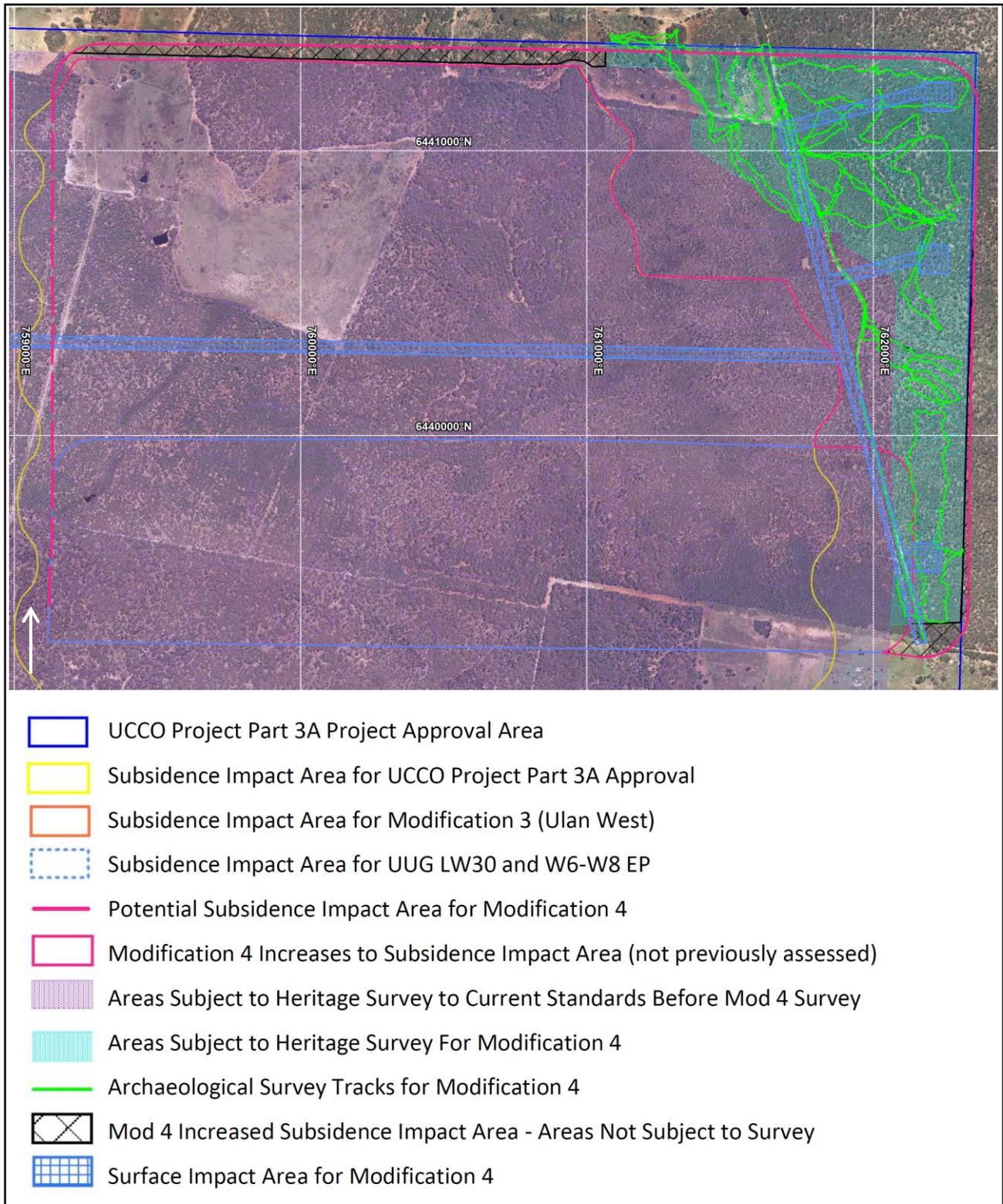


Figure 10: Approximate location of GPS recorded archaeological survey transects within the north-eastern portion of the investigation area and extent of heritage survey coverage (noting that vegetation cover limited the effectiveness and accuracy of the hand-held GPS units at times; that the field teams involved a number of participants, only one of which in each team typically carried a GPS unit; aerial photograph courtesy UCML; one kilometre MGA grid).

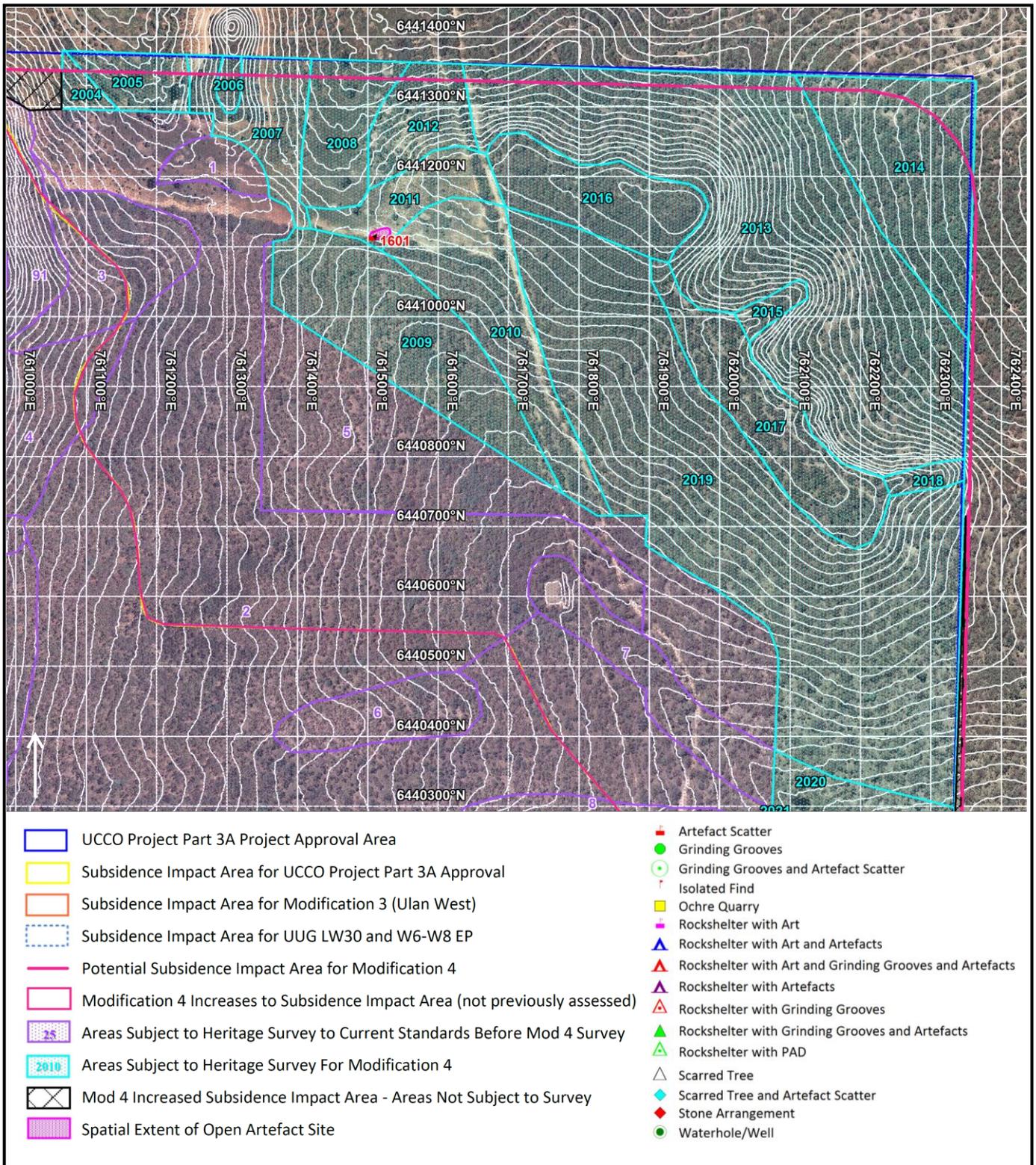


Figure 11: Upper north-eastern portion of area surveyed for Modification within the Curra Creek catchment showing archaeological survey areas and Aboriginal heritage sites (aerial photograph and one metre contours courtesy UCML; 100 metre MGA grid).

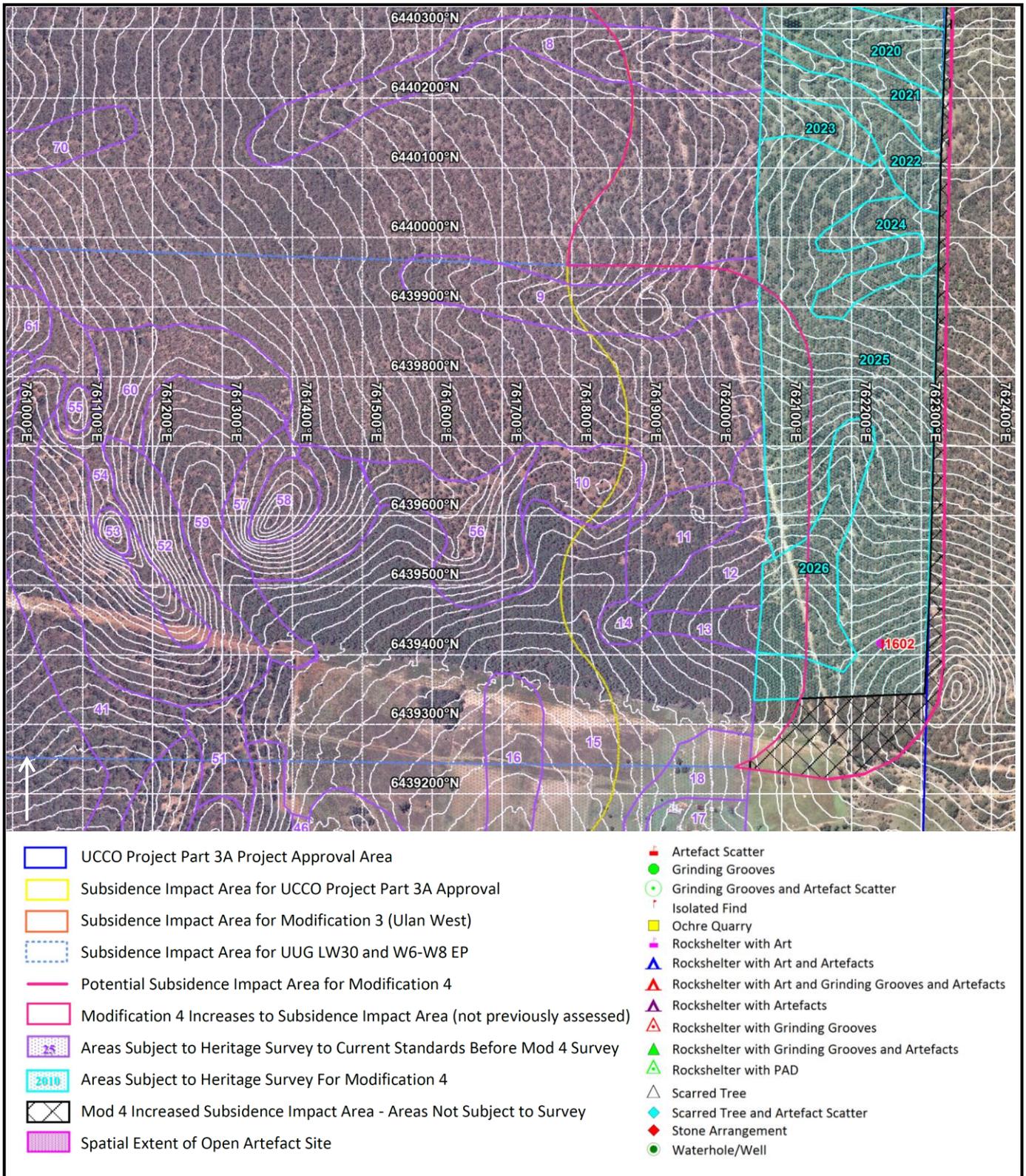


Figure 12: Lower north-eastern portion of area surveyed for Modification within the Curra Creek catchment showing archaeological survey areas and Aboriginal heritage sites (aerial photograph and one metre contours courtesy UCML; 100 metre MGA grid).

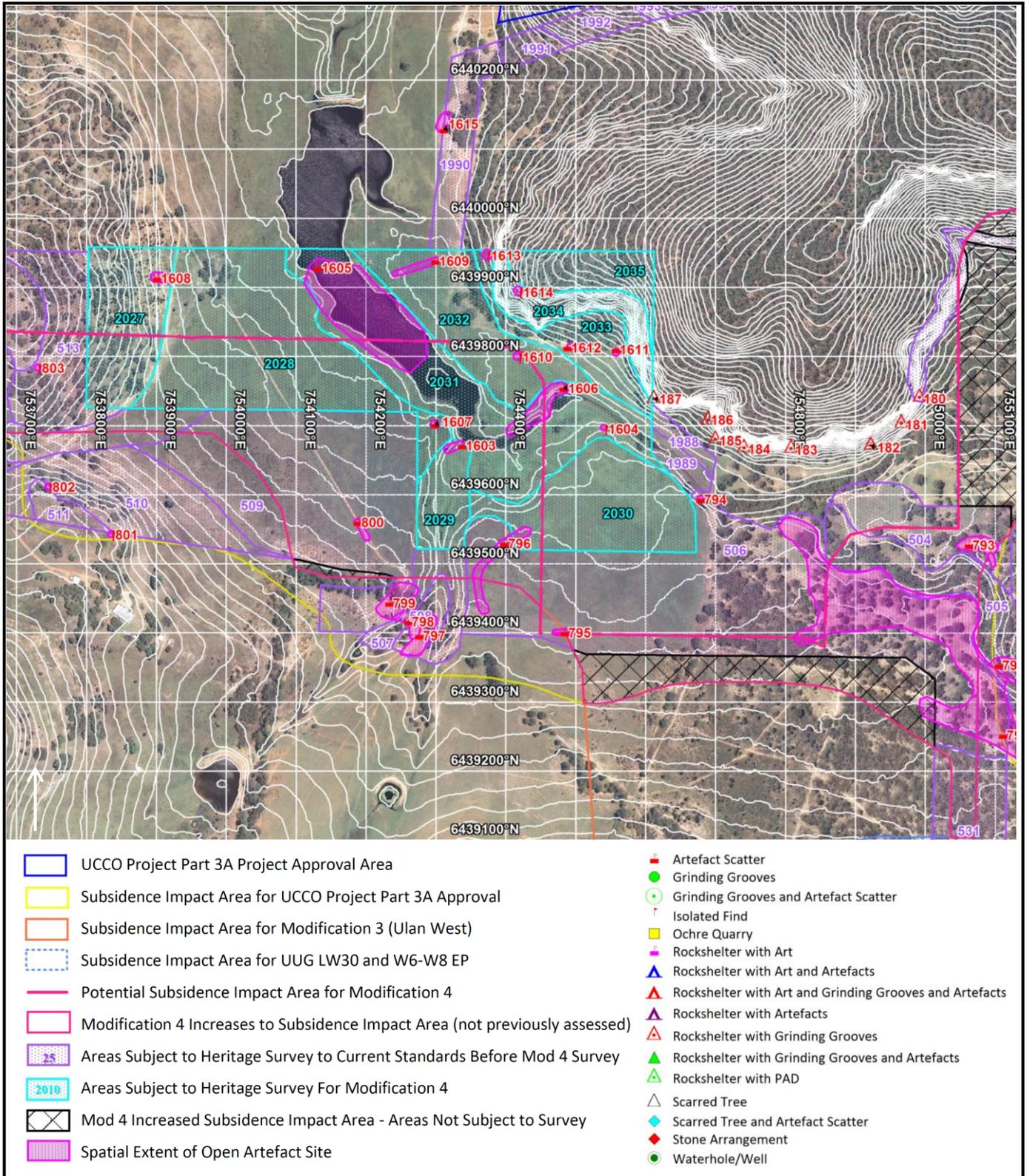


Figure 13: North-western portion of area surveyed for Modification 4 around Mona Creek showing archaeological survey areas and Aboriginal heritage sites (aerial photograph and one metre contours courtesy UCML; 100 metre MGA grid).

