APPENDIX 22

Aboriginal Cultural Heritage Assessment Report



Glendell Continued Operations Project

Aboriginal Cultural Heritage Assessment Report

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Glendell Continued Operations Project

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Document Control Information

Document information

Client: Umwelt Environmental & Social Consultants Client Contact: Bridie McWhirter Title: Glendell Continued Operations Project Subtitle: Aboriginal Cultural Heritage Assessment Report Our Ref: P18-0089 Date: 12th September 2019

Recipient Name	Organisation	Hardcopy	Electronic	Transmission Method	Purpose	Date

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Spatial Data

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Executive Summary

The Glendell Continued Operations Project (the Project) is a Glencore project to extend the life of coal mining operations at Glendell Mine to approximately 2044 and provide for ongoing employment for its existing workforce and contractors. The Project would also involve the ongoing use of the Mount Owen Complex Coal Handling and Preparation Plant (CHPP) and associated coal handling and transport infrastructure to approximately 2045. The new development consent being sought for the Project will include the current approved mining operation (and associated rehabilitation requirements) relating to the Glendell Pit at the Glendell Mine and therefore the Glendell Consent will be surrendered should approval be granted for the Project. In accordance with section 4.63(3) of the Environmental Planning and Assessment Act 1979 (EP&A Act), the consent authority is not required to re-assess the likely impact of continued development under the existing Glendell Consent.

The Glendell Mine forms part of the Mount Owen Complex located in the Upper Hunter Valley of New South Wales (NSW), approximately 20 kilometres (km) north-west of Singleton, 24 km south-east of Muswellbrook and to the north of Camberwell (see Map 1-1).

In addition to the Glendell Mine, the Mount Owen Complex comprises mining operations at the Mount Owen Mine (North Pit) and Ravensworth East Mine (Bayswater North Pit). The Mount Owen Complex also includes a coal handling and preparation plant (CHPP) and coal handling and transport infrastructure (see Map 1-2).

Mt Owen Pty Limited (Mount Owen) operates the Ravensworth East (Bayswater North Pit), the CHPP and Glendell mining operations at the Mount Owen Complex, with mining operations at the Mount Owen Mine North Pit operated by Thiess Pty Ltd pursuant to a contractual arrangement with Mount Owen. The Mount Owen Complex is adjacent to the Integra Underground, Liddell Coal Operations and Ravensworth Operations, which are also operations owned and operated by subsidiaries of Glencore and its joint venture partner (JV). Glencore and the JV partner also hold a number of exploration licences surrounding the Mount Owen Complex.

The Glendell Mine currently operates under development consent DA 80/952 (Glendell Consent). The Glendell Consent regulates the mining of coal from the Glendell Pit and the rehabilitation of the mining area. The processing of coal mined from the Glendell Pit is regulated by development consent SSD-5850 (Mount Owen Consent) which also regulates mining at the Mount Owen and Ravensworth East Mines, and associated activities. Liddell Coal Operations operates under development consent DA 305-11-01 (Liddell Consent). This consent regulates open-cut mining from the South Pit and Entrance Pit and associated facilities.

Australian Cultural Heritage Management (ACHM) has been engaged by Umwelt Environmental and Social Consultants (Umwelt) on behalf of Glencore to complete an Aboriginal Cultural Heritage Assessment Report (ACHAR) for the Project. This assessment forms part of an Environmental Impact Statement (EIS) being prepared by Umwelt to accompany an application for development consent. Under Section 4.5 of the EP&A Act, the consent authority for development applications for SSD is the Minister for Planning and Public Spaces unless otherwise prescribed by an environmental planning instrument. Clause 8A of the SSD SEPP prescribes the Independent Planning Commission as the consent authority in the following circumstances:

- (a) development in respect of which the council of the area in which the development is to be carried out has duly made a submission by way of objection under the mandatory requirements for community participation in Schedule 1 to the Act,
- (b) development in respect of which at least 25 persons (other than a council) have duly made submissions by way of objection under the mandatory requirements for community participation in Schedule 1 to the Act,
- (c) development the subject of a development application made by a person who has disclosed a reportable political donation under section 10.4 to the Act in connection with the development application.

The above circumstances also define the consent authority for the purposes of modification applications.

At the time of submission of the development application, the Proponents had not made a reportable political donation as described in clause 8A(1)(c). Accordingly, the determination of consent authority for the Project will be dependent on the number and nature of objections received following the public exhibition of the applications and EIS.

Aboriginal Cultural Heritage Assessment Report

The process followed to consult with the Registered Aboriginal Parties (RAPs) has been a continuation of Glencore's overall approach to cultural heritage assessment in the Hunter Valley as previously utilised for the Bulga, Mount Owen, United Wambo JV and Mangoola EIS processes. Alongside this ACHAR, the existing Mount

Owen Aboriginal Cultural Heritage Management Plan covers the Glendell Mine and part of the Project Area and has on-going consultation mechanisms through the working group convened under that plan.

When engaging in Aboriginal cultural heritage assessments within the Hunter Valley, members of the Aboriginal community(s) have self-nominated to be part of either (a) representative bodies or (b) to participate in cultural heritage assessment processes as individuals.

The representative bodies for the Project are known as 'Knowledge Holder Groups' in this ACHAR, and they are:

- Wonnarua Nation Aboriginal Corporation (WNAC)
- Plains Clan of the Wonnarua People (PCWP), and the
- Individuals and groups not involved in the consultation and reporting processes of the Knowledge Holder Groups but who registered as RAPs were consulted separately, and their values are reported on by ACHM in this report. These individuals are referred to throughout this report as the 'Community RAPs'.

The process provided consultation and engagement for all the RAPs and allowed opportunities for additional information, stories and knowledge from Wonnarua people to be made known.

Cultural values assessment for the Community RAPs was undertaken by ACHM. The understanding of significance and the RAPs recommendations has also informed the Project on the development of a range of cultural heritage management recommendations. Any publicly disclosed documents from the Knowledge Holder Groups are included in this report.