5. RESULTS AND DISCUSSION

5.1 Survey Coverage

During the present heritage survey conducted for Modification 4, archaeological survey coverage was obtained across a total area of 121.5 hectares that had not been previously subject to heritage survey to current standards. This included approximately 98.7 hectares *within* the increased zone of potential subsidence impacts of the proposed Modification and approximately 22.8 hectares *outside of* the zone of potential subsidence impacts of the Modification (this area was included within the initial study area, but subsequent refinements meant that it will no longer be subject to impacts) (refer to Figures 11 - 13 and Appendix 1).

The total area of 121.5 hectares subject to detailed archaeological sampling during the present survey was subdivided into a total of 32 archaeological survey areas (numbered 2004 to 2035 following the sequential Ulan survey coverage system), each representing a specific combination of landform unit and class of slope (definitions as per McDonald *et al* 1984). Each archaeological survey area was inspected for Aboriginal heritage evidence. The environmental contexts surveyed included the eight landform elements and four classes of slope present (refer to Table 2).

The locations of the individual survey areas are marked on Figures 11 - 13 and descriptions are presented in Appendix 1. A summary of the survey coverage is presented in Table 2 for the combined environmental contexts and individual classes of slope and landform elements.

The total survey coverage (ground physically inspected for heritage evidence) equated to approximately 271,680 m², or 22.4% of the sampled area. As this coverage only refers to an area of several metres width directly inspected by each member of the survey team, the actual coverage for obtrusive site types (for example, scarred trees and rock shelters) was significantly greater than this. The total effective survey coverage (*visible* ground surface physically inspected with potential to host heritage evidence) equated to around 17,353 m², or 1.4% of the sampled area.

Conditions of surface visibility were generally low across the investigation area, due to the dense cover of vegetation and leaf litter (Appendix 1). Archaeological visibility, the actual visible ground surface with potential for heritage evidence (accounts for factors such as ground disturbance and sediment deposition), was generally similar to surface visibility. Mean archaeological visibility across the entire survey sample was approximately 6.4%. Exposures tended to be present along vehicle tracks and other areas of recent ground disturbance, such as animal diggings and erosion.

A number of mature native trees exist within the investigation area and where identified, these were inspected for evidence of Aboriginal scarring.

Large sandstone formations are present along the cliff-lined margin of the Mona Creek valley (survey area 2034), but these tend to comprise straight-walls with few rock shelters. Residual sandstone bedrock (open surfaces), boulders and outcrops occur in several other survey areas, but these typically tend to comprise minor outcrops (refer to Plates 15 - 18 in Appendix 3). These rock formations were targeted for inspection during the survey. However, almost two-thirds of survey areas had no rock outcrops.

Notwithstanding the low surface visibility and resulting low proportion of effective survey coverage as a percentage of the entire investigation area, the level and nature of effective survey coverage is considered satisfactory enough to present an effective assessment of the Aboriginal heritage resources identified and potentially present within the surveyed area, particularly in relation to potential subsidence impacts. The coverage was relatively comprehensive for obtrusive site types (for example, scarred trees, grinding grooves and rock shelters) but limited for the less obtrusive stone artefacts.

Nevertheless, in view of the predictive modelling and results obtained from the sample of effective coverage, it is concluded that the survey provides a valid basis for formulating recommendations for the management of the identified and potential Aboriginal heritage resources in relation to the proposed Modification.

In addition to the areas surveyed during the present assessment, sizeable portions of the zones of potential subsidence and surface impacts of the Modification have previously been subject to heritage survey to current standards (refer to Kuskie 2009 for details and Figures 5 and 6).

Approximately 21.6 hectares within the increased zone of potential subsidence impacts of the Modification (including 0.3 hectares of the overlapping increased zone of potential surface impacts) was not surveyed due to property access or other constraints and will be addressed under Section 3.7.5 of the HMP post-approval.

Table 2: Environmental contexts, class of slope and landform elements - summary of survey coverage and artefact density for Modification survey.

Environmental Context	Total Area of Context (m ²)	% Context Comprises of Area Investigated	Total Area Surveyed (m ²)	% Surveyed of Context	Effective Survey Coverage Total (m ²)	% Effective Survey Coverage of Context	Total # Artefacts (open sites)	Artefact Density (# artefacts per m ² effective survey coverage)
gentle drainage depression	210,350	17.3%	59,400	28.2%	5,062	2.4%	54	0.011
level-very gentle valley flat	33,500	2.8%	16,000	47.8%	160	0.5%	4	0.025
level-very gentle terrace	29,610	2.4%	16,000	54.0%	160	0.5%	3	0.019
level-very gentle simple slope	62,300	5.1%	32,400	52.0%	324	0.5%	3	0.009
gentle simple slope	463,210	38.1%	68,080	14.7%	3,074	0.7%	7	0.002
moderate simple slope	246,427	20.3%	38,460	15.6%	6,118	2.5%	2	-
gentle spur crest	28,105	2.3%	5,200	18.5%	84	0.3%	0	-
moderate spur crest	12,740	1.1%	7,000	54.9%	140	1.1%	0	-
gentle ridge crest	113,750	9.4%	23,080	20.3%	2,110	1.9%	3	0.001
steep scarp	12,710	1.1%	4,800	37.8%	96	0.8%	1	0.010
level-very gentle hillock	2,416	0.2%	1,260	52.2%	25	1.0%	0	-
Totals/Means	1,215,118	100%	271,680	22.4%	17,353	1.4%	77	0.004
Class of Slope								
level-very gentle	127,826	10.5%	65,660	51.4%	669	0.5%	10	0.015
gentle	815,415	67.1%	155,760	19.1%	10,330	1.3%	64	0.006
moderate	259,167	21.3%	45,460	17.5%	6,258	2.4%	2	-
steep	12,710	1.1%	4,800	37.8%	96	0.8%	1	0.010
Totals/Means	1,215,118	100%	271,680	22.4%	17,353	1.4%	77	0.004
Landform Element								
drainage depression	210,350	17.3%	59,400	28.2%	5,062	2.4%	54	0.011
valley flat	33,500	2.8%	16,000	47.8%	160	0.5%	4	0.025
terrace	29,610	2.4%	16,000	54.0%	160	0.5%	3	0.019
simple slope	771,937	63.5%	138,940	18.0%	9,516	1.2%	12	0.001
spur crest	40,845	3.4%	12,200	29.9%	224	0.5%	0	-
ridge crest	113,750	9.4%	23,080	20.3%	2,110	1.9%	3	0.001
scarp	12,710	1.1%	4,800	37.8%	96	0.8%	1	0.010
hillock	2,416	0.2%	1,260	52.2%	25	1.0%	0	-
Totals/Means	1,215,118	100%	271,680	22.4%	17,353	1.4%	77	0.004

*Totals may not completely tally due to the effects of rounding.

5.2 Aboriginal Heritage Evidence

The present survey for the proposed Modification has resulted in the recording of an additional 14 Aboriginal sites, comprising nine artefact scatters and five isolated finds. One previously recorded site (ID# 796), an artefact scatter, was re-recorded as it was identified that it extended into the present survey area. Another previously recorded site (ID# 187), a rock shelter with artefacts first reported by Haglund (1999a), was re-recorded with updated details. Full descriptions of all newly identified and re-recorded sites are presented in Appendix 2 and their locations are marked on Figures 11 - 14.

A summary of the open artefact sites recorded during the current survey is presented in Table 3. Typically these are small, low density open isolated finds or open artefact scatters with ten or less artefacts. However, sites ID# 1605 (with 37 artefacts) and ID# 1606 (with 13 artefacts) adjacent to the higher order watercourse of Mona Creek, contained higher numbers. Artefacts occur across all gradients and on most landform units, but in very low mean densities (refer to Table 2). Many sites were situated in the few exposures around the higher order Mona Creek, in locations where there was typically a high potential for sub-surface deposits of research value.

The identified artefacts probably only represent a small fraction of the entire artefact resource that is present within the surveyed area, because the vast majority of evidence is likely to be currently obscured by vegetation and soil. Substantial portions of the area were not directly sampled for artefacts, and where the sample was obtained, conditions of surface visibility were typically low (mean archaeological visibility across the entire survey sample was 6.4%: refer to Section 5.1).

One rock shelter with artefacts (ID# 187) was re-recorded during the present survey (refer to Figure 13, Table 4 and Appendix 2). This site forms the western extent of the Mona Creek 23-30 complex of sites (ID# 180-187), for which the UCCO Project Approval conditions (and consequently Section 3.4 of the HMP) specify that impacts will continue to be avoided.

Eight of these sites are located in land *outside of* the zone of potential subsidence impacts of the Modification, including three isolated finds (ID# 1604, 1613 and 1614), four artefact scatters (ID# 1608, 1609, 1611 and 1612) and one rock shelter with artefacts (ID# 187). For completeness, the sites outside of the potential subsidence impact area of the proposed Modification are included in the assessment of impacts and management strategies.

In relation to known Aboriginal sites, the key area of interest in relation to the proposed Modification is the increased zone of potential subsidence impacts of 220 hectares for the Ulan West and UUG longwall panel extensions (refer to Figures 4 - 7). Two potential *changes* to Aboriginal sites relating to subsidence impacts may occur from the proposed Modification within this zone and therefore all Aboriginal sites and PADs within these categories have been included in the assessment of subsidence impacts and management strategies for the Modification (refer to Sections 9 and 10 and Appendix 5)⁹:

- a) Sites/PADs with an *increase in impacts*, as subsidence impacts that would not have occurred under the approved UCCO Project will now occur under the proposed Modification; and
- b) Sites/PADs with an *altered level of impacts*, where subsidence impacts that may have occurred under the approved UCCO Project will also occur under the proposed Modification, but at a different level.

⁹ Decreases in impacts associated with minor areas in which subsidence impacts may be reduced did not require further consideration at the request of UCML.

Although subsidence associated with the proposed Modification will have no material impact on the artefact scatters and isolated finds, the sites recorded during the present survey are included in the assessment of significance (refer to Section 7.2), assessment of impacts (Section 9) and management strategies (Section 10) for completeness.

No known Aboriginal sites are located within the increased zone of potential surface impacts (which overlaps portions of the currently approved zone and increased zone of potential subsidence impacts).

While the above discussion focuses on Aboriginal objects and physical evidence of Aboriginal occupation, contemporary cultural values associated with the investigation area have been identified by the Aboriginal stakeholders. Some of these relate to physical objects, including items that qualify as *Aboriginal objects* as defined under the NP&W Act. However, some relate to intangible values, associations or landscape features that do not qualify as *Aboriginal objects*. These include:

- In general terms, the use of subsistence or other resources, with comments made about the presence of various native flora and fauna where observed. These comments were not of a historical nature (ie. did not relate to plant and animal resource use areas known from the post-contact period) but rather were general observations of the occurrence of particular species and their known traditional uses (eg. for food, medicine, tools, etc.);
- In general terms, the traditional use of the area by north-eastern Wiradjuri people, and an ongoing cultural and spiritual connection to the land and resources of the study area by the north-eastern Wiradjuri; and
- In relation to the forested sandstone formations (survey area 2034) adjacent to the higher order Mona Creek, in the locality of rock shelters MC 23-30 (ID# 180-187), the Aboriginal stakeholders expressed a strong spiritual and cultural connection with this locality.

In addition to these places, other archaeological sites (for example, rock shelters, grinding grooves and artefact scatters) identified within the Project Approval Area are of contemporary significance to the Aboriginal community, as they represent a tangible link with the traditional past and with the lifestyle and values of community ancestors (refer to Section 7).

The possibility cannot be excluded that further Aboriginal values or associations may exist within the locality of the investigation area that were not divulged to South East Archaeology by the persons consulted. However, the representatives did not disclose any specific knowledge of sites or places associated with ceremonies, spiritual/mythological beliefs or traditional knowledge, which date from the pre-contact period and have persisted until the present time, within the proposed Modification area. The representatives also did not disclose any specific knowledge of sites or places associated with historical associations, which date from the post-contact period and are remembered by people today (for example, plant and animal resource use areas and known camp sites), within the study area.

In general terms, the attachment of the north-eastern Wiradjuri people to the landscape and continuing strong cultural connections with the locality of the study area was evident (refer to Kuskie 2009). As noted by Goulding (2002:63), land is a fundamental part of Aboriginal culture and such cultural connections are integral to the health and wellbeing of Aboriginal people, which can be complex and is not always obvious to others.

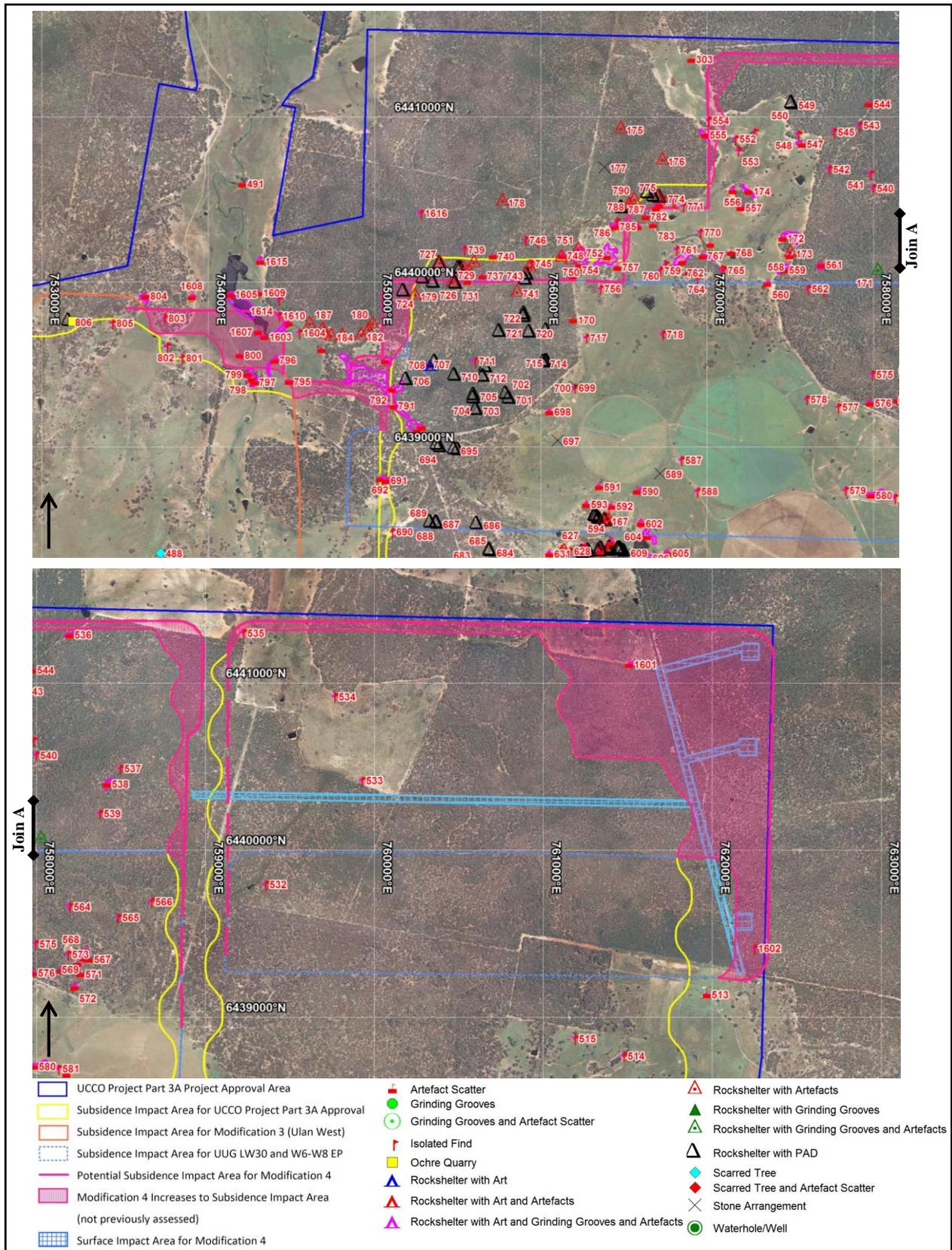


Figure 14: Modification area and recorded Aboriginal heritage sites after completion of the Modification heritage survey (Aboriginal site data from UCML Aboriginal Site Database Revision 16, September 2017; only valid for UCCO Project Approval Area; aerial photograph courtesy UCML; one kilometre MGA grid; not all site labels visible).