Through the involvement of RAPs who identify a range of connections to both country and community, and through several past cultural heritage investigations (most notably the extensive assessments and consultations through the Mount Owen Continued Operations Project ACHAR undertaken between 2011-2013) the region surrounding the Project Area is known to contain a number of archaeological sites and to also hold certain cultural, historic and aesthetic values. The wider region has been identified as being of high cultural significance to many Wonnarua people, however the Project Area has been assessed during this ACHAR process as holding lower cultural significance than much of the surrounding region.

This ACHAR also presents a summary of the archaeological values assessment of the GCOP as well as a synthesis of the values and recommendations of all RAPs who participated in the cultural heritage assessment process.

Assessment Approach

This ACHAR has been prepared in accordance with the Secretary's Environmental Assessment Requirements (SEARs) for the Project, the requirements of the Draft Guidelines for Aboriginal Cultural Heritage Impact Assessment (DEC 2005), the Community Consultation guidelines of the current Aboriginal Cultural Heritage Consultation Requirements for Proponents (DECCW 2010a), and the Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW (OEH 2011). It has also been prepared in accordance with, and it also complies with the intent, requirements and assessment methodologies outlined in the Burra Charter (Australia ICOMOS 1999). The ACHAR has also been informed by the results of the Aboriginal Archaeological Impact Assessment (AAIA) undertaken by OzArk (2019).

Consultation Process

Consultation for the Project was undertaken consistent with the DEC (2005) and DECCW (2010a) guidelines and in accordance with the principles of the Burra Charter (Australia ICOMOS 1999). This has involved four consultation stages as detailed below.

Stage 1: Formal notification of the proposed Project and the ACHAR process and provided the opportunity for Aboriginal people to formally register their interest in the Project.

Stage 2: Initial Project description consultation, which included presenting information on the proposed Project to all Aboriginal parties who registered an interest in **Stage 1**. This consultation included details of the Project Area and potential impacts, and a description of works proposed. During the initial consultation phase, the draft Aboriginal cultural heritage survey methodology and archaeological testing methods (OzArk 2018) were issued for review by the RAPs. Consultation with the RAPs involved a combination of methods, including some one on one meetings, small and large group briefing sessions, including onsite inspections. **Stage 2** also included correspondence with PCWP to provide them with either the option to participate in the workshop process or to produce their own cultural values report for inclusion in this ACHAR.

Stage 3: Further consultation which refined the cultural heritage assessment approach with the WNAC and Community RAPs. The approach actively involved the WNAC and Community RAPs in the assessment of their cultural heritage values, the likely Project impacts, and the development of management measures. Consultation with the Knowledge Holder Groups was also proposed via a series of cultural values workshops.

Stage 4: Further consultation will be undertaken in relation to the RAPs review of the draft ACHAR, to seek feedback, modify reports as appropriate, receive and review submissions and to incorporate any additional input into the finalised ACHAR. The AAIA (OzArk 2019) report will be also circulated to the RAPs for a minimum 28-day review and comment. Glendell is continuing to engage with the PCWP regarding their input into the ACHAR and this offer remains open for their input.

Registered Aboriginal Parties

Throughout the course of the consultation program, 32 parties registered an interest in the Project.

The RAPs included individuals from:

- Two Knowledge Holder Groups (PCWP and WNAC);
- The Wanaruah Local Aboriginal Land Council; and
- Community RAPs.

A full list of all RAPs is contained in Appendix 11.2

All RAPs were invited to participate in the assessment process from the time of their registration, with extensive consultation undertaken to inform the Project, the ACHAR, the AAIA (OzArk 2019) and the broader environmental assessment of the Project.

Participation opportunities have been provided to the RAPs through:

- Two workshops;
- Discussions and/or meetings with individuals;
- Provision of archaeological survey and test pit methodologies for review,
- Archaeological investigations including survey and test excavation fieldwork onsite;
- Historic research and archaeological excavation fieldwork onsite; and
- Extensive correspondence between RAPs and the Project team via phone and email.

Throughout the Project, information was provided to RAPs in formal meetings or presentations and via mail, email or phone contact. Full details of the consultation process undertaken in relation to the ACHAR are contained in **Section 5** and copies of correspondence are contained in **Appendix 11.3** (Consultation Records).

The consultation approach also provided the RAPs with opportunities to decide in what manner they wanted their information shared and to identify any restricted access provisions. The process provided opportunities to identify a range of Aboriginal cultural values within the Project Area.

Glencore has engaged with the PCWP since the commencement of the Project. This has included numerous meetings and phone calls. At the time of writing the PCWP have not elected to participate in a Values and Recommendations Workshop and have not provided a Values and Recommendations Report or Statement, as was received for the Mt Owen Continued Operations Project. The offer for inclusion of PCWP Values and Recommendations remains open through the assessment process.

Whilst specific input has not been received, the engagement has raised the PCWP's concerns regarding colonial frontier violence and claims of a massacre of Aboriginal people. This was also the Subject of an Application under section 10 of the ATSIHP Act, made by some members of the PCWP. This has since been withdrawn and is discussed further in Section 1.5.1. It is also the focus of the additional work that was commissioned for this Project which is discussed in Section 3.2 and Section 3.3.

Aboriginal Archaeology Impact Assessment Report

An AAIA was undertaken by OzArk alongside this ACHAR. The full AAIA report is included as Appendix 11.5.

The majority of Aboriginal sites identified have been assessed as having low scientific significance. The overall low scientific significance of the new sites is directly related to the extensive and long-running previous disturbances within the Project Area.

Aboriginal Cultural Heritage Assessment Report

RAPs consulted for the ACHAR identified concerns with current and future mining within the broader region, and that this mining poses a significant threat to Aboriginal cultural heritage values. Many RAPs expressed the view that mining continues to cause fragmentation to the cultural, spiritual and historic values of the cultural landscape including degradation to important waterways. There were also some concerns expressed about the fate of the Ravensworth Homestead complex.

Direct Impacts

The Project will directly impact a number of archaeological sites if approved, as discussed in the AAIA. The Project will also have direct impact to the Ravensworth Homestead complex.

Indirect Impacts

The Project may also result in indirect impacts on Aboriginal cultural heritage values. The indirect impacts often identified by RAPs include:

- Difficulty in remembering the landscape as it was prior to mining;
- Difficulty for Wonnarua people in accessing much of the land in the Hunter Valley due to private ownership and/or mining;
- Regardless of the current condition and/or status of the land in question, Wonnarua people still feel a direct connection to the country of their ancestors, which would be further disrupted by more mining; and
- The predicted direct and indirect impact on the Aboriginal cultural heritage values of the Project Area add to the cumulative impact of mining development on the cultural heritage resources of the Upper Hunter Valley.

RAPs provided positive feedback regarding the indirect intergenerational impacts of this ACHAR process. The process has allowed stakeholders to (a) involve themselves in detailed archaeological and cultural values consultations and (b) to have discussions with family members and particularly Elders who may not otherwise have been involved in the assessment processes. This has allowed the RAPs the opportunity to engage with these Elders to ensure thorough consultation providing positive intergenerational outcomes.

Cumulative Impacts

Though the Project has been designed to avoid harm wherever practicable and the archaeological significance of the majority of sites within the Additional Disturbance Area is low, the Project's impacts will further contribute to the cumulative loss of Aboriginal cultural values and archaeological sites within the local area, and the region more generally. The direct impacts to the Ravensworth Homestead complex will also further contribute to the perceived loss of cultural values in the Project Area, however the relocation of the building group will mitigate some of the heritage loss associated with the Project.

Avoidance of Harm

In developing the footprint and the disturbance zone of the proposed Project, the Proponent has considered numerous mining options, layouts, overburden emplacements and infrastructure arrangements to optimise the Project's final design to avoid harm to as many Aboriginal sites as possible.

Aboriginal Cultural Heritage Management Measures

The management measures proposed for the Project align to the Principles of the Burra Charter (ICOMOS, 1999) and to the Aboriginal Community Wellbeing toolkit and criterion from OEH (OEH 2012). As a result of this assessment process, three of the eight wellbeing principles have been identified as priority areas most aligned to the context of the GCOP Project. Most of the recommendations from the RAPs for this project are more oriented towards social values (i.e. employment, education and training) rather than purely cultural values, however the recommendations should be viewed considering their cultural context.

The three principles most aligned are the following:

- Caring for Land and/or Cultural Awareness;
- Bringing People Together; and
- Education and learning.

These principles, in conjunction with the consultation outcomes with the RAPs, have informed the development and evaluation of management measures proposed for the GCOP Project.

Further, the following key considerations also guide the GCOPs recommendations and management outcomes:

- Alignment of the outcomes with the principles of the Strengthening Aboriginal Community Wellbeing Toolkit (OEH 2012) and the Burra Charter (2013);
- Aligning the recommendations with the findings of this ACHAR;
- Delivery of proposed management measures which are achievable;
- Includes a mix of short term and long-term management measures and implementation periods; and

• Foster and promote intergenerational equity through caring for country, education and research initiatives.

Management Recommendations

A range of management recommendations are presented in **Section 8**. These recommendations have been developed in conjunction with the RAPs for the Project.

The management measures are based on the key themes and values of the RAPs which have been identified through the ACHAR process.

The proposed management and mitigation measures have also been separated into those located onsite (within the Project Area) and those which are offsite (outside the Project Area or not requiring physical works within the Project Area). The management and mitigation measures have also been developed to address intergenerational equity aspects and to respect the regional significance of culturally significant features which surround the Project Area. These management measures have been developed in order to be consistent with the management measures recommended by the RAPs during this ACHAR process.

Conclusions

Alongside a previous ACHAR over the wider Project area (the Mount Owen Continued Operations Project ACHAR), this ACHAR has reaffirmed that there are no *traditional cultural values* associated with the Project Area (directly and specifically) held by the participants in this ACHAR process. By '*traditional*' cultural values, we refer to these in the Native Title sense as an inherited and cohesive body of '*traditional*' knowledge, laws and customs that are still observed and maintained by a particular Indigenous group.

However, in common with many urbanised communities, strong contemporary cultural values exist in almost universal claims of '*connection*' to the land in question, and a sense of anguish and/or anger at having been '*disconnected*' from the land in question by historical circumstances. In this case, the RAPs also expressed a potential for there to have been connections through time with the Ravensworth Homestead complex, however none of the RAPs had any direct knowledge of any of their ancestors having a direct association with the property.

It is the opinion of the author that the Project Area has undergone considerable modification since European settlement. Traditional Aboriginal lifeways and customs began to disappear in the early days of contact with Europeans and had largely disappeared before the turn of the 19th Century. Much of the natural landscape no longer exists in any cohesive manner, as the long history of agriculture in the area has irreversibly altered the landscape. Combining the historical disconnection of people from place with the extensive landscape modification since settlement means that the Project Area has a relatively low cultural significance when compared to other places within the wider region. This is also consistent with the archaeological assessment, which has determined that most of the archaeological sites are of low to moderate scientific significance.

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1 Introduction

ACHM has been engaged by Umwelt (Australia) Pty Ltd and Glencore Coal Australia Pty Ltd to complete an Aboriginal Cultural Heritage Assessment Report (ACHAR) for the Glendell Continued Operations Project (the Project). The purpose of the assessment is to form part of an Environmental Impact Statement (EIS) being prepared by Umwelt to accompany an application for development consent under Divisions 4.1 and 4.7 of Part 4 of the Environmental Planning and Assessment Act 1979 (EP&A Act) for the Project.

This ACHAR has been prepared in accordance with the SEARs the Aboriginal Cultural Heritage Consultation Requirements for Proponents (DECCW 2010a), and the Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW (OEH 2011). It also been prepared in accordance with, and it also complies with the intent, requirements and assessment methodologies outlined in the Burra Charter (Australia ICOMOS 1999).

A stand-alone Aboriginal Archaeological Impact Assessment (AAIA) report was prepared by OzArk Environmental and Heritage Management (OzArk) to assess the archaeological values of the Project Area and provide management recommendations for sites within the Project Area. The results of that archaeological assessment have been incorporated into this ACHAR. Historical archaeological investigations were also undertaken at the Ravensworth Homestead complex and surrounds by Casey & Lowe Pty Ltd.