Table 3: Summary of open artefact sites recorded during the Modification 4 survey.

Ulan ID#	Site Name	Landform Element	Slope	Distance to Water	Vegetation	Ground Disturbance	Visible Extent of Surface Exposures: Length (m)	Visible Extent of Surface Exposures: Width (m)	Visible Extent of Evidence: Length (m)	Visible Extent of Evidence: Width (m)	Visible Locus Area (m ²)	Mean Surface Visibility of Locus (%)	Mean Archaeological Locus (%)	Effective Locus Area (m ³)	# of Artefacts	# of Artefacts/m ² of Effective Locus Area	Sub-Surface Deposit	Comments	MGA Reference Easting	MGA Reference Northing
796	MC308	valley flat	level-very gentle	>50	1	low-mod	4	3	3	3	7.2	80	80	7.2	4	0.555	probable	extension of site ID# 796 to north-east; new artefacts located around wombat hole; deep sandy deposit; all surface artefacts buried by bioturbation and obscured by grass apart from exposures such as this	754428	6439542
1601	CU78	ridge crest	gentle	>50	1, 2	mod	varies	varies	25	2	40	80	80	40	3	0.075	unlikely	on vehicle track adjacent to forest; low research potential	761507	6441115
1602	CU79	simple slope	gentle	>50	2	low	nil	1	1	1	0.01	1	1	0.01	1	100,000	unlikely	in dense leaf litter in forest; low research potential	762242	6439417
1603	MC345	drainage depression	gentle	<50	1	mod	varies	varies	25	2	5	10	10	5	3	0.600	probable	exposed in erosion in creek channel of tributary of Mona Creek, immediately south of confluence; low potential for deposit of research value directly at locus but high potential in adjacent areas	754337	6439672
1604	MC346	drainage depression	gentle	<50	1	low	varies	varies	1	1	0.2	20	20	0.2	1	5.000	probable	exposed on south bank of Mona Creek; low disturbance from vegetation removal and grazing; high potential for a deep deposit of research value in sandy soil	754541	6439696
1605	MC347	drainage depression	gentle	<50	1	high	varies	varies	200	65	2600	20	20	2600	37	0.014	probable	exposed over broad area on both margins of Mona Creek, where dam waters have receded and erosion has occurred; high disturbance from erosion, but low disturbance on adjacent heavily grassed terrace/basal slopes, where there is higher potential for a deposit of research value than directly at the site; sandy soil; water level currently very low	754131	6439929
1606	MC348	drainage depression	gentle	<50	1	mod	varies	varies	100	15	150	10	10	150	13	0.087	probable	northern side of Mona Creek channel; ants nests, wombat holes, creek bank erosion, cattle trails, erosion - moderate disturbance; high potential on adjacent terrace	754482	6439755
1607	MC349	simple slope	level-very gentle	<50	1	mod	50+	3	2	2	0.4	10	10	0.4	3	7.500	probable	on unformed vehicle track leading north near fence to Mona Creek; moderate disturbance at site but high potential for deposit in adjacent areas	754298	6439702
1608	MC350	simple slope	moderate	>50	1, 2	low-mod	varies	varies	25	2	25	50	50	25	2	0.080	possible	on exposures adjacent to wombat hole and access road to rural residences; pine forest, all previously cleared; low research potential	753901	6439914

Table 3 (continued):

Ulan ID#	Site Name	Landform Element	Slope	Distance to Water	Vegetation	Ground Disturbance	Visible Extent of Surface Exposures: Length (m)	Visible Extent of Surface Exposures: Width (m)	Visible Extent of Evidence: Length (m)	Visible Extent of Evidence: Width (m)	Visible Locus Area (m ²)	Mean Surface Visibility of Locus (%)	Mean Archaeological Locus (%)	Effective Locus Area (m ²)	# of Artefacts	# of Artefacts/m ² of Effective Locus Area	Sub-Surface Deposit	Comments	MGA Reference Easting	MGA Reference Northing
1609	MC351	terrace	level-very gentle	<50	1	low	varies	varies	65	2	130	1	1	1.3	2	1.538	probable	grassy terrace on north side of Mona Creek; artefacts on cattle trail and exposed by animal diggings; low-moderate potential for deposit of research value as mostly further distant from creek	754299	6439939
1610	MC352	terrace	level-very gentle	>50	1	low	nil	nil	1	1	1	1	1	0.01	1	100.000	probable	grassy terrace on north side of Mona Creek; sandy alluvial soil, deep; potential for deposit of research value over terrace closer to Mona Creek, but low-moderate at site locus as further distant; vegetation removal, grazing - low disturbance; artefact 23m east of wombat hole	754418	6439800
1611	MC353	simple slope	gentle	>50	1	low-mod	15	10	4	1	4	70	50	2	2	1.000	possible	exposed in erosion scour at base of scarp near fence; low research potential	754557	6439811
1612	MC354	simple slope	gentle	>50	1	low-mod	60	15	30	10	300	50	30	90	3	0.033	possible	exposed in erosion scour and old vehicle track at base of scarp near fence; low research potential	754488	6439814
1613	MC355	simple slope	gentle	>50	1	low	varies	varies	1	1	1	20	20	0.2	1	5.000	possible	low disturbance - forest, wombat holes nearby; 10m west of scarp; low research potential	754373	6439947
1614	MC356	scarp	steep	>50	2	low	5	1	1	1	1	5	5	0.05	1	20.000	unlikely	on slope between sandstone outcrops, boulders; forested; part of scarp	754419	6439894

Vegetation - 1 = cleared/grass/crop; 2 = forest/bush/regrowth

Table 4: Summary of rock shelter sites recorded during the Modification 4 survey.

Ulan ID #	187
Site Name	MC30
Site Type	Rockshelter with Artefacts
Landform Element	scarp
Distance to Water (m)	<50
Type of Water	Mona Ck
Rock Material	sandstone
Outcrop Type	rockshelter
Outcrop Form	scarp
Aspect	south-west
Erosion	exfoliation, cavernous
Surface Condition	exfoliating
Soils	sand, humic
Disturbance/Deposit	high
Causes of Disturbance	animals
# of Artefacts	0
# of Grinding Grooves	0
Mean Archaeological Visibility (%)	80%
Shelter Floor Area (m ²)	72
Potential Depth of PAD (mm)	<80
Comments	originally recorded by Haglund 1999; grid references previously adjusted as site 100-150m from where previously listed, and adjusted marginally again here; shelter dimensions approximately 8m wide and 9m deep, 7m high at dripline and 4.5m high internally; large boulders at front of shelter; mostly rocky sloping floor with no deposit; PAD of 5 x 3.5m present but very shallow (<8cm) and highly disturbed by animals; natural yellow and red staining in walls; stepped rocky floor; animal scats and bones present; situated in scarp overlooking Mona Creek 50m to south-west; Haglund recorded 8 small quartz flakes but these were not observed during 2017 recording.
MGA Easting	754612
MGA Northing	6439738

5.3 Discussion

The results of the survey conducted for the present investigation are discussed below, including the potential integrity of the evidence, nature of the evidence and interpretations of the evidence.

5.3.1 Integrity of Evidence

The integrity of the identified sites and the remainder of the area surveyed can primarily be assessed for surface evidence only through examination of land use impacts. Controlled excavation enables integrity to be assessed through the horizontal and vertical distribution of artefacts and by conjoining items.

As discussed in Section 2, recent non-Aboriginal land-use practices have had a generally low impact on the investigation area. Levels of ground disturbance were recorded during the survey, after McDonald *et al* (1984) (Appendix 1). The survey areas typically exhibited low levels of ground disturbance (88% of the total area surveyed).

The open artefact sites tended to be located in exposures where minimal vegetation was present, with five exhibiting moderate or high levels of impacts, four low to moderate impacts, and six low levels of impacts. At most sites and locations, but particularly in deeper terrace deposits adjacent to Mona Creek, should sub-surface deposits of artefacts occur they may exhibit reasonable integrity. At the rock shelter site ID# 187, disturbance levels to the shallow deposit were high, negating the potential for a deposit of research value.

5.3.2 Lithic Assemblage

A total of 77 lithic items were recorded during the survey. These items are listed for each site in Appendix 2 and summarised in Table 5. Almost half of these items were recorded in the larger open artefact site ID# 1605 (37 artefacts).

In terms of stone materials, consistent with assemblages from the locality (for example, the overall Ulan assemblage of Kuskie 2009 of over 9,000 artefacts), the combined assemblage is overwhelmingly dominated by quartz (including crystal quartz; 70% of the combined assemblage), with lower frequencies of other materials such as tuff, acidic volcanic, chert, porphyritic rhyolite and silcrete.

In terms of artefact types, consistent with assemblages from the locality (for example, the overall Ulan assemblage of Kuskie 2009), the combined assemblage is overwhelmingly dominated by flakes (32.5%), flake portions (14.3%), lithic fragments (14.3%), cores (22.1%) and core fragments (6.5%). These items may represent the fragmented debris of on-site knapping of primary flakes and/or microblades or other on-site fracture, such as accidental breakage, or accidental discard. Other items identified in low frequencies included microblade cores, microblade portions, a backed artefact portion, a utilised flake and retouched flakes/pieces.

Table 5: Summary of stone artefacts recorded during the present heritage survey.

Lithic Item Type	Stone Material							Total
	acidic volcanic	chert	crystal quartz	porphyritic rhyolite	quartz	silcrete	tuff	
backed artefact tip					1			1
core	3	1	2		6	1		13
core fragment			1		4			5
flake	3		1	3	15		3	25
flake - distal					3			3
flake - longitudinal					4		1	5
flake - proximal					3			3
lithic fragment					9		2	11
microblade - medial					2			2
microblade core							2	2
pebble core		2			2			4
retouched flake					1			1
retouched piece							1	1
utilised flake							1	1
Total	6	3	4	3	50	1	10	77

5.3.3 Spatial Distribution and Site Interpretation

The spatial distribution of evidence identified during the survey can be examined, particularly in relation to environmental variables such as slope and landform element. However, the inferences that can be made from this comparison are limited by the very small nature of the samples.

Overall, artefacts in open contexts in the surveyed area occur at a very low mean density of 0.004 artefacts per square metre of effective survey coverage (refer to Table 2). The spatial distribution and nature of evidence is largely consistent with background discard, manuport and artefactual material which is insufficient either in number or in association with other material to suggest focused activity in a particular location (*cf.* Kuskie and Kamminga 2000).

Very few sites or artefacts were identified in the north-eastern corner of the Project Approval area, which is consistent with the occupation model given the absence of higher order water sources. A number of sites and artefacts (but at a generally low density) were identified in the north-western portion of the Project Approval Area around Mona Creek, where depositional factors and vegetation have probably acted to bury and obscure artefact evidence.

In general terms, the artefact density indicates a generally low-intensity utilisation of the surveyed areas, comparable to the low mean density of 0.02 per square metre of effective survey coverage within the broader UCML analysis area (Kuskie 2009).

Although the identified open artefact evidence probably only represents a fraction of the artefact resource that is present within the investigation area, because the majority of evidence is likely to be currently obscured by vegetation and soil (*cf.* Kuskie 2009), much of the surveyed area is located in contexts that do not conform to primary or secondary resource zones under the model of occupation. These areas are generally distant from higher order watercourses, where more reliable potable water and subsistence resources would have been available, and/or of moderate to steep gradient. As such, rather than having represented focused occupation, Aboriginal use of these portions of the surveyed area is therefore more likely to have related to hunting and gathering activities, along with transitory movement between locations and procurement of stone materials, and would have been of a generally low intensity.

However, part of the north-western portion of the surveyed area is traversed by the higher order watercourse of Mona Creek, and in the past, some retention of water in ponds may have occurred and a second resource zone may have been available. The largest open artefact sites are situated in this area. Occupation of this area may have included camping by small parties of hunters/gatherers and nuclear/extended family groups, in addition to hunting and gathering and transitory movement.

The open artefact evidence identified during the survey is consistent with the occupation model for the locality (refer to Kuskie 2009). The inferences that can be made about the nature of occupation at the sites are limited by the small nature of the sample.

In general terms, the nature of occupation within the surveyed area could represent a variety of circumstances as outlined in detail in Section 3.4, particularly transitory movement between locations, hunting and gathering activities, and possibly camping by small parties of hunters/gatherers and nuclear/extended family groups along Mona Creek. The evidence at particular locations could represent single or multiple episodes of one or more of the above types of occupations. The episodes of occupations could have occurred at different times over the entire time-span of occupation in the region. Each episode of occupation could also have been for a different duration of time (refer to Kuskie 2009).

5.3.4 Regional Context

The nature of the evidence from the surveyed area can be compared with other evidence from the Ulan locality and the wider region (refer to Kuskie 2009: Section 7.8). The primary purpose is to identify similarities and differences with other reported evidence, in order to provide a framework for interpreting representativeness and assessing potential cumulative impacts.

Several primary similarities have been identified with other survey results in the locality including the:

- ❑ Occurrence of similar open artefact sites and rock shelter sites in similar topographical contexts;
- ❑ Similar stone material and artefact types;
- ❑ Generally low artefact numbers and densities; and
- ❑ Presence of evidence in similar environmental contexts, including landform elements and gradients.

The extent of any feasible comparison is limited by the small nature of the sample obtained from the present survey.

The evidence from the surveyed area is typical of that from the Ulan locality. No specific aspects of the evidence appear to be rare or unusual or not replicated elsewhere within a local or regional context.