1.1 Project Overview

The Glendell Mine is part of the Mount Owen Complex located in the Upper Hunter Valley of New South Wales (NSW), approximately 20 kilometres (km) north-west of Singleton, 24 km south-east of Muswellbrook and to the north of Camberwell.

In addition to the Glendell Mine, the Mount Owen Complex comprises mining operations at the Mount Owen Mine (North Pit) and Ravensworth East Mine (Bayswater North Pit). The Mount Owen Complex also includes a coal handling and preparation plant (CHPP) and coal handling and transport infrastructure (refer to Map 1-2).

Mt Owen Pty Limited (Mount Owen) operates the Mount Owen CHPP, Ravensworth East and the Glendell mining areas with mining operations at the Mount Owen Mine North Pit operated by Thiess Pty Ltd pursuant to a contractual arrangement with Mount Owen. The Mount Owen Complex is adjacent to the Integra Underground, Liddell Coal Operations and Ravensworth Operations, which are also operations owned and operated by subsidiaries of Glencore Coal Assets Australia Pty Limited (Glencore) and its joint venture partner (JV). Glencore and the joint venture partner also hold a number of exploration licences surrounding the Mount Owen Complex.

The Glendell Mine currently operates under development consent DA 80/952 (Glendell Consent). The Glendell Consent regulates the mining of coal from the Glendell Pit and the rehabilitation of the mining area. The processing of coal mined from the Glendell Pit is regulated by development consent SSD-5850 (Mount Owen Consent) which also regulates mining at the Mount Owen and Ravensworth East Mines, and associated activities. Liddell Coal Operations operates under development consent DA 305-11-01 (Liddell Consent). This consent regulates open-cut mining from the South and Entrance Pits and associated activities.

This proposed extension of the current open cut mining operations at the Glendell Mine would extract approximately an additional 135 million tonnes (Mt) of run of mine (ROM) coal. This extension of the Glendell Pit is referred to as the Glendell Pit Extension. The Glendell Pit Extension will extract reserves down to and including the Hebden Seam. The Project would extend the life of mining operations at Glendell to approximately 2044.

In addition to the existing operations, this development consent would cover the Glendell Pit Extension and works directly associated with the pit extension including:

- Rehabilitation of areas disturbed by mining activities, including overburden emplacement areas
- Realignment of a section of Hebden Road
- Relocation of Ravensworth Homestead
- Realignment of the lower section of Yorks Creek
- Construction and use of new mine infrastructure area (MIA) facilities, related infrastructure and associated access roads.



Map 1-1: Location of the Glendell Continued Operations Project



Map 1-2: Proposed Project

1.2 Structure of the Report

The format of this report mirrors the format recommended by the Office of Environment and Heritage (OEH) in the 'Guide to investigating, assessing and reporting on Aboriginal cultural heritage in New South Wales' (OEH 2011).

The process followed to consult with the Registered Aboriginal Parties (RAPs) has been a continuation of Glencore's overall approach to cultural heritage assessment as previously utilised for the Bulga, Mount Owen, United Wambo JV and Mangoola EIS processes. When engaging in Aboriginal cultural heritage assessments within the Hunter Valley, members of the Aboriginal communities may choose to be part of representative bodies or to participate in cultural heritage assessments as individuals.

The representative bodies for this Project are known as 'Knowledge Holder Groups' in this ACHAR, and they are:

- Wonnarua Nation Aboriginal Corporation (WNAC)
- Plains Clan of the Wonnarua People (PCWP),

RAPs whose views were not captured by those Knowledge Holder Groups were also consulted for this ACHAR, and their cultural values, care and control and conservation recommendations have been included in this report.

This ACHAR presents a summary of the archaeological values assessment of the Project Area as well as a synthesis of the values and recommendations of all RAPs who participated in the cultural heritage assessment process.

Section 1 of this report introduces the Project and the ACHAR within the Project, EIS and legislative contexts.

Section 2 of this report describes the Project Area and presents a discussion of the land ownership and environmental background of the Project Area. A review of historical land use practices and previous approvals for other mining activities relevant to the Project are also discussed.

Section 3 presents a historical narrative of the Project Area.

Section 4 includes the results of the AAIA (OzArk 2019) undertaken for the Project and concludes with an assessment of the scientific significance of Aboriginal sites and objects identified through the archaeological assessment. Historical archaeological investigations of the Ravensworth Homestead complex are also discussed. The AAIA is contained in **Appendix 11.5**

Section 5 outlines the extensive consultation processes undertaken with RAPs for this ACHAR.

Section 6 presents a discussion on cultural heritage values and significance assessment in general, alongside a consolidated statement of significance for the Aboriginal Places within the Project Area formulated according to the cultural heritage industry best-practice guidance of the Burra Charter (Australia ICOMOS 1999).

Section 7 discusses opportunities for avoiding and/or mitigating harm to Aboriginal cultural heritage.

Section 8 presents management recommendations developed by the Project stakeholders for both 'Project Approval' and 'No Project Approval' scenarios. Specific recommendations regarding intergenerational equity are also discussed.

1.3 Key Issues

The Aboriginal community of the Hunter Valley shares many similarities with other Aboriginal communities throughout Australia. One of those similarities is a degree of division among the people living in the Hunter Valley. There are divisions between several family groups, Knowledge Holder Groups and individuals, which at the time of writing showed no progress towards resolution. Resolving this issue is beyond the scope of this report. Because of these divisions within the community and groups, the individuals who registered as RAPs could not be consulted as a single group, and an alternative approach was required.

Following initial public notification and targeted invitations, 29 parties registered for this project. By the end of the process, there were 32 RAPs.

In the interests of ensuring that all interested Aboriginal parties were consulted, the Project embarked on a process of consultation and reporting that has been utilised previously by Glencore for the Bulga, Mount Owen, United Wambo JV and Mangoola projects.

Glencore has engaged with the PCWP since the commencement of the Project. This has included numerous meetings and phone calls. At the time of writing the PCWP have not elected to participate in a Values and Recommendations Workshop and have not provided a Values and Recommendations Report or Statement, as was received for the Mt Owen Continued Operations Project. The offer for inclusion of PCWP Values and Recommendations remains open through the assessment process.

Whilst specific input has not been received, the engagement has raised the PCWP's concerns regarding colonial frontier violence and claims of a massacre of aboriginal people. This was also the Subject of an Application under section 10 of the ATSIHP Act, made by some members of the PCWP. This has since been withdrawn and is discussed further in Section 1.5.1. It is also the focus of the additional work that was commissioned for this Project which is discussed in Section 3.2 and Section 3.3.

The key points of the ACHAR consultation process are as follows:

- There were two Knowledge Holder Groups (WNAC and PCWP) registered for the Project.
- Individuals not involved in the consultation and reporting processes of the two knowledge holder groups but who registered as RAPs were consulted separately, and their values are reported on by ACHM in this report. These individuals are referred to throughout this report as the 'Community RAPs'
- One family group requested that they be consulted separately to all other groups (Hickey family). Feedback from the Hickey's has been included with the feedback from the Community RAPs.
- At the time of writing, the PCWP were yet to provide their values for input into the ACHAR, however the offer for inclusion of their values report remains open throughout the assessment process.

The process provided consultation and engagement for all the RAPs and allowed opportunities for additional information, stories and knowledge from Wonnarua people to be made known.

1.3.1 Roadmap of the Report

For ease of reference, the following table provides page numbers and reference points to key issues in this report.

Key Item	Section	Page
Project Overview	1.1	3
ACHAR Objectives	1.3.2	8
SEARs	1.5.2	10
Consultation Processes	4.4	31
Cultural Values and Significance Assessment	6.0	66
Recommendations	8.0	81

Table 1-1: Report Roadmap

1.3.2 Aboriginal Cultural Heritage Assessment Approach and Objectives

The cultural values and archaeological assessments culminating in the preparation of this ACHAR have been undertaken to provide:

- 1. Extensive and meaningful opportunities for engagement and consultation with Knowledge Holders and RAPs for the Project,
- 2. Full compliance with the Secretary's Environmental Assessment Requirements (SEARs),
- 3. Full compliance with the Aboriginal Cultural Heritage Consultation Requirements for Proponents (DECCW 2010a),
- 4. Full compliance with the Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW (OEH 2011),
- 5. An objective archaeological assessment to determine the scientific significance of the archaeological places within the Project Area, and
- 6. The identification of cultural values and the determination of cultural significance which are consistent with the guidance provided in the Burra Charter and Indigenous Cultural Heritage Management Practice Note (Australia ICOMOS, 2013).

The objectives of this report are to:

- 1. Present the Project's consultation methodologies and processes as agreed with the RAPs and utilised in this Project, and
- 2. Ensure that Aboriginal people can participate in and improve the outcomes of the assessment by:
 - (d) Providing relevant information about the cultural significance and values of the Aboriginal object(s) and/or place(s) within the Project Area,

- (e) Influencing the design of the method to assess cultural and scientific significance of Aboriginal object(s) and/or place(s) within the Project Area,
- (f) Actively contributing to the development of cultural heritage management options and recommendations for any Aboriginal object(s) and/or place(s) within the Project Area; and
- (g) Commenting on draft assessment reports before they are submitted by the proponent as part of the EIS.

1.4 Registered Aboriginal Parties

This report is a consolidation of cultural values assessments undertaken and reported on with the RAPs by ACHM for this Project. It also relies heavily on the extensive cultural values assessments completed for the Mount Owen Continued Operations Project ACHAR in 2011 and 2012 (ACHM, 2013). Any information produced by the consultation processes as utilised for this report were compliant with the 2010 OEH Draft Guidelines for Community Consultation, and the results of that information is consolidated and presented in this ACHAR.

The groups who registered and were consulted are:

- 1. WNAC,
- 2. PCWP, and
- 3. Community RAPs

The Community RAPs are not usually members of the Knowledge Holder Groups but are RAPs for the Project. ACHM was also contracted to undertake the community consultation and cultural values reporting with this group. The results of that consultation process are presented in this report. The Hickey family are a part of the Community RAPs; however as noted, they requested a separate consultation process.

The consultation process has involved consultation with all 32 RAPs from the discrete groups. The process has also facilitated the knowledge holder groups having the ability to consult with Aboriginal people who (a) were not RAPs for the Project but (b) are traditional owners of the Hunter Valley area, and therefore constitute important stakeholders.

1.4.1 Other Consultant Input

Several parties have been involved in the preparation of components of this report.

Alongside the consultants noted in Table 1-2, below, Project personnel have also provided extensive amounts of information and support for the final report.

Organisations	Individual(s)	Role	
АСНМ	Dr Shaun Canning	Cultural values recording, consultation workshops, significance assessment, ACHAR consolidation and preparation	
OzArk	Ben Churcher	Archaeological survey, excavation and reporting	
Casey & Lowe	Mary Casey	Historic archaeological excavations and reporting	
Umwelt	Bridie McWhirter	EIS preparation, GIS, environmental and proposed development sections, mapping, historic heritage	
Mark Dunn	Mark Dunn	Historical research and reporting on interactions between Aboriginal people and early settlers within and around Ravensworth Estate	

Table 1-2: EIS and ACHAR Consultants.

This report has been prepared by Dr Shaun Canning, Principal Heritage Advisor with ACHM.

1.4.2 About Dr Shaun Canning

Dr Shaun Canning is the Managing Director and the Principal Heritage Advisor of Australian Cultural Heritage Management (Vic) Pty Ltd. (ACHM), which specializes in cultural heritage assessment, expert advice, management of complex and large-scale cultural heritage management projects (primarily in relation to Australian Indigenous culture and heritage), native title advice and research, Indigenous community consultation and development matters, geographic information systems, cartography and analysis. Shaun has been involved extensively in the completion of over 500 cultural heritage management projects nationally.