5.3.5 Reassessment of Predictive Model

In view of the survey results, the predictive model of site location for the surveyed area (refer to Section 3.4) can be reassessed in relation to the areas within the sampled zone that were not directly inspected. The predictions for the areas within the broader subsidence impact zone that have not been surveyed to current standards, or were not directly sampled during the survey, remains unchanged (refer to Section 3.4 and Kuskie 2009).

The potential for bora/ceremonial, carved tree, scarred tree, rock engraving, rock shelter and stone arrangement sites to occur within the portions of the surveyed area that have not been directly sampled can be reassessed as very low or negligible (generally consistent with the conclusions of Kuskie 2009 for the much larger Ulan study area) given the comprehensive nature of the survey and/or the relatively obtrusive nature of these site types.

No direct evidence of lithic procurement sites was identified, however the potential for casual, opportunistic procurement of stone, such as quartz, from colluvial gravels within the surveyed area cannot be discounted.

No evidence was encountered of burial sites, and although the potential for skeletal remains to occur within the surveyed area is considered to be very low, it cannot be discounted.

Areas of exposed sandstone bedrock were identified within the surveyed area and widely sampled for the presence of grinding grooves. The potential for open grinding groove sites to occur can be revised downward to very low, but cannot be discounted in areas that were not directly sampled or are currently obscured by sediment or vegetation/leaf litter.

Sites of traditional cultural significance (such as mythological sites) were not identified by the Aboriginal representatives involved in the investigation. The Aboriginal stakeholders also did not disclose any specific knowledge of other cultural values/places (for example, historically known places or resource use areas). Although the possibility cannot be excluded that traditional or historical Aboriginal values or associations may exist that were not divulged by the persons consulted, this potential is reassessed as low. The Aboriginal stakeholders did identify contemporary values/associations with the investigation area and previously recorded values have been reported by Haglund (1999a) and Kuskie (2009).

A number of open artefact sites were identified within the surveyed area. There remains potential for additional open artefact evidence to occur in the areas that were not directly sampled or are currently obscured by vegetation, consistent with the predictions in Section 3.4 and Kuskie (2009). In most of the surveyed area, this evidence is likely to comprise a low to very low density sub-surface deposit of artefacts, consistent with the survey results and occupation model and generally representing background discard, although a low frequency of activity areas (with consequent higher artefact density) may be present. However, around Mona Creek (for example, in the vicinity of sites ID# 1604-1607 and 1609-1610 and survey areas 2028-2032) there is a moderate to high potential for numerous more artefacts and sub-surface deposits, including deposits that may be of research value.

6. ABORIGINAL CONSULTATION

The investigation area lies within the boundaries of the Mudgee Local Aboriginal Land Council (Mudgee LALC) and within an area of interest to other Aboriginal persons and organisations.

The Aboriginal heritage impact assessment for the UCCO Project involved a program of consultation with the Aboriginal community that complied with the *Interim Community Consultation Requirements for Applicants* (DEC 2004) policy requirements of the OEH that were introduced on 1 January 2005 and were applicable to the Project (refer to Kuskie 2009: Section 8 and Appendix 6 for full details).

Substantial and ongoing additional consultation has been undertaken with the Aboriginal community after completion of the UCCO Project EA in accordance with the approved UCML HMP (refer to Section 3).

Consultation with the registered Aboriginal stakeholders (Warrabinga Native Title Claimants Aboriginal Corporation, North East Wiradjuri Company Ltd, Mudgee Local Aboriginal Land Council, Murong Gialinga Aboriginal and Torres Strait Islanders Corporation and Warranha Ngumbaay) for the UCCO Project has continued for the proposed Modification in accordance with the approved UCCO Project and Section 3.1 of the approved HMP, with WVVAC also being consulted as an additional interested organisation as part of wider consultation separate to the HMP requirements.

Key aspects of the HMP relevant to this assessment of the proposed Modification include:

- HMP Section 3.1: *UCML will provide the registered Aboriginal stakeholders with details of the proposed methodology of any forthcoming archaeological survey, salvage collection or excavation (where that methodology is different from that already approved by the stakeholders for the Continued Operations Project or in this Plan) and allow a minimum of 15 working days to provide comment, including identification of issues or areas of cultural significance that might affect, inform or allow refinement of the methodology. UCML will document and take into account all comment provided by the registered Aboriginal stakeholders and identify how these comments were considered in finalising the methodology.*
 - The survey methodology was the same as implemented for the UCCO Project (Kuskie 2009) and as such, additional consultation in relation to the methodology was not required. All stakeholders, along with the WVVAC, were informed of the proposed Modification by correspondence and by meeting and their input was invited (refer to Appendix 4).
- HMP Section 3.1: *UCML will engage representatives of the registered Aboriginal stakeholders to participate in any archaeological survey, collection, excavation or monitoring required under this Plan. UCML may engage registered Aboriginal stakeholders through a competitive selection process involving criteria such as demonstrated qualifications in cultural heritage, skills or experience in the conduct of heritage studies in the local area, specific cultural knowledge of the Project area and/or ability to report the results to the broader Aboriginal community, consistent with Part C of the Interim Community Consultation Requirements for Applicants Policy (DEC 2004).*
 - All stakeholders, along with the WVVAC, were invited to attend the field survey. Representatives of each organisation attended on a daily basis for each of the four days of the field survey (31 July to 3 August 2017), as documented in the consultation database in Appendix 4.

- HMP Section 3.1: *UCML will provide the registered Aboriginal stakeholders engaged for any field investigation with a minimum of five working days notice of the date of commencement of the field investigation, unless a shorter period is agreed to by the engaged stakeholders. UCML will provide safe access to the investigation area and induct representatives to an appropriate level for Occupational Health and Safety purposes.*
 - All stakeholders, along with the WVVAC, were informed of the starting date of the survey with at least five working days notice, and access was facilitated by UCML personnel (refer to Appendix 4).
- HMP Section 3.1: *The registered Aboriginal stakeholders will provide suitably qualified and/or experienced representatives to participate in any archaeological survey, collection, excavation or monitoring required under this Plan. The representatives will comply with all requirements of UCML at all times when in the Project area.*
 - The registered Aboriginal stakeholders and WVVAC provided suitably experienced representatives to participate in the survey and complied with UCML requirements.
- HMP Section 3.1: *UCML will ensure that any heritage reports produced under this Plan that require the review and input of the registered Aboriginal stakeholders (for example, further investigations as set out in Section 3.7 of this Plan) are distributed in a draft format to the registered Aboriginal stakeholders for review where specified in this Plan, with a minimum 15 working days allowed for comment. Final heritage reports would be prepared that address and incorporate any input received within the specified timeframe from the registered Aboriginal stakeholders.*
 - A draft version of this report was forwarded to the Aboriginal stakeholders, along with the WVVAC, and a minimum 15 working days allowed for comment. A final report has been prepared that incorporated and addressed input received from the Aboriginal stakeholders (refer to Table 6 and Appendix 4).
- HMP Section 3.1: *UCML will provide the registered Aboriginal stakeholders with final hard copies of all heritage reports produced under this Plan (for example, in relation to further investigations in Section 3.7) within 30 working days of the completion of the report.*
 - Copies of the final heritage assessment report will be provided to the registered Aboriginal stakeholders, along with the WVVAC, within 30 working days of completion.
- HMP Section 3.7.7: *Where the alterations to the underground mine plan are proposed in areas already subject to heritage survey sampling (consistent with the methodology and standards in the EA; Kuskie 2009), this will involve an assessment of potential subsidence impacts by a qualified subsidence expert and reconsideration of the management strategies for relevant identified sites presented in Appendix 2 of this Plan by an appropriately qualified and experienced archaeologist, in consultation with the registered Aboriginal stakeholders.*
 - Potential subsidence impacts on relevant Aboriginal sites have been assessed (refer to Section 9 of this report) and consultation with the Aboriginal stakeholders, along with the WVVAC, has occurred through provision of a draft version of this report for comment.

- HMP Section 3.7.7: *Where the alterations to the underground mine plan or open cut mine plan are proposed in areas that have not been subject to heritage survey sampling (consistent with the methodology and standards in the EA; Kuskie 2009), the procedures outlined in Section 3.7.5 of this Plan will be implemented.*
 - A detailed survey was undertaken by appropriately qualified and experienced archaeologists from South East Archaeology and representatives of the Aboriginal stakeholders of a portion of the area that had not been subject to heritage survey to current standards within the increased zone of potential subsidence impacts. Portions of the remainder of the area to which the proposed Modification relates were subject to heritage survey to current standards during the UCCO Project (Kuskie 2009). In accordance with Sections 3.7.7, 3.7.4 and 3.7.5 of the HMP, the remaining areas within the zone of potential subsidence impacts that have not been surveyed to current standards will be surveyed prior to any impacts occurring in accordance with Section 3.7.5 of the approved HMP.

- HMP Section 3.7.7: *A report will be prepared with reference to the DEC Aboriginal Heritage Standards and Guidelines Kit (1997) and the requirements of this Plan and where relevant, DP&I, documenting the results of any heritage assessment of future proposed alterations to the underground mine plan or open cut mine plan or Approved Project. Any draft reports will be distributed to the registered Aboriginal stakeholders for review, with a minimum 15 working days allowed for comment. Final heritage reports would be prepared that address and incorporate any input received within the specified timeframe from the registered Aboriginal stakeholders. Hard copies of any final reports will be distributed to the registered Aboriginal stakeholders, DP&I and OEH within 30 working days of completion (refer to Section 5.5 of this Plan).*
 - This report has been prepared in accordance with the requirements of the HMP and consistent with the *Aboriginal Heritage Standards and Guidelines Kit* (DEC 1997), documenting the results of this assessment of the proposed Modification. A draft version of this report was forwarded to the Aboriginal stakeholders and a minimum 15 working days was allowed for comment. A final report has been prepared that incorporates input received from the Aboriginal stakeholders (refer to Table 6 and Appendix 4). Copies of the final heritage assessment report will be provided to the registered Aboriginal stakeholders, along with the WVVAC, within 30 working days of completion.

All registered stakeholders, along with the WVVAC, were invited to attend (and all participated in) a Heritage Review Meeting on 3 August 2017 to discuss the proposed Modification and proposed changes to the mine plan (refer to Appendix 4). All registered stakeholders, along with the WVVAC, were invited to attend another Heritage Review Meeting on 9 November 2017, to further discuss the proposed Modification and receive information about the progress of the assessment (refer to Appendix 4). Representatives of Warrabinga, NEWCO, MGATSIC, Mudgee LALC and WVVAC attended.

All registered parties were provided the draft version of this report on 15 February 2018 with an invitation to comment. Comments were received from two stakeholders prior to finalisation of the report on 20 March 2018, both supporting the findings and recommendations (refer to Section 6 and Appendix 4).

Correspondence received from the Aboriginal stakeholders is included in Appendix 4. Issues raised by the stakeholders during the course of the assessment and subsequent consultation and how they have been addressed are outlined in Table 6. Each issue number has been noted on correspondence provided by the stakeholder in Appendix 4.

Table 6: Summary of Aboriginal stakeholders key comments and how they have been addressed by the proposed Modification.

Issue #	Issue	Raised by	Modification Team Response
1	Provided response to draft heritage report agreeing with findings and recommendations.	Brad Bliss, WVVAC (23/2/18)	Noted.
2	Provided response to draft heritage report agreeing with findings and recommendations.	Debbie Foley, MGATSIC (19/3/18)	Noted.

7. SIGNIFICANCE ASSESSMENT

7.1 Criteria

The information contained within this report, along with an assessment of the significance of the Aboriginal heritage evidence, provides the basis for informed decisions to be made regarding the management and degree of protection which should be afforded to specific Aboriginal heritage sites.

Consistent with the UCCO Project (Kuskie 2009), the significance of Aboriginal heritage evidence has been assessed along the following criteria, widely used in Aboriginal heritage management and derived from the relevant aspects of the International Council on Monuments and Sites (ICOMOS) *Burra Charter*:

- I. Scientific (Archaeological) value;
- II. Importance to Aboriginal people (Cultural value);
- III. Educational value;
- IV. Historic value; and
- V. Aesthetic value.

Greater emphasis is generally placed on scientific and cultural criteria when assessing the significance of Aboriginal heritage evidence in Australia.

Scientific (Archaeological) Value:

Scientific value refers to the potential usefulness of heritage evidence to address further research questions, the representativeness of the evidence, the nature of the evidence and its state of preservation.

Research Potential:

Research potential refers to the potential for information derived from further investigation of the evidence to be used for answering current or future research questions. Research questions may relate to any number of issues concerning past human culture, human behaviour generally or the environment. Numerous locations of heritage evidence have research potential. The critical issue is the threshold level, at which the identification of research potential translates to significance/importance at a local, regional or national level.

Several key questions can be posed for each location of heritage evidence:

- Can the evidence contribute knowledge not available from any other resource?
- Can the evidence contribute knowledge, which no other such location of evidence can?
- Is this knowledge relevant to general questions about human history, past environment or other subjects?

Assessing research potential therefore relies on comparison with other evidence in local and regional contexts. The criteria used for assessing research potential include the:

- a) Potential to address locally specific research questions;
- b) Potential to address regional research questions;
- c) Potential to address general methodological or theoretical questions;
- d) Potential deposits; and
- e) Potential to address future research questions.

In terms of meeting a threshold level to have significant research potential, the particular questions asked of the evidence should be able to contribute knowledge that is not available from other resources or evidence (either on a local or regional scale) and are relevant to general questions about human history, past environment or other subjects.

Representativeness:

Representativeness is generally assessed at local, regional and national levels. It is an important criterion, because the primary goal of cultural resource management is to afford greatest protection to a representative sample of Aboriginal heritage evidence throughout a region. The more unique or rare evidence is, the greater its value as being representative within a regional context.

The main criteria used for assessing representativeness include:

- a) The extent to which the evidence occurs elsewhere in the region;
- b) The extent to which this type of evidence is subject to existing or potential future impacts in the region;
- c) The integrity of the evidence compared to that at other localities in the region;
- d) Whether the evidence represents a prime example of its type within the region; and
- e) Whether the evidence has greater potential for educational or demonstrative purposes than at other similar localities in the region.

Nature of Evidence:

The nature of the heritage evidence is related to representativeness and research potential. The less common the type of evidence is, the more likely it will have representative value. The nature of the evidence is directly related to its potential to be used in addressing present or future research questions. Criteria used in assessing the nature of the evidence include the:

- a) Presence, range and frequency of stone materials;
- b) Presence, range and frequency of artefact types; and
- c) Presence and types of other features.

A broader range of stone and artefact types generally equates to the potential for information to address a broader range of research questions. The presence of non-microlith and microlith tool types also equates to higher potential to address relevant research questions. The presence and frequency of particular stone or artefact types or other features also has relevance to the issue of representativeness (for example, a rare type may be present).

Integrity:

The state of preservation of the evidence (integrity) is also related to representativeness and research potential. The higher the integrity of evidence, the greater the level of scientific information likely to be obtained from its further study. This translates to greater importance for the evidence within a local or regional context, as it may be a suitable example for preservation within a sample representative of the entire cultural resources of a region.

The criteria used in assessing integrity include:

- a) Horizontal and vertical spatial distribution of artefacts;
- b) Preservation of intact features such as midden deposits, hearths or knapping floors;
- c) Preservation of site contents such as charcoal and shell which may enable accurate direct dating or other analysis; and
- d) Preservation of artefacts which may enable use-wear/residue analysis.