Shaun holds a Bachelor of Arts degree majoring in Cultural Heritage Studies and Anthropology, a Bachelor of Applied Science (Hons) degree in Parks, Recreation and Heritage, and a PhD in Australian Indigenous Archaeology (La Trobe), specialising in predictive modelling and cultural heritage management in southern Victoria. Shaun was the recipient of a 3-year Australian Postgraduate Award Scholarship to complete his PhD. Shaun has extensive experience in Indigenous cultural heritage management in the resources, urban development, infrastructure and

public land management sectors, alongside considerable experience in community consultation and Aboriginal education. Shaun has expertise in complex project management, and the use of GIS and predictive modelling in archaeological, cultural and natural heritage management contexts.

Shaun is a Fellow of the Australian Anthropological Society (F.AAS), a member of the International Council on Monuments and Sites (M. ICOMOS), a full member of the Australian Association of Consulting Archaeologists (M. AACAI) and a Certified Environmental Practitioner (CenvP) through the Environment Institute of Australia and New Zealand (EIANZ).

Shaun is an 'Expert Member' of the ICOMOS International Committee on Archaeological Heritage Management (ICAHM), an Honorary Research Associate of the Archaeology Program at La Trobe University, a member of the Indigenous Relations Working Group committee of the Minerals Council of Australia, and a member of the EnviroDevelop Technical Standards Development Taskforce for the Urban Development Institute of Australia (UDIA). He is the current Chair of the EIANZ Heritage Special Interest Section (SIS).

1.5 Legislative Environment

The following sections present the Commonwealth and State statutory controls that provide legal protection for Aboriginal cultural heritage in NSW, and that identify the approval processes for any proposed Project that seeks to impact Aboriginal cultural heritage places and objects.

1.5.1 Commonwealth Legislation

Aboriginal and Torres Strait Islander Heritage Protection Act 1984

The Aboriginal and Torres Strait Islander Heritage Protection Act 1984 (the ATSIHP Act) provides for the declaration by the Minister for the protection of Aboriginal cultural heritage of significance to Indigenous Australians, generally in circumstances where State or Territory laws fail to do so. The power to make declarations is a last resort process, after the relevant processes of the state or territory have been exhausted.

The Minister for the Environment received a written application under section 10 of the Act for a declaration for the protection and preservation of an area described as the '**Ravensworth Estate Homestead Complex and Surrounds'** on the basis of its Aboriginal significance and a Reporter was appointed to review the application.

The application was made by Mr Scott Franks and Mr Robert Lester, as representatives of the 'Plains Clan of the Wonnarua People'. Mr Lester is the Chairperson of the PCWP Aboriginal Corporation, the representative body for a native title claim by the Plains Clan of the Wonnarua People over an area of land that includes the Specified Area.

The DoEE appointed Reporter for the process noted the Application in the Australian Government Gazette in June and July 2019, and invited Representations in response. The Australian Government Gazette noted the claims regarding events of colonial frontier violence, noting the mid 1820's including the claim of a massacre of Aboriginal people in reprisal for the killing of two settlers. Eleven Representations were made, including government departments, community members, other Aboriginal stakeholders, Infrastructure owners, other mining companies and Glencore. The Reporter also requested further information from the Applicants. Following the provision of Representations to the Reporter (21 August 2019), the Applicants withdrew the Application on 6 September 2019. The further information requested by the Reporter from the Applicants was not provided.

Native Title Act 1993

The *Native Title Act 1993* provides for the recognition and determination of native title in Australia, processes for how future activity can proceed on native title land, and to provide compensation where native title is impaired or extinguished. Native Title Act processes for the purposes of the Project are not discussed in this report as Native Title is extinguished within the Project area.

Protection of Movable Cultural Heritage Act 1986

The *Protection of Movable Cultural Heritage Act 1986* (the PMCH Act) implements Australia's obligations under the UNESCO Convention on the Means of Prohibiting the Illicit Import, Export and Transfer of Ownership of Cultural Property. Under the PMCH Act it is unlawful to export a 'protected object' from Australia without a certificate or permit from the Environment Minister. This Act is not directly relevant to this report.

1.5.2 State Legislation

Environmental Planning and Assessment Act 1979

The *Environmental Planning and Assessment Act 1979* (EP&A Act) is the main piece of legislation regulating land use in NSW. The Act is administered by the Department of Planning and Environment (DPE) and guides the process of land development, including the assessment and management of cultural heritage impacts.

This ACHAR (including the AAIA) has been prepared in accordance with SEAR's.

Specific to the assessment of Aboriginal cultural heritage impacts, the SEAR's require that the EIS must include:

 An assessment of the potential impacts of the development on Aboriginal heritage (cultural and archaeological), including consultation with relevant Aboriginal communities/parties and documentation of the views of these stakeholders regarding the likely impact of the development on their cultural heritage;

The archaeological and cultural values assessments along with this ACHAR have been prepared in accordance with the SEARs.

Table 1-3: Secretary's Environmental Assessment Requirements

SEAR	Where Addressed
An assessment of the potential impacts of the development on Aboriginal heritage (cultural and archaeological), including consultation with relevant Aboriginal communities/parties and documentation of the views of these stakeholders regarding the likely impact of the development on their cultural heritage.	Chapters 4-7
During the preparation of the EIS, you must consult with relevant local, State and Commonwealth Government authorities, service providers, Aboriginal stakeholders, community groups and affected landowners.	Chapters 5 through 7

National Parks & Wildlife Act 1974

The *National Parks & Wildlife Act 1974* (NP&W Act) is the primary law in NSW that provides protection for Aboriginal cultural heritage.

Under section 86(1) and 86(4) of the Act, it is an offence to harm an Aboriginal objector an Aboriginal place. The NP&W Act provides for several defences to prosecution for harming Aboriginal objects or places including that the person harmed the object or place in accordance with an Aboriginal Heritage Impact Permit (AHIP) or that the person exercised due diligence.

Under Section 4.41 of the EP&A Act, an AHIP is not required, and the NP&W Act provisions prohibiting harm to Aboriginal objects and places are not applicable, to State Significant Development that is authorised by development consent.

Heritage Act 1977

The *Heritage Act 1977* provides for the protection of natural, cultural and built heritage that are of State or local heritage significance in NSW, through the register of heritage places or items on the State Heritage Register and the making of interim heritage orders and emergency orders to protect heritage items or places at risk.

The registration on the State Heritage Register or the making of interim register order places limits on what can be done to the heritage, although interim heritage orders do not apply to State Significant Development under the EP&A Act.

2 Description of the Site

The Project area is in the order of 2,900 hectares.

2.1 Land Ownership

The land within the Project Area is owned by Glencore or associated entities except for some Crown land, and the road reserve for Hebden Road for which Singleton Council is the Roads Authority. A small parcel of Crown land is located within the proposed Glendell Pit Extension area. A claim under the *Aboriginal Land Rights Act 1983* has been lodged over this parcel of Crown Land, however Native Title has been extinguished over that land.

Land ownership in the area is shown in Map 2-1.

2.2 Environmental Overview

The Project Area has been predominantly and historically cleared for agriculture and contains native and exotic grasslands with scattered patches of native regenerated vegetation. Intact mature vegetation occurs along the creeks and tributaries of the area including along Yorks Creek, Swamp Creek and Bowmans Creek. The Project Area has historically been used for agriculture since the 1800s and is comprised predominately of degraded grazing land and patches of native woodland.

2.2.1 Topography / Landforms and Drainage

The Project Area is situated centrally on the floor of the Hunter Valley (Central Lowlands) and occurs within the wider Hunter River catchment which covers approximately 22,000 km² of land bordered by the Liverpool Ranges, the Great Dividing Range, the Mount Royal Range and the Barrington Tops. The Project Area is situated approximately 87 km from the coast and 150 km from the western extremity of the Hunter catchment at the Great Dividing Range.

The Project Area is typical of the Central Lowlands of the Hunter Valley, which are characterised by undulating to low rolling hills formed on weak sedimentary rocks with low local relief (Kovac and Lawrie 1991). The topography of the Project Area is characterised by an undulating and hilly landscape extending to lower areas associated with the creek lines that traverse the Project Area. Elevations range between 70 mAHD in the south and 400 mAHD in the northern extent of the Project Area, west of Mount Owen Mine. The Glendell Pit extension will affect land with elevations of between approximately 70 mAHD and 130 mAHD (excluding areas of the Ravensworth East emplacement areas impacted by the Glendell Pit extension).

Approximately 18 km to the south of the Project Area are the dissected sandstone plateaus of Wollemi and Yengo National Parks, while approximately 30 km to the north, the foothills of the Barrington Tops and Mount Royal Range adjoin the Hunter Valley floor, which is bounded by the Hunter Thrust System (Peake 2006). To the east and west of the Project Area extend the highly eroded Permian lowlands of the floor of the Hunter Valley. The topography across the majority of the Project Area is generally flat to gently undulating with 0 to 5-degree slopes with the exception of Ravensworth State Forest and those steeper slopes created by the existing approved mining operations.

The Project Area is located within the Bowmans Creek catchment. Bowmans Creek is a tributary of the Hunter River. Mining in the proposed Glendell Pit extension is primarily within two sub-catchments of Bowmans Creek, namely Yorks Creek and Swamp Creek. The Project will result in relatively minor modifications to the approved Glendell Mine final landform, which will also modify the Bettys Creek catchment.

2.2.2 Geological Features and Resource Description

The proposed Glendell Pit extension, like the current Glendell Pit, is located along the Camberwell Anticline. The Camberwell Anticline is the major structural feature in the area and runs in a general north-south alignment through the proposed Glendell Pit Extension. The Camberwell Anticline exhibits steep dips (>20 degrees) on its eastern flank and dips up to 12 degrees on its western flank. The main open cut resources occur along the axis of the anticline with deeper resources present on the western and eastern margins.

The two other major geological features present in the area are the Block Fault Zone (which occurs towards the northern extent of the proposed Glendell Pit Extension) and the Hunter Valley Dyke, (which occurs to the northwest of the proposed Glendell Pit extension). Both features run in a general north-east/south-west alignment. The target coal reserves for the Glendell Pit Extension are the Burnamwood, Bulga and Foybrook Formations, which are the lowermost coal bearing formations of the Wittingham Coal Measures. Seven seams with open cut potential exist from the Bayswater seam to the Hebden seam and range in depth to approximately 240 m. The Bayswater and Upper Lemington Seams are limited to the eastern extent of the proposed pit.



Map 2-1: Land Ownership.

In addition to the hard rock strata, the surface drainage channels host Quaternary to recent unconsolidated alluvial and colluvial materials of variable thickness and extent.

To determine the soils and the likely age of the parent material they are derived from, a review of detailed soil landscapes mapping and geological mapping was undertaken to determine whether Permian derived soils occur within the Project Area. The Project Area is situated on the edge of the Permian Singleton Coal Measures mapping with much of the surface geology being formed by the Triassic Narrabeen group (as determined both from regional geological mapping and from detailed geological investigations undertaken within the Project Area). The detailed soil survey undertaken within the Project Area found that the soils have mostly been derived from the Triassic Narrabeen group.

2.2.3 Existing Environmental Conditions

The Potential Additional Disturbance Area has been predominantly and historically cleared for agriculture and contains native and exotic grasslands with scattered patches of native regenerated vegetation. Intact mature vegetation occurs along the creeks and tributaries of the area including along Yorks Creek, Swamp Creek and Bowmans Creek.

The broad plant community types that are likely to occur in the Potential Additional Disturbance Area include:

- Narrow-leaved Ironbark-Grey Box Grassy Woodland of the Central and Upper Hunter
- Spotted Gum Narrow-leaved Ironbark Shrub Grass Open Forest of the Central and Lower Hunter
- Bull Oak Grassy Woodland of the Central Hunter Valley
- River Oak Riparian Grassy Tall Woodland of the Western Hunter Valley
- Swamp Oak Weeping Grass Grassy Riparian Forest of the Hunter Valley.