Generally, many of these criteria can only be applied to evidence obtained by controlled excavation. High levels of ground disturbance limit the possibility that the evidence would surpass the threshold of significance on the basis of integrity (ie. the area would be unlikely to possess intact spatial distributions, intact features, *in situ* charcoal or shell, etc).

Aboriginal (Cultural) Significance:

Aboriginal (cultural) significance refers to the value placed upon Aboriginal heritage evidence by the local Aboriginal community.

All heritage evidence tends to have some contemporary significance to Aboriginal people, because it represents an important tangible link to their past and to the landscape. Heritage evidence may be part of contemporary Aboriginal culture or be significant because of its connection to spiritual beliefs or as a part of recent Aboriginal history.

Consultation with the local Aboriginal community is essential to identify the level of Aboriginal significance.

Educational Value:

Educational value refers to the potential of heritage evidence to be used as an educational resource for groups within the community.

Historic Value:

Historic value refers to the importance of heritage evidence in relation to the location of an historic event, phase, figure or activity.

Aesthetic Value:

Aesthetic value includes all aspects of sensory perception. This criterion is mainly applied to art sites or mythological sites.

7.2 Significance of Heritage Evidence Within the Proposed Modification Investigation Area

The significance of the 1,005 recorded Aboriginal heritage sites or PADs within the UCCO Project study area (ie. those sites/PADs that were potentially subject to impacts at the time of the UCCO Project EA and required further management consideration) was assessed in relation to the criteria presented in Section 7.1 (refer to Section 9.2 and Appendix 4 of Kuskie 2009 and Appendix 2 of the HMP). A number of these sites are relevant to the proposed Modification. The significance of these sites is addressed by Kuskie (2009) and not repeated here (refer also to Appendix 2 of the HMP).

The significance of the Aboriginal heritage sites, cultural areas/values and PADs within or immediately adjacent to the Modification investigation area that were recorded during the present survey or are now within the potential impact area of the proposed Modification (but were not within the UCCO Project impact area and therefore were not considered further in that assessment) has been assessed in relation to the criteria presented in Section 7.1, consistent with the assessment undertaken for the UCCO Project (Kuskie 2009). The significance assessment is presented for each of these sites in Table 7.

The significance assessment involves ratings of 'low', 'low-moderate', 'moderate', 'moderate-high' and 'high'. Key criteria are included in Table 7.

It is noted that all Aboriginal heritage is of interest and contemporary value to the Aboriginal community. Aboriginal heritage evidence represents a tangible link with the traditional past and with the lifestyle and values of community ancestors. The Aboriginal community themselves are in the best position to identify the levels of cultural significance and the stakeholders have been invited throughout the course of the assessment, the field investigation and stakeholder meetings to provide input into the cultural significance of the specific sites and areas.

The response of several Aboriginal stakeholders is that all identified sites and cultural values, along with the Modification area itself, are of cultural significance (refer to Table 7 and Appendix 4). Some Aboriginal stakeholders are reluctant to engage in any comparative or ranking process (as is inherent within any system of significance assessment) and prefer to identify all sites and the investigation area as being of cultural significance. Nevertheless, a specifically high value has been noted for the Mona Creek locality and associated large sandstone formations in the vicinity of sites ID# 180-187 (MC 23-30).

The key conclusions of the significance assessment are presented below for each site type. In overall terms, 56.2% of the sites are assessed as being of low significance within a local context (compared with 74.8% for the much larger sample of 1,005 sites assessed in the UCCO Project), with 12.5% of sites assessed as being of low to moderate or 'low to possibly moderate' significance (compared with 10.7% for the overall UCCO Project), 12.5% of moderate or 'possibly moderate' significance (6.3% for the overall UCCO Project), 18.8% of moderate to high or 'moderate to possibly high' or 'possibly moderate to high' significance (4.9% for the overall UCCO Project) and nil of high significance (3.3% for the overall UCCO Project) (refer to Table 7).

It is noted that if occupation deposits were to be identified through controlled excavation in rock shelters or open contexts that relate to occupation earlier than the mid-late Holocene period (older than say 5,000 years BP), these sites may rate as being of regional significance.

Artefact Scatters and Isolated Finds

Three of the open artefact occurrences (ID# 1604, 1605 and 1606) are assessed as being of potentially moderate to high significance within a local context, due to their location in low gradient contexts adjacent to the higher order Mona Creek and consequent high research potential, notwithstanding vegetation cover and the depositional context tended to limit the number of artefacts exposed and therefore recorded during the survey. Two of the open artefact occurrences (ID# 796 and 1607) are assessed as being of potentially moderate significance, two (ID# 1609 and 1610) as being of low to potentially moderate significance, and the remaining eight open artefact sites as being of low significance (refer to Table 7).

Artefact scatters and isolated artefacts are common occurrences throughout the region and are therefore generally of low representative value. The sites tended to be of lower significance if levels of ground disturbance were high (and therefore the integrity of any evidence low), there was a limited range and nature of artefact evidence, and/or the potential for deposits of research value was low. Artefact occurrences tended to be of higher significance if the site integrity was high and there was a higher potential for deposits of research value, a broad range and nature of evidence was present, and/or rare or unusual types were present.

Research potential relates to the probability that the sites contain sub-surface deposits that may yield evidence useful in addressing locally relevant research questions, such as those relating to occupation patterns or stone technology. This was assessed in relation to the detailed model of occupation presented by Kuskie (2009) and thus assumes that deposits of higher research potential will generally be located where more focused occupation has occurred, such as in the primary and secondary resource zones. As discussed in Section 5 and by Kuskie (2009), the occurrence of these contexts within present survey areas is confined to the vicinity of Mona Creek.

Rock Shelters with Artefacts and/or PADs

One rock shelter site (ID# 187) was located in the surveyed area and is assessed singularly as being of low significance within a local context, due to the very shallow potential deposit and low levels of integrity (refer to Table 7). However, this site forms the western extent of the Mona Creek 23-30 complex of sites (ID# 180-187), for which the UCCO Project Approval conditions (and consequently Section 3.4 of the HMP) specify that impacts will continue to be avoided. Detailed recording of these sites (and subsequently assessment of their significance) is unlikely to occur unless UCML obtains access to the land on which they are situated. If that occurs, UCML is committed to giving consideration to the dedication of a Conservation Area around these sites.

The research potential of rock shelters was one of the primary criteria used in assessing their significance, as there can be stratified deposits with datable cultural evidence (potentially extending back many thousands or even tens of thousands of years) and typically, due to sedimentation processes or other visibility constraints, any evidence visible on the surface of the shelter floor does not necessarily provide an accurate indication of the nature of the buried deposits.

The research potential and significance of the rock shelter sites at UCML are assessed with reference to various criteria, including:

- 1) Size of the habitable floor area: A larger habitable floor area (the floor area of a rock shelter where the ceiling height is about one metre or more) equates to higher potential, as family groups may have been accommodated, a broader range of activities performed, and overnight camps and stays of longer duration been more feasible. Conversely, a small floor area limits the potential to short-duration/low-intensity activities such as people having sought temporary shelter from adverse weather;
- 2) Internal roof height: A low internal roof height (eg. less than standing height) is inferred to have reduced the attractiveness of a shelter for occupation of any more intensity than temporary shelter from adverse weather;
- 3) Nature of artefacts (count, density, range, specific types): As with artefact sites, a broader range and nature of evidence, including less common or rare items, is an indicator of higher potential and significance. However, due to site formation processes and factors influencing the visibility of items on the current shelter floors, the absence of evidence or a limited range of visible evidence is not taken to be a factor that lowers the level of significance;
- 4) Depth of deposit: The deeper the deposit within a rock shelter, the higher the potential for stratification and spatially (vertically) separate evidence of discrete episodes of occupation from different time periods. Hence, a deeper deposit equates to higher potential and a shallower deposit equates to lower potential;
- 5) Extent of potential deposit: A larger PAD, including often in areas marginally forward of the dripline, equates to higher potential, whereas a smaller PAD equates to lower potential;
- 6) Complexity (presence of grooves and/or art): The presence of grooves and/or art adds to the range of activities performed in a shelter and equates to higher significance and possibly research potential;
- 7) Proximity to potable water: The topographic context of each shelter was considered, particularly proximity to potable water, especially higher order watercourses (refer to the detailed model of occupation presented by Kuskie (2009), which assumes that deposits of higher research potential will generally be located where more focused occupation has occurred, such as in the primary and secondary resource zones); and
- 8) Potential integrity: Although problematic to assess in the absence of controlled hand excavation, where low integrity was inferred (typically due to shallow deposits and clear evidence of extensive animal activity, such as wombat burrows, and/or erosion) this typically negates most other criteria and equates to low research potential and low significance.

Rock shelter sites of low significance at UCML typically have small habitable floor areas and/or potential deposits, occasionally with shallow deposits and/or low internal roof heights. Consequently they have low research potential. Such shelters may not even have been used by Aboriginal people (in the case of PADs where evidence is not visible), or if occupied, may only have been for short-duration/low-intensity activities, such as the seeking of temporary shelter from adverse weather. However, without excavation of a sample from a shelter, where artefacts are not visible it cannot be stated that the shelter was not occupied by Aboriginal people, nor can the nature and resulting evidence of any occupation be known.

Rock shelter sites of moderate or high potential often have no obvious substantial ground disturbance (ie. most or all of the PAD appears relatively intact, albeit that integrity can only fully be clarified through controlled excavation of deposits) and have moderate to large habitable floor areas and potential deposits, often with moderate or deep deposits. Often low internal roof heights are not a constraint in shelters of moderate or high significance. For some shelters, the presence of other features such as art adds to the level of significance. The level of significance is also enhanced for shelters where a broad range and nature of evidence is present, and/or rare or unusual types are present. Shelters of moderate to high significance are more likely to have been occupied by groups of people, for overnight or longer stays, and been used for a wider range of activities than just temporary shelter from adverse weather.

Nevertheless, as noted above, in any shelter irrespective of the assessed level of potential, this factor can only be adequately assessed through controlled excavation. Without excavation, the nature of any evidence present in sub-surface deposits cannot be adequately identified. Controlled excavation of any shelter may lead to a revision of the assessment of significance, either upward (in the case of a shelter where deposits of higher research value than anticipated are revealed) or downward (in the case of a shelter where anticipated deposits of research value do not exist or are in a state of low integrity).

Other Cultural Values

No sites or places associated with ceremonies, spiritual/mythological beliefs or traditional knowledge, which date from the pre-contact period and have persisted until the present time, or places associated with historical associations which date from the post-contact period and are remembered by people today, were identified within the study area.

However, as documented above, the physical manifestations of evidence of past occupation (Aboriginal objects or archaeological/heritage sites) are generally of contemporary significance to the Aboriginal community, as they represent a tangible link with the traditional past and with the lifestyle and values of community ancestors.

The representatives also disclosed a number of associations with the surveyed area of contemporary cultural significance, including:

- In general terms, the use of subsistence or other resources, with comments made about the presence of various native flora and fauna where observed. These comments were not of a historical nature (ie. did not relate to plant and animal resource use areas known from the post-contact period) but rather were general observations of the occurrence of particular species and their known traditional uses (eg. for food, medicine, tools, etc.);
- In general terms, the traditional use of the area by north-eastern Wiradjuri people, and an ongoing cultural and spiritual connection to the land and resources of the study area by the north-eastern Wiradjuri; and
- In relation to the forested sandstone formations (survey area 2034) adjacent to the higher order Mona Creek, in the locality of rock shelters MC 23-30 (ID# 180-187), the Aboriginal stakeholders expressed a strong spiritual and cultural connection with this locality.

In general terms, the attachment of the north-eastern Wiradjuri people to the landscape and continuing strong cultural connections with the locality of the study area was evident. As noted by Goulding (2002:63), land is a fundamental part of Aboriginal culture and such cultural connections are integral to the health and wellbeing of Aboriginal people, which can be complex and is not always obvious to others.

Table 7: Significance assessment of Aboriginal sites, cultural areas/values and potential archaeological deposits within the Modification investigation area that have not been reported on previously (for example, by Kuskie 2009).

Ulan ID#	Site Name	Site Type	Significance					
			Overall	Archaeological / Scientific	Aboriginal / Cultural ¹⁰	Aesthetic	Educational	Historic
187	MC30	rockshelter with artefacts	low	low (relatively large habitable floor area but very shallow PAD of low integrity; low research potential; part of MC23-30 complex of sites)	high	moderate	low	nil
554	MC70	isolated find	low	low (isolated, but less common type - axe; low integrity; low potential)	high	low	low	nil
796	MC308	artefact scatter	potentially moderate	potentially moderate (moderate to high potential, but limited range of evidence; partially salvaged)	high	low	low	nil
1601	CU78	artefact scatter	low	low (common; limited range of evidence; low potential)	high	low	low	nil
1602	CU79	isolated find	low	low (common; isolated; low potential)	high	low	low	nil
1603	MC345	artefact scatter	low	low (common; limited range of evidence; moderate to low integrity; low potential directly at site; on 4th order Mona Creek)	high	low	low	nil
1604	MC346	isolated find	potentially moderate-high	potentially moderate-high (high potential, but limited range of evidence; on 4th order Mona Creek)	high	low	low	nil
1605	MC347	artefact scatter	potentially moderate-high	potentially moderate-high (low integrity for identified evidence but high in adjacent deposits; high potential in adjacent less disturbed areas; modest range of evidence; on 4th order Mona Creek)	high	low	low	nil
1606	MC348	artefact scatter	potentially moderate-high	potentially moderate-high (lower integrity for identified evidence but high in adjacent deposits; high potential in adjacent less disturbed areas; on 4th order Mona Creek)	high	low	low	nil

¹⁰ Several Aboriginal stakeholders have expressed the view that all of the sites/places are of high cultural significance (ie. high importance) and make no differentiation on the comparative level of value between any site or place. This is acknowledged and respected.

Table 7 (continued):

Ulan ID#	Site Name	Site Type	Significance					
			Overall	Archaeological / Scientific	Aboriginal / Cultural	Aesthetic	Educational	Historic
1607	MC349	artefact scatter	potentially moderate	potentially moderate (lower integrity for identified evidence but high in adjacent deposits; high potential in adjacent less disturbed areas; limited range of evidence; on 4th order Mona Creek)	high	low	low	nil
1608	MC350	artefact scatter	low	low (common; low potential)	high	low	low	nil
1609	MC351	artefact scatter	low - potentially moderate	low - potentially moderate (low to possibly moderate research potential; limited range of evidence; near 4th order Mona Creek)	high	low	low	nil
1610	MC352	isolated find	low - potentially moderate	low - potentially moderate (low to moderate research potential; limited range of evidence but less common item; near 4th order Mona Creek)	high	low	low	nil
1611	MC353	artefact scatter	low	low (common; low potential)	high	low	low	nil
1612	MC354	artefact scatter	low	low (common; low potential)	high	low	low	nil
1613	MC355	isolated find	low	low (common; isolated; low potential)	high	low	low	nil
1614	MC356	isolated find	low	low (common; isolated; low potential)	high	low	low	nil
	Modification Surveyed Area	cultural area/value	low - high	n/a	high	low	low	nil
	Use of subsistence and other resources	cultural area/value	low	n/a	high	low	low	nil
	Sandstone formations adjacent to 4th order Mona Creek (survey area 2034) in locality of MC23-30 (ID# 180-187)	cultural area/value	high	high (part of MC23-30 cluster of rock shelters in forested sandstone cliffs bordering higher order Mona Creek)	high	high	low	nil
	Contemporary significance of Aboriginal objects	cultural area/value (refer above to individual sites)						

8. STATUTORY OBLIGATIONS

Commonwealth, State and local legislation relevant to the protection and management of Aboriginal heritage is outlined in the sections below. The investigation area does not contain any heritage items listed for indigenous values under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) or *Aboriginal and Torres Strait Islander Heritage Protection Act 1984* or *NSW Heritage Act 1977*, but it does contain Aboriginal objects protected under the *NSW National Parks and Wildlife Act 1974*.

8.1 Commonwealth

While the primary legislation offering protection to Aboriginal heritage in NSW is enacted by the State (refer to Section 8.2), several Acts administered by the Commonwealth may also be relevant.

Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act):

The EPBC Act is the primary Commonwealth legislation for the protection and management of matters of national environmental significance, which includes heritage places. The primary features of the EPBC Act relating to heritage include:

- ❑ A National Heritage List of natural, indigenous and historic places of national heritage significance;
- ❑ A Commonwealth Heritage List of heritage places owned or managed by the Commonwealth; and
- ❑ Consideration of heritage in the planning and development approvals process.

Commonwealth Heritage places are protected in that:

- ❑ Actions taken on Commonwealth land which are likely to have a significant impact on the environment will require the approval of the Minister;
- ❑ Actions taken outside Commonwealth land which are likely to have a significant impact on the environment on Commonwealth land, will require the approval of the Minister; and
- ❑ Actions taken by the Commonwealth Government or its agencies that are likely to have a significant impact on the environment anywhere will require approval by the Minister.

Australian Government agencies that own or lease heritage places are required to assist the Minister and the Australian Heritage Council to identify and assess the heritage values of these places. They are required to:

- ❑ Develop heritage strategies;
- ❑ Produce a register of the heritage places under their control;
- ❑ Develop a management plan to manage these places consistent with the Commonwealth Heritage Management Principles prescribed in regulations to the Act;
- ❑ Ensure the ongoing protection of the Commonwealth heritage values of the place when selling or leasing a Commonwealth heritage place; and
- ❑ Ask the Minister for advice about taking an action, if the action has, will have, or is likely to have, a significant impact on a Commonwealth heritage place.

The environmental assessment process of the EPBC Act protects matters of national environmental significance (including national heritage places), along with the environment where actions proposed are on, or will affect, Commonwealth land and/or where Commonwealth agencies are proposing to take an action. When a proposal is identified as having the potential to have a significant impact on a matter of national environmental significance, the proponent must refer the project to the Commonwealth Department of the Environment. The matter is made public and referred to the relevant state, territory and Commonwealth ministers for comment. The Minister then decides whether the likely environmental impacts of the project are such that it should be assessed under the EPBC Act. State governments may, under agreement with the Commonwealth, assess actions that may have an impact on matters of national environmental significance. Following assessment, the Minister or their delegate may approve the action (with or without conditions) or not approve the action.

Australian Heritage Council Act 2003:

The *Australian Heritage Council Act 2003* established the Australian Heritage Council, an independent expert body to advise the Minister on the listing and protection of heritage places and other matters relating to heritage. This Act also enabled until 19 February 2012 the continued management of the Register of the National Estate, a list of more than 13,000 heritage places around Australia that had been compiled by the former Australian Heritage Commission since 1976. The Register of the National Estate has now ceased to be a statutory list and is retained only as an archive of information. References to the Register of the National Estate have now been removed from the EPBC Act and *Australian Heritage Council Act 2003*.

Aboriginal and Torres Strait Islander Heritage Protection Act 1984:

The *Aboriginal and Torres Strait Islander Heritage Protection Act 1984* provides for the protection of areas and objects which are of significance to Aboriginal people in accordance with Aboriginal tradition. The Act allows Aboriginal people to apply to the Minister to seek protection for significant Aboriginal areas and objects. The Minister has broad powers to make such a declaration should the Minister be satisfied that the area or object is a significant Aboriginal area or object and is under immediate threat of injury or desecration. An 'emergency declaration' can remain in force for up to 30 days.

8.2 State

National Parks and Wildlife Act 1974 (NP&W Act):

The NP&W Act provides the primary basis for the legal protection and management of Aboriginal heritage in NSW. With respect to development proposals and planning approvals, the EP&A Act is the primary legislation.

Implementation of the Aboriginal heritage provisions of the NP&W Act is the responsibility of the OEH. The rationale behind the NP&W Act is to prevent the unnecessary or unwarranted destruction of Aboriginal objects and to protect and conserve objects where such action is considered warranted (DECCW 2009a, 2009b).

Section 2A of the Act, defines its objects to include 'the conservation of nature, including ...

- (b) the conservation of objects, places or features (including biological diversity) of cultural value within the landscape, including, but not limited to:
 - (i) places, objects and features of significance to Aboriginal people, and
 - (ii) places of social value to the people of New South Wales.

Section 2A also identifies that the objects of the Act are to be achieved by applying the principles of ecologically sustainable development, defined in Section 6 of the *Protection of the Environment Administration Act 1991* as requiring the integration of *economic* and *environmental* considerations (including cultural heritage) in the decision-making process.

In regard to Aboriginal cultural heritage, ecologically sustainable development can be achieved by applying the *principle of intergenerational equity* and the *precautionary principle* (DECCW 2009b).

Intergenerational equity is the principle whereby the present generation should ensure the health, diversity and productivity of the environment for the benefit of future generations. In terms of Aboriginal heritage, intergenerational equity can be considered in terms of the cumulative impacts to Aboriginal objects and places in a region. If few Aboriginal objects and places remain in a region, fewer opportunities remain for future generations of Aboriginal people to enjoy the cultural benefits of those Aboriginal objects and places. Information about the integrity, rarity or representativeness of the Aboriginal objects and places proposed to be impacted, and how they illustrate the occupation and use of land by Aboriginal people across the region, are therefore relevant to the consideration of intergenerational equity and the understanding of the cumulative impacts of a proposal (DECCW 2009b:26).

The precautionary principle states that if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing cost-effective measures to prevent environmental degradation. In applying the precautionary principle, decisions should be guided by (DECCW 2009b:26):

- A careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment; and
- An assessment of the risk-weighted consequences of various options.

The precautionary principle is relevant to the OEH's consideration of potential impacts to Aboriginal cultural heritage where:

- The proposal involves a risk of serious or irreversible damage to Aboriginal objects or places or to the value of those objects or places; and
- There is uncertainty about the Aboriginal cultural heritage values or scientific or archaeological values, including in relation to the integrity, rarity or representativeness of the Aboriginal objects or places proposed to be impacted (DECCW 2009b:26).

Where this is the case, the OEH instructs that a precautionary approach should be taken and all cost-effective measures implemented to prevent or reduce damage to the objects/place (DECCW 2009b).

With the exception of some artefacts in collections, the NP&W Act generally defines all Aboriginal objects to be the property of the Crown. The Act then provides various controls for the protection, management of and impacts to these objects. An 'Aboriginal object' is defined under Section 5(1) as:

'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'.

In practice, archaeologists generally subdivide the legal category of 'object' into different site types, which relate to the way Aboriginal heritage evidence is found within the landscape. The archaeological definition of a 'site' may vary according to survey objectives, however it should be noted that even single and isolated artefacts are protected as Aboriginal objects under the NP&W Act.

Under Section 89A of the NP&W Act, a person who is aware of the location of an Aboriginal object that is the property of the Crown or, not being the property of the Crown, is real property, and does not, in the prescribed manner, notify the Director-General thereof within a reasonable time after the person first becomes aware of that location is guilty of an offence against the Act unless the person believes on reasonable grounds that the Director-General is aware of the location of that Aboriginal object. The 'prescribed manner' is currently taken to be written notice in a form approved by the Director-General, being the Aboriginal Site Recording Forms available on the OEH website. Failure to comply with the requirements may result in a maximum penalty of 100 penalty units for an individual, and in the case of a continuing offence, a further 10 penalty units for each day the offence continues, with double the fines for a corporation.

Aboriginal places are defined as any place declared to be an Aboriginal place under Section 84 of the Act. Typically these are locations of 'special significance with respect to Aboriginal culture' (for example, traditional or historical cultural value to Aboriginal people), for which identified Aboriginal objects may not be present.

Section 86 of the NP&W Act specifies the offences and penalties relating to harming or desecrating Aboriginal objects and Aboriginal places:

- 1) A person must not harm or desecrate an object that the person knows is an Aboriginal object.

Maximum Penalty:

- (a) in the case of an individual - 2,500 penalty units or imprisonment for one year, or both, or (in circumstances of aggravation) 5,000 penalty units or imprisonment for two years, or both, or
- (b) in the case of a corporation - 10,000 penalty units (currently \$1,100,000).

- 2) A person must not harm an Aboriginal object ('strict liability offence').

Maximum Penalty:

- (a) in the case of an individual - 500 penalty units or (in circumstances of aggravation) 1,000 penalty units, or
- (b) in the case of a corporation - 2,000 penalty units (currently \$220,000).

Under Section 86(4) it is an offence for a person to harm or desecrate an Aboriginal place, with maximum penalties of 5,000 penalty units or imprisonment for two years, or both, for individuals and 10,000 penalty units for corporations.

Harm to an Aboriginal object or place is defined under Section 5(1) as any act or omission that:

- (a) destroys, defaces or damages the object or place, or
- (b) in relation to an object - moves the object from the land on which it had been situated, or
- (c) is specified by the regulations, or
- (d) causes or permits the object or place to be harmed in a manner referred to in paragraph (a), (b) or (c), but does not include any act or omission that:
- (e) desecrates the object or place, or
- (f) is trivial or negligible, or
- (g) is excluded from this definition by the regulations.

There are various exemptions and defences to offences under Section 86 of the Act, including:

- Of most relevance to development proposals generally, the offences under Section 86(1), (2) and (4) have a defence to prosecution under Section 87(1) if the harm or desecration was authorised by an Aboriginal Heritage Impact Permit (AHIP) and the conditions to which that AHIP were subject have not been contravened;
- The strict liability offence under Section 86(2) has a defence to prosecution under Section 87(2) if the person exercised *due diligence* to determine whether the act or omission constituting the alleged offence would harm an Aboriginal object and reasonably determined that no Aboriginal object would be harmed. Section 87(3) and the regulations associated with the Act (*National Parks and Wildlife Regulation 2009*) enable due diligence to be achieved through compliance with industry-specific Codes of Practice approved by the Minister. These include the DECCW (2010a) *Due Diligence Code of Practice for the Protection of Aboriginal Objects in NSW* and other approved codes such as the *NSW Minerals Industry Due Diligence Code of Practice for the Protection of Aboriginal Objects* (NSW Minerals Council 2010).

The 'due diligence' process is essentially intended to provide a defence to the strict liability offence under Section 86(2) of the NP&W Act, if an activity were subsequently to unknowingly harm an Aboriginal object in the absence of an AHIP. If Aboriginal objects are present or are likely to be present and an activity will harm those objects, then an AHIP application is required (excluding Part 3A Major Projects and Part 4 State Significant Development Projects). While the DECCW (2010a) *Due Diligence Code of Practice for the Protection of Aboriginal Objects in NSW* sets out procedures to determine whether or not Aboriginal objects are, or are likely to be present, identify whether the activity may harm objects and whether an AHIP is necessary, it does not constitute a level of Aboriginal heritage impact assessment that is typically required to satisfy the assessment requirements for projects under Part 4 and Part 5 of the EP&A Act. However, the conduct of an Environmental Impact Assessment for a Part 4 or Part 5 project that satisfies the requirements of the Code of Practice will satisfy the 'due diligence' defence to Section 86(2) of the NP&W Act;

- The strict liability offence under Section 86(2) has a defence to prosecution under Section 87(4) if the person shows that the act or omission constituting the alleged offence is prescribed by the regulations as a low impact act or omission.

Clause 80B of the *National Parks and Wildlife Regulation 2009* describes low impact acts or omissions as including:

- Maintenance work on land already disturbed (such as maintenance of existing roads, tracks or utilities);

- Farming and land management works on land already disturbed (such as cropping or leaving paddocks fallow, or construction of farm dams, fences, irrigation infrastructure, ground water bores, flood mitigation works, erosion control or soil conservation works, or maintenance of various existing infrastructure);
- Grazing of animals;
- Activity on already disturbed land that comprises exempt development or was the subject of a complying development certificate issued under the EP&A Act;
- Mining exploration work (such as costeaning, bulk sampling or drilling) on land already disturbed;
- Geological mapping, surface geophysical surveys and sub-surface surveys involving downhole logging, sampling or coring using hand-held equipment except where conducted as part of an archaeological investigation (exempted where the DECCW 2010 *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* is followed);
- Removal of isolated dead or dying vegetation if there is minimal ground disturbance;
- On already disturbed land seismic surveying or groundwater monitoring bores;
- Environmental rehabilitation work (such as silt fencing, tree planting, bush regeneration and weed removal, but not erosion control or soil conservation works).

For the purposes of Clause 80B, land is considered to be 'already disturbed' if it 'has been the subject of a human activity that has changed the land's surface, being changes that remain clear and observable' (for example, soil ploughing, construction of rural infrastructure such as dams and fences, construction of roads, tracks and trails, clearing of vegetation, construction of buildings, installation of utilities, substantial grazing involving the construction of rural infrastructure, or construction of earthworks related to the above);

- The defence of honest and reasonable mistake of fact applies under Section 86(5) to the strict liability offence of Section 86(2) and to offences against Aboriginal places under Section 86(4);
- The offences under Section 86(1) and (2) do not apply under Section 86(6), with respect to an Aboriginal object that is dealt with in accordance with Section 85A (refer below);
- Exemptions are available under Section 87A to Section 86(1)-(4) for various emergency situations, conservation works and conservation agreements; and
- Exemptions are available under Section 87B to Section 86(1), (2) and (4) for Aboriginal people in relation to the carrying out of traditional cultural activities.

Consents regarding impacts to Aboriginal objects or areas with potential for Aboriginal objects are managed through the OEH Aboriginal Heritage Impact Permit (AHIP) system, as outlined in Section 90 of the NP&W Act and clauses 80D and 80E of the Regulations. The issuing of an AHIP is dependent upon adequate archaeological assessment and review (Aboriginal cultural heritage assessment report), together with an appropriate level of Aboriginal community liaison and involvement.

Typically, to support an AHIP, an Aboriginal cultural heritage assessment must be undertaken in accordance with the OEH (2011a) *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW*, which effectively involves an assessment following the DECCW (2010b) *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* and Aboriginal community consultation in accordance with the DECCW (2010c) *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* policy.

The DECCW (2010b) *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* contains detailed requirements for heritage assessments. Key features include:

- Investigations must be undertaken by people with appropriate skills and experience, specified in Section 1.6 as:
 - 1) A minimum of a Bachelor's degree with honours in archaeology or relevant experience in the field of Aboriginal cultural heritage management, and
 - 2) The equivalent of two years full-time experience in Aboriginal archaeological investigation, including involvement in a project of similar scope, and
 - 3) A demonstrated ability to conduct a project of the scope required through inclusion as an attributed author on a report of similar scope.
- Archaeological test excavation will be necessary when (regardless of whether or not there are objects present on the ground surface) it can be demonstrated through Requirements 1, 2, 3, 4, and 5 of the Code that sub-surface Aboriginal objects with potential conservation value have a high probability of being present in an area, and the area cannot be substantially avoided by the proposed activity; and
- A Section 90 AHIP is not required for test excavations undertaken in compliance with the Code (implementation of the *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* policy is required however).

Under clause 80D of the *National Parks and Wildlife Regulation 2009*, the cultural heritage assessment report that accompanies the AHIP application must address:

- The significance of the Aboriginal objects or Aboriginal places that are the subject of the application;
- The actual or likely harm to those Aboriginal objects or Aboriginal places from the proposed activity that is the subject of the application;
- Any practical measures that may be taken to protect and conserve those Aboriginal objects or Aboriginal places;
- Any practical measures that may be taken to avoid or mitigate any actual or likely harm to those Aboriginal objects or Aboriginal places; and
- Include any submission received from a registered Aboriginal party under clause 80C and the applicant's response to that submission.

The OEH determination of AHIP applications is guided by the OEH (2011a) *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW*, OEH (2011b) *Applying for an Aboriginal Heritage Impact Permit: Guide for Applicants*, and OEH (2011c) *Guide to Aboriginal Heritage Impact Permit Processes and Decision-Making* policy.

AHIPs may be issued in relation to a specified Aboriginal object, Aboriginal place, land, activity or person or specified types or classes of Aboriginal objects, Aboriginal places, land, activities or persons. AHIPs may be transferred or varied (subject to conditions and approval of the Director-General). AHIPs may be refused. An application is taken to be refused (unless otherwise granted or refused earlier), 60 days after the date on which the application was received by the Director-General (not including any period during which an applicant is required to supply to the Director-General further information under Section 90F).

The Director-General may attach any conditions seen fit to any AHIP granted. Failure to comply with a condition is deemed under Section 90J to be a contravention of the Act. Such offences may result in a maximum penalty of 1,000 penalty units and/or imprisonment for six months, and, in the case of a continuing offence, a further 100 penalty units for each day the offence continues, for an individual, with double the fines for a corporation.

Under Section 90K of the NP&W Act, in making a decision in relation to an AHIP, the Director-General must consider the following matters (but only these matters):

- a) The objects of the Act;
- b) Actual or likely harm to the Aboriginal objects or Aboriginal place that are the subject of the permit;
- c) Practical measures that may be taken to protect and conserve the Aboriginal objects or Aboriginal place that are the subject of the permit;
- d) Practical measures that may be taken to avoid or mitigate any actual or likely harm to the Aboriginal objects or Aboriginal place that are the subject of the permit;
- e) The significance of the Aboriginal objects or Aboriginal place that are the subject of the permit;
- f) The results of any consultation by the applicant with Aboriginal people regarding the Aboriginal objects or Aboriginal place that are the subject of the permit (including any submissions made by Aboriginal people as part of a consultation required by the regulations);
- g) Whether any such consultation substantially complied with any requirements for consultation set out in the regulations (specified in Section 90N of the NP&W Act and clause 80C of the *National Parks and Wildlife Regulation 2009* and in the *DECCW Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010*);
- h) The social and economic consequences of making the decision;
- i) Any documents accompanying the application and any public submission that has been made under the EP&A Act in connection with the activity to which the permit application relates and that has been received by the Director-General; and
- j) Any other matter prescribed by the regulations.

An appeals process is available under Section 90L of the NP&W Act whereby an applicant, dissatisfied with the refusal of the Director-General to grant a Section 90 AHIP, or with any conditions attached to the AHIP, may appeal to the Land and Environment Court. The appeal must be made within 21 days after notice of the decision that is being appealed. The decision of the Land and Environment Court on the appeal is final and is binding on the Director-General and the appellant.

Under Section 85A of the NP&W Act, the Director-General may 'dispose' of Aboriginal objects that are the property of the crown:

- a) By returning the Aboriginal objects to an Aboriginal owner or Aboriginal owners entitled to, and willing to accept possession, custody or control of the Aboriginal objects in accordance with Aboriginal tradition, or

- b) By otherwise dealing with the Aboriginal objects in accordance with any reasonable directions of an Aboriginal owner or Aboriginal owners referred to in paragraph (a), or
- c) If there is or are no such Aboriginal owner or Aboriginal owners - by transferring the Aboriginal objects to a person, or a person of a class, prescribed by the regulations for safekeeping (typically implemented by way of a Care Agreement between the OEH and the Aboriginal person or organisation).

Under Section 85A(3) of the NP&W Act, the regulations may make provision as to the manner in which any dispute concerning the entitlement of an Aboriginal owner or Aboriginal owners to possession, custody or control of Aboriginal objects for the purposes of this section is to be resolved.

Under Section 91AA of the NP&W Act, if the Director-General is of the opinion that any action is being, or is about to be carried out that is likely to significantly affect an Aboriginal object or Aboriginal place or any other item of cultural heritage situated on land reserved under the Act, the Director-General may make a stop-work order for a period of 40 days. Various exemptions exist, such as for emergency situations and for approved developments under the EP&A Act. A person that contravenes a stop-work order may be penalised up to 1,000 penalty units and an additional 100 units for every day the offence continues (10,000 units and 1,000 units respectively in the case of a corporation). Under Section 91A, the Director-General may also make recommendations to the Minister for an Interim Protection Order in respect of land which has cultural significance, including Aboriginal objects, for a duration of up to two years. The existence of an AHIP does not prevent the making of a stop-work order or an interim protection order (Section 90O).

Under Section 91L of the NP&W Act the Director-General may direct a person to carry out remediation work to Aboriginal objects or places, if they have been harmed as a result of an offence under the Act. The remediation work may involve protection, conservation, maintenance, remediation or restoration of the harmed Aboriginal object or place. The maximum penalties under Section 91Q for contravening a remediation direction are 2,000 penalty units and 200 penalty units for each day the offence continues for a corporation.

Environmental Planning and Assessment Act 1979 (EP&A Act):

The EP&A Act requires that environmental impacts (including those to cultural heritage) be considered in land use planning and decision-making. Various planning instruments such as Local Environmental Plans (LEPs) or Development Control Plans (DCPs) may be made under the EP&A Act. These planning instruments may identify places and features of cultural heritage significance and define statutory requirements regarding the potential development, modification and conservation of these items. In general, places of identified significance, or places requiring further assessment, are listed in heritage schedules that form part of an LEP. Listed heritage items are then protected from certain defined activities, unless consent has been gained from an identified consent authority (typically the local government authority).

In determining a Development Application (DA) under Part 4 of the EP&A Act, a consent authority, such as a local government authority, must take into consideration matters such as the provisions of environmental planning instruments (for example, LEPs), DCPs, the likely impacts of that development, including environmental impacts on the natural and built environments, and social and economic impacts on the locality (Section 79C{1}).

If Aboriginal objects are known to exist on the land to which the development application applies prior to the application being made, under Part 4 of the EP&A Act an 'Integrated Development Application' (IDA) must be submitted to the consent authority. Any Development Approval issued for development of this kind must be consistent with the General Terms of Approval (GTA's) or requirements provided by the relevant State Government agency (for example, the OEH).

Under Part 5 of the EP&A Act, public authorities and government agencies that carry out activities have a duty to take into account to the fullest extent possible all matters affecting or likely to affect the environment (including cultural heritage) by reason of that activity. This typically takes the form of a Review of Environmental Factors (REF) or Environmental Impact Statement (EIS), with the agency (proponent) acting as the determining authority.

Part 3A of the EP&A Act has been repealed, but under Division 4.1 of Part 4, 'State Significant Development' is treated in a similar manner to the former Part 3A. The Minister is the Consent authority for State Significant Development applications, although for staged developments, the Minister may determine the local Council as the Consent authority for subsequent stages. As for other development applications under Part 4, the environmental impacts of the proposal need to be considered, including those on heritage.

Similar to the previous Part 3A legislation, under Section 89J of Part 4 of the EP&A Act, a Section 90 AHIP to impact Aboriginal objects is not required for an approved State Significant Development or for any investigative or other activities required to be carried out for the purpose of complying with environmental assessment requirements issued in connection with a development application for any such development. *In lieu* of a Section 90 AHIP, Aboriginal heritage needs to be managed post-approval under an Aboriginal Heritage Management Plan subject to the approval of the DP&E.

The UCCO Project is a Part 3A Major Project (notwithstanding that this Part of the Act has now been repealed). This proposed Modification 4 is being assessed under Section 75W of the EP&A Act.

The interplay of the NP&W Act and Regulation and the planning system is complex. For proposed developments, the specific level of Aboriginal heritage impact assessment and Aboriginal community consultation required, and any requirement for an AHIP, is highly dependent upon not just the NP&W Act and Regulation, but the nature of the proposal, the Part and Division of the EP&A Act under which planning approval is required, any specific project approval requirements issued by DP&E and/or the OEH, the presence or otherwise of Aboriginal objects, and the potential for Aboriginal objects to occur.

8.3 Local

Under the EP&A Act the Minister may make various planning instruments such as Local Environment Plans (LEPs), that are administered at a local government level. These plans set out objectives and controls for the development of land in the local government areas.

The *Mid-Western Regional Local Environmental Plan 2012* applies to the investigation area, however it is noted that the NSW Minister for Planning is the consent authority for the proposed Modification, as the UCCO Project is a Major Project approved under Part 3A of the EP&A Act.

9. POTENTIAL IMPACTS

The proposed Modification 4 to PA 08_0184 involves changes to the Ulan West and UUG mine plans that include extending eight longwall panels between 155 and 1140 metres within existing mining leases, with an overall increase in the area of land subject to potential subsidence impacts by approximately 220 hectares (refer to Figures 3 and 4). The proposed Modification would also involve minor changes to approved surface infrastructure, with up to two additional dewatering facilities above LW30-33 and associated service tracks and relinquishment of several approved corridors (refer to Figure 5). The proposed Modification would not involve any other changes to approved surface infrastructure, mining methods, mine life, extraction limits or other aspects of the Approved Project.

Hence, the impacts of the proposed Modification on Aboriginal heritage (comprising both the identified Aboriginal objects, the potential resource and cultural values) primarily relate to the increased zone of potential subsidence impacts of 220 hectares for the Ulan West and UUG longwall panel extensions (refer to Figures 4 - 7) and the indirect impacts to the ground surface that can be caused by underground mining induced subsidence. Potential *changes* to Aboriginal sites relating to subsidence impacts include:

- a) Subsidence impacts that may have occurred under the approved UCCO Project will no longer occur under the proposed Modification (decrease in impacts);
- b) Subsidence impacts that would not have occurred under the approved UCCO Project will now occur under the proposed Modification (increase in impacts);
- c) Subsidence impacts that may have occurred under the approved UCCO Project will also occur under the proposed Modification, but with an altered level of potential impact.

An assessment of potential subsidence impacts for the Modification has been prepared by Wilson and Mills (SCT Operations 2017). Potential changes from the proposed Modification to the level of impacts on each of the Aboriginal sites and cultural areas/values within or immediately adjacent to the investigation area are discussed in Section 9.1 and Appendix 5. Relevant mitigation measures and management strategies are outlined in Sections 10 and 11 and Appendix 5. UCML did not require further assessment of any decrease in impacts, due to potential future mine plan modifications.

Modification 4 will also result in an increase to the previously assessed/approved zone of potential surface impacts of up to approximately 24.5 hectares (excluding around 1.2 hectares that overlaps with previously approved corridors), which may result in surface impacts to Aboriginal heritage that would not have occurred under the approved UCCO Project now occurring under the proposed Modification (increase in impacts). These potential surface impacts are discussed in Section 9.2.

Other potential impacts on Aboriginal heritage associated with the Approved Project (for example, exploratory drilling or continued land use) are addressed in the HMP and do not require further consideration here.

9.1 Potential Subsidence Impacts

The primary potential impacts of the approved UCCO Project and proposed Modification on Aboriginal heritage relate to underground mining induced subsidence.

SCT Operations (2017) conclude that the subsidence effects, impacts and consequences associated with the proposed additional mining areas for Modification 4 are expected to be similar to those previously predicted (eg. Mills 2009, 2010, 2014), generally in accordance with the approved mine plan and compliant with the subsidence performance measures of the UCCO Project Approval.

SCT Operations (2017) assessment focused on the additional mining and subsidence impact areas (refer to Figure 3), and no material change was expected from the Modification to those Aboriginal sites within the currently approved subsidence impact areas (apart from ID# 179 as discussed below).

In the proposed additional mining areas for Modification 4, SCT Operations (2017) forecast maximum vertical subsidence of less than 1.7 metres, maximum tilt of less than 55 millimetres per metre (mm/m), and maximum strains less than 25 mm/m in compression and 20 mm/m in tension. Maximum tilts and strains are expected to be lower in areas of greater overburden depth. The predicted impacts are not expected to be greater in the Modification 4 area than in adjacent approved areas.

In terms of identified Aboriginal sites, no change is expected (nil impact) to the Mona Creek rock shelter sites, or the Brokenback Conservation Area or Grinding Groove Conservation Areas, consistent with the current Project Approval. The Mona Creek 23-30 rock shelter sites (Ulan ID# 180-187) are situated outside of the increased zone of potential subsidence impacts associated with the Modification (Figure 6).

No impacts are expected to any of the open artefact sites within the proposed additional mining areas for Modification 4, including those sites recorded during the present investigation, consistent with the overall UCCO Project (Kuskie 2009).

Only two Aboriginal sites (refer to Figure 13) have an increased probability of impact due to the Modification (SCT Operations 2017):

- ID# 179 (MC22), a rock shelter with artefacts of low heritage significance, situated marginally within the previously approved subsidence impact area (with an estimate of 10% probability of perceptible impacts) is now situated marginally further within the Modification 4 subsidence impact area and subject to an estimated 20% probability of rock fall and 70% probability of perceptible impacts; and
- ID# 724 (MC236), a rock shelter with PAD of low heritage significance, previously situated outside of the approved subsidence impact area (with an estimate of 0% probability of perceptible impacts) is now situated within the additional Modification 4 subsidence impact area and subject to an estimated less than 1% probability of rock fall and 10% probability of perceptible impacts.

As for the UCCO Project EA (refer to Kuskie 2009, Section 11), the assessment of potential subsidence impacts for each rock shelter site or PAD relates to the potential for rock falls and the probability of 'perceptible impacts'. 'Perceptible impact' is taken to refer to any changes in the rock formations that are associated with mining activity and subsidence movements. Such impacts may include tensile cracking, ranging from fine cracks to major fractures, shear movements on bedding planes and through intact strata, perceptible disturbance of any formations, and rock falls, ranging from minor dislocation of material through to major falls.

The probability of perceptible impacts is a generic estimate based on the stratigraphic horizon in which the rock shelters are formed, rather than the specific geometries of individual sites. Large, continuous, overhanging formations are likely to be more susceptible to rock falls than pagoda features and isolated rocks, so there may be significant differences in potential impacts at individual sites that cannot be captured without a specific site assessment (Mills 2009, 2010, SCT Operations 2017).

Mills (2009, 2010) has described the probability for subsidence impacts on sandstone rock formations in various categories:

- ❑ Almost certain: >90% probability;
- ❑ Likely: 50 - 90% probability;
- ❑ Possible: 11 - 49% probability;
- ❑ Unlikely: 1 - 10% probability; and
- ❑ Most unlikely: <1% probability.

By virtue of the approximately 220 hectare increase in the spatial area of potential subsidence impacts, the proposed Modification will result in a marginal increase in impacts associated with the ongoing cultural and spiritual connection to the land and resources of the study area by the north-eastern Wiradjuri and other Aboriginal persons.

The Modification will not result in impacts to the forested sandstone formations (survey area 2034) adjacent to the higher order Mona Creek, in the locality of rock shelters MC 23-30 (ID# 180-187), a locality with which the Aboriginal stakeholders have expressed a strong spiritual and cultural connection.

In overall terms, the proposed Modification would result in a very minor (almost negligible) net overall increase in impacts to Aboriginal heritage, in relation to two rock shelter sites/PADs of low heritage significance and a minor increase in the overall subsidence impact area and consequent effect on cultural values. Significantly however, the proposed Modification will not result in any impacts to any Aboriginal sites of heritage significance, the MC 23-30 rock shelter sites (ID# 180-187), or any of the Aboriginal heritage conservation areas.

9.2 Potential Surface Impacts

Modification 4 would result in an increase to the previously assessed/approved zone of potential surface impacts of up to approximately 24.5 hectares (excluding around 1.2 hectares that overlaps with previously approved corridors), with up to two additional dewatering facilities above LW30-33 and associated service tracks (refer to Figure 5). The proposed impacts are subject to detailed design and are within the "small-scale high level impacts" category.

No known Aboriginal sites are located within the increased zone of potential surface impacts (which overlaps portions of the currently approved zone and increased zone of potential subsidence impacts) (refer to Figure 14). However, there remains potential for open artefact evidence to occur in the areas that were not directly sampled or are currently obscured by vegetation, consistent with the predictions in Section 3.4 and Kuskie (2009). Generally this evidence is likely to comprise a low to very low density sub-surface deposit of artefacts, typically representing background discard, although a low frequency of activity areas (with consequent higher artefact density) may be present.

The surface impacts will be minimal in extent and are situated in areas that do not conform to primary or secondary resource zones under the occupation model, and therefore deposits of research value or significance are not expected to occur. As such, the potential increase in impacts to Aboriginal heritage associated with the increase in surface impacts with the Modification is assessed as very minor (almost negligible).

Minor reductions to the currently approved surface impact area will also occur through relinquishment of infrastructure corridors above UUG, as shown on Figure 5. No identified Aboriginal sites are affected by this reduction in impacts.

9.3 Regional Context and Cumulative Impacts

The assessment of cumulative impacts or impacts within a regional context remains unchanged from Kuskie (2009: Section 11.3). For the UCCO Project, following from the conclusion that the impacts of the overall Project would be relatively low within a regional context prior to, and very low after, the implementation of mitigation measures, it logically followed that the cumulative impact of the UCCO Project within a regional context (in combination with other mining projects in the region such as Moolarben and Wilpinjong) would be very low (Kuskie 2009).

The proposed Modification itself would result in an almost negligible net overall increase in impacts to Aboriginal heritage, and it is concluded that in a broader regional context the overall impacts of the UCCO Project incorporating the proposed Modification will remain relatively low subject to the implementation of appropriate management and mitigation measures (refer to Sections 10 and 11).

10. POTENTIAL MITIGATION AND MANAGEMENT STRATEGIES

In the UCCO Project EA (refer to Kuskie 2009: Section 12.1) a discussion is presented of the general strategies that are typically available for the management of identified and potential Aboriginal heritage resources. In selecting suitable strategies, a key consideration has been the recognition that Aboriginal heritage is of primary importance to the Aboriginal community, and that decisions about the management of the sites should be made in consultation with the relevant Aboriginal stakeholders.

Specific options for the proposed Modification are discussed below and the recommended strategies are presented in Section 11 and Appendix 5.

Of particular significance to the selection of appropriate management strategies is the approved HMP that applies to the UCCO Project Approval Area. The area of relevance to the proposed Modification is situated entirely within the UCCO Project Approval Area and notwithstanding DP&E approval requirements necessary for the Modification, can be managed in accordance with the existing HMP.

The Sections of the approved HMP of particular relevance to the ongoing management of heritage within the UCCO Project Approval Area (both before and after any approval of the proposed Modification) include:

- *Section 3.1: Aboriginal community involvement* - specifies procedures for involvement of stakeholders in heritage actions, notification times for field investigations, stakeholder review of reports and proposed HMP changes and relevant timeframes for such, and Aboriginal Heritage Review Meetings;
- *Section 3.3: Aboriginal conservation areas* - specifies procedures for the Brokenback Conservation Area, Valley Way Grinding Groove Conservation Area and Bobadeen Grinding Groove Conservation Area;
- *Section 3.4: Protection of Aboriginal sites where impacts are avoided* - specifies procedures for continued avoidance of impacts to the Mona Creek 23-30 rock shelter sites (ID# 180-187) and future archaeological survey of these locations and consideration to establishment of Conservation Areas should UCML obtain ownership or control of the land on which they are located, assessment of heritage within the Ground Disturbance Permit process, minimising inadvertent impacts to identified sites, and minimising impacts to known sites where works occur in close proximity;
- *Section 3.5: Management of identified Aboriginal heritage evidence* - specifies procedures for surface collections of specific sites, surface scrapes and localised hand excavations of specific sites, broad area hand excavation of specific sites, and development of a sampling strategy and the conduct of test and salvage excavations within the rock shelters of low to moderate or higher significance that are susceptible to subsidence impacts;
- *Section 3.6: Management of previously unrecorded Aboriginal heritage evidence* - specifies procedures for management of previously unrecorded evidence that is identified within the UCCO Project Area during the course of operations or further heritage investigations, with consideration of the nature of the evidence, significance of the evidence and nature of proposed impacts, along with relevant updates to Appendix 2 of the HMP, the Aboriginal site database and OEH site records, and reporting;

- ❑ *Section 3.7: Additional Aboriginal heritage investigation required* - specifies procedures for additional investigation of specific Aboriginal heritage sites and areas, including specific stone arrangement sites, several large open artefact sites, reassessment of planned surface impacts after detailed design, assessment of future proposed small-scale surface impacts consistent with PA 08_0184, heritage survey of areas not sampled during the UCCO Project EA investigation, heritage survey of the portions of the open cut potential blast impact zone that have not been sampled, assessment of future mine plan alterations (such as the current proposed Modification) and Subsidence Management Plan (now Extraction Plan) requirements;
- ❑ *Section 3.8: Curation of heritage evidence* - specifies procedures for the curation of all salvaged Aboriginal objects;
- ❑ *Section 3.9: Heritage awareness training* - specifies procedures for the training of staff and contractors in heritage awareness;
- ❑ *Section 5.1: Aboriginal site database and site records* - specifies procedures for maintenance of the UCML Aboriginal site database, lodgement of site records with the OEH and record keeping;
- ❑ *Section 5.2: Aboriginal site monitoring* - specifies procedures for monitoring of subsidence impacts for rock shelter and grinding groove sites, a stone arrangement site, and sites associated with blast monitoring;
- ❑ *Section 5.5: Reporting requirements* - specifies procedures for completion, review by stakeholders and submission of heritage reports required under the HMP; and
- ❑ *Section 6: Review and improvement* - specifies procedures for review and amendment of the HMP in consultation with the Aboriginal stakeholders, including with respect to any modifications to PA 08_0184.

In relation to the identified Aboriginal sites that are subject to a material increase in potential subsidence impacts from the proposed Modification (ID# 179 and 724), both are of low heritage significance and consistent with other similar sites, the management strategy appropriately remains as 'no action required'.

Through establishment of the 58 hectare Brokenback Conservation Area (refer to Kuskie 2009) subsidence impacts will be avoided to a total of 27 rock shelter sites, including six of high significance that would have been susceptible to impacts if not subject to conservation, four of moderate to high significance, and three of moderate significance. Continued conservation of these sites would serve to offset any impacts from the Modification on the ID# 179 and 724 rock shelter sites. Considering the limited potential for the ID# 179 and 724 rock shelters to yield deposits of research value or contribute to a greater understanding of Aboriginal occupation of the locality, unmitigated impact remains a feasible strategy for these shelters.

In relation to the newly identified open artefact sites recorded during the present survey (refer to Table 3), SCT Operations (2017) conclude that impacts from subsidence are unlikely, but for completeness and to address any possible future impacts from continuing land use or other small-scale activities (such as exploratory drilling and environmental monitoring), management strategies for these sites are included in Appendix 5.

In relation to the proposed additional surface infrastructure, no identified Aboriginal sites will be subject to impacts. Almost all of this area (apart from approximately 0.3 hectares) was either previously subject to heritage survey to current standards in relation to underground impacts or is located within the increased zone of potential subsidence impacts for the Modification and was inspected during the present survey. However, the surface impact area was not defined until after completion of the heritage survey and all survey coverage obtained within the surface impact area (either for the present assessment or the previous UCCO Project) was typically to a low intensity consistent with proposed subsidence impacts, rather than to a higher intensity consistent with potential surface impacts (refer to survey methodology in Kuskie 2009). Hence, heritage survey sampling has not occurred to a level consistent with the methodology and standards in the EA (Kuskie 2009).

As such, once detailed design of the proposed surface infrastructure has occurred and prior to any impacts occurring, consistent with Section 3.7.4 of the HMP, an appropriately qualified and experienced archaeologist should conduct a detailed archaeological survey and recording of the impact area, in consultation with the registered Aboriginal stakeholders, using the same methodology as for the EA (Kuskie 2009). Any identified heritage evidence can then be managed in accordance with Section 3.6 of the HMP.

Approval of the proposed Modification would trigger a review of the HMP, as required by the current UCCO Project Approval conditions and reflected in Section 6 of the HMP. The key actions required under the HMP and/or potential revisions to the HMP that would be required if the proposed Modification were to be approved include:

- *Section 3.1: Aboriginal community involvement* - UCML will provide the registered Aboriginal stakeholders notification of and a minimum 15 working days to comment on any proposed amendments to the HMP. UCML will ensure that copies of any updated version of the HMP are distributed to the registered Aboriginal stakeholders within 30 working days of completion;
- *Section 3.7: Additional Aboriginal heritage investigation required* - heritage survey is required prior to any impacts occurring of the areas not sampled during the UCCO Project EA or subsequent investigations as per Sections 3.7.4 and 3.7.5 of the HMP including:
 - Minor gaps totalling approximately 21.6 hectares *within* the increased zone of potential subsidence impacts of the proposed Modification (refer to Figures 8 - 10);
 - Other gaps *within* the previously approved subsidence impact zone within the UCCO Project Approval Area (refer to Figure 6); and
 - Proposed surface infrastructure impact areas (refer to Figure 5);
- *Section 6: Review and improvement* - the HMP would require review and revision within three months of any approval of the Modification, and where amendments are required to Section 3 of the HMP, UCML will provide the registered Aboriginal stakeholders notification of and a minimum 15 working days to comment on any proposed amendments, and ensure that copies of any updated version of the HMP are distributed to the registered Aboriginal stakeholders within 30 working days of completion. Consultation over any amendments would also be required with the DP&E and the OEH and Mid-Western Regional Council; and
- *Appendix 2* - the entries for each Aboriginal site in Appendix 5 would need to replace (or in the case of new sites, be added to) current entries in Appendix 2 of the HMP.

11. RECOMMENDATIONS

This Aboriginal cultural heritage assessment has been prepared by South East Archaeology for UCML in relation to an approval being sought from the DP&E under Section 75W of Part 3A of the EP&A Act for the proposed Modification 4 to the UCCO Project Approval (PA 08_0184).

The Modification relates to a proposed change to the Ulan West and UUG mine plans that includes extending eight longwall panels between 155 and 1140 metres within existing mining leases, with an overall increase in the area of land subject to potential subsidence impacts by approximately 220 hectares (refer to Figures 3 and 4). The proposed Modification would also involve minor changes to approved surface infrastructure, with up to two additional dewatering facilities above LW30-33 and associated service tracks, and relinquishment of several approved corridors (refer to Figure 5). The Modification would not involve any other changes to approved surface infrastructure, mining methods, mine life, extraction limits or other aspects of the Approved Project.

The proposed Modification itself would result in an almost negligible net overall increase in impacts to Aboriginal heritage, and it is concluded that in a broader regional context the overall impacts of the UCCO Project incorporating the proposed Modification will remain relatively low subject to the implementation of appropriate management and mitigation measures.

Consistent with PA 08_0184, the heritage assessment for the UCCO Project EA (Kuskie 2009) and the UCML HMP, and with consideration of legal requirements under the NSW NP&W Act and EP&A Act, the results of the present investigation and consultation with the Aboriginal stakeholders, the following management and mitigation measures are proposed:

- 1) Provisions relating to Aboriginal heritage in the UCML HMP for the approved UCCO Project will continue to be implemented, with revisions and additional actions implemented where necessary that are relevant to the proposed Modification. In particular, these revisions and/or additional actions include¹¹:
 - a) Management strategies for individual sites as outlined here in Appendix 5, with the entries for each Aboriginal site replacing (or in the case of new sites, being added to) current entries in Appendix 2 of the HMP;
 - b) Additional investigation involving the conduct of heritage surveys prior to any impacts occurring of the areas not sampled during the UCCO Project EA or subsequent investigations (consistent with Section 3.7.5 of the HMP) including:
 - Minor gaps totalling approximately 21.6 hectares *within* the increased zone of potential subsidence impacts of the proposed Modification (refer to Figures 8 - 10);
 - Other gaps *within* the previously approved subsidence impact zone within the UCCO Project Approval Area (refer to Figure 6); and
 - Proposed surface infrastructure impact areas (refer to Figure 5);

¹¹ Refer to the UCML Heritage Management Plan for all management policies and actions relevant to Aboriginal heritage that may require implementation for the proposed Modification and UCCO Project.

- c) Revision of the HMP within three months of any approval of the proposed Modification, and where amendments are required to Section 3 of the HMP, provision to the registered Aboriginal stakeholders of notification and a minimum 15 working days to comment on any proposed amendments, with copies of any updated version of the HMP distributed to the registered Aboriginal stakeholders within 30 working days of completion. Consultation over any amendments would also be required with the DP&E and the OEH and Mid-Western Regional Council (Section 6 of the HMP);
- 2) Under the terms of the NP&W Act it is an offence to harm or desecrate an object that the person knows is an Aboriginal object, or to harm an Aboriginal object ('strict liability offence'). Therefore, no activities or work should be undertaken within the Aboriginal site areas as described in this report without approval under Section 75W of Part 3A of the EP&A Act (or *in lieu* a valid Section 90 AHIP) and subsequent implementation of any relevant approval conditions, unless such impacts are already approved under the existing UCCO Project Approval and HMP and managed in accordance with the HMP; and
- 3) Copies of this final report should be forwarded to each registered Aboriginal stakeholder and the DP&E and the OEH within 30 working days of completion.

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DISCLAIMER

The information contained within this report is based on sources believed to be reliable. Every effort has been made to ensure accuracy by using the best possible data and standards available. The accuracy of information generated during the course of this field investigation is the responsibility of the consultant.

However, as no independent verification is necessarily available, South East Archaeology provides no guarantee that the base data (eg. the OEH AHIMS) or information from informants (obtained in previous studies or during the course of this investigation) is necessarily correct, and accepts no responsibility for any resultant errors contained therein and any damage or loss which may follow to any person or party. Nevertheless this study has been completed to the highest professional standards.