Threatened Ecological Communities (TECs) are ecological communities which are at risk of extinction. Under the EPBC Act, there are three categories for listing TECs: critically endangered, endangered and vulnerable. The Potential Additional Disturbance Area is likely to include the following TECs:

- Central Hunter Ironbark Spotted Gum Grey Box Forest in the NSW North Coast and Sydney Basin Bioregions endangered ecological community (EEC) listed under the BC Act.
- Central Hunter Grey Box Ironbark Woodland in the NSW North Coast and Sydney Basin Bioregions EEC listed under the BC Act
- Central Hunter Valley Eucalypt Forest and Woodland critically endangered ecological community (CEEC) listed under the EPBC Act.

No threatened flora species listed under the BC Act or EPBC Act have been recorded within the Potential Additional Disturbance Area. Three endangered flora populations listed under the BC Act have been previously recorded close to or within the Potential Additional Disturbance Area being:

- Cymbidium canaliculatum (tiger orchid) population in the Hunter Catchment
- Eucalyptus camaldulensis (river red gum) population in the Hunter Catchment
- Acacia pendula (weeping myall) population in the Hunter Catchment.

2.2.4 Climate

The nearest Bureau of Meteorology (BoM) record station to the Project Area is situated at the Singleton STP location (BoM 2018). Climate statistics from the Singleton STP indicate that the region experiences a mostly temperate climate with temperatures above zero during the cooler months. The climate statistics show that the highest mean monthly temperatures are in January (31.9°) and the lowest mean monthly temperatures are in July and August (4.3°). Rainfall is greatest in February (mean rainfall: 85.6 millimetres [mm]) and the lowest in July (mean rainfall: 24.3 mm). The annual average rainfall is 659.1 mm.

3 Historical Background

3.1 Historical Narrative of the Region

Literature and research concerning the Wonnarua of the central Hunter Valley area is incomplete, largely as a result of omissions, silence and antiquated concepts of ethnology. In relation to New South Wales' Indigenous population, ethnohistoric attention has focused on coastal communities to the detriment and exclusion of those inland, thereby making the material about the Wonnarua patchy at best, but more commonly absent (Brayshaw, 1987: 74). Research into the language group was further hampered by changing notions of significance. In considering the lack of historical and archaeological information about campsites, Koettig (1990: 35) for example acknowledges that they were neglected as an important subject matter by her peers for many, many decades, because they were regarded as relatively unimportant, especially when compared to ceremonial sites. Even though they are now deemed to be of significance, the literature remains largely silent about them.

Nolan (2012:78) reminds her readers there was a popular concept during the colonial period that time (and therefore history) in the new colony of New South Wales began with the arrival and occupation of Europeans. Consequently, there was a lack of activity in recording the detailed lives of Indigenous people at the commencement of European settlement. This, however, began to change from the 1830s, yet by this time, these communities had already been adversely and irretrievable effected by disease, violence, displacement and dispossession and so the accounts were not a true reflection of how they once had lived (Umwelt, 2011).

3.1.1 Prior to White Settlement

The land of the Wonnarua was vast and stretched over much of the Hunter Valley. Tindale (1974: 201) estimated that it covered over five thousand square kilometres. Its borders were somewhat vague and, as a result, often erroneously recorded in the literature, possibly because of the new settlers' lack of understanding of the complexity of Indigenous society and its association with land. Tindale (1974: 201) defined Wonnarua country as being located on the *'upper Hunter River from a few miles above Maitland west to Dividing Range. The southern boundary with the Darkinjang is on the divide north of Wollombi*'. The Wonnarua's neighbours were the Darkinung (to the south), the Awabakal (to the south east), the Worimi (to the east) and the Wiradjuri (to the west) (Horton, 1994). They had close ceremonial ties to the Darkinung and Wiradjuri people (Macquarie University, 2009). See Figure 3-1, below.

The population of the Wonnarua prior to European settlement is unknown, and approximations vary widely. Estimates vary and were most likely made well after populations had declined, so must be treated with caution. Discrepancies also arose partly because when official census were conducted, Indigenous people often went unseen by Europeans, either intentionally or unintentionally. When travelling through the area in 1825, Cunningham observed that although no Aboriginal people had been seen *'their recent marks on the trees and fired country'* showed that they had been in the area (Cunningham (1825) cited in Bradshaw 1987: 20).

The structure of Indigenous communities was complex. The Wonnarua comprised a nation, or language group. They all spoke the one language and shared similar customs and beliefs. However, within that group there was clans, each with their own territories. According to Fawcett (1898: 180), Wonnarua men belonged to one of four skin groups: either of the *Ippye, Kumbo, Murree* or *Kubbee*. Women, conversely, were either *Ippatha, Butha, Matha* or *Kubbitha*. With marriage within skin groups strictly forbidden, members of different clans lived together in small communities or familial groups.

As Miller (1985) discusses, kinship was the very thing that 'welded Koori society together' since everyone was related to one another in a web of obligations, biological connections and spiritual associations. While the mother and father were important people in a child's life, a boy or girl's uncle (mother's brother) was particularly significant as it was he who taught them many things in their early lives. For males, this relationship altered, though, when boys were initiated after reaching puberty and were transformed into men.

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Figure 3-1: The boundary lines of the Wonnarua and their neighbours according to Norman Tindale (1940).

Spiritual kinship also united the Wonnarua with one another, the landscape and everything in it, *'thus kinship interwove throughout Aboriginal society, creating a very complex dynamic in which every individual had a specific relationship with every other individual, with the food they ate, and with the land'* (Bradshaw, 1987: 37). Before a child was born, he or she was assigned totems and skin groups according to that of the biological father (Miller, 1985). The child's mother was from the opposite totem and skin group. The totem system linked them with the Dreaming as it was a *'legacy of the spirits'* (Miller, 1985).

Life for the Wonnarua was intensely spiritual, as it was for all Indigenous people. Everything in the landscape was created by the spirits. A newborn baby was perceived as a spirit in physical, human form (Miller, 1985). Events, natural or otherwise, were perceived as the workings of benevolent or malevolent spirits. Everything from food shortages and droughts to births and deaths could be explained by the actions of unseen evil or benign actors. Consequently, the Wonnarua along with most Australian Indigenous people saw themselves not as the owners of resources or land but rather as custodians, for these were all created in the Dreamtime by the ancestral or mythical beings. The myths that surrounded and influenced their daily lives were passed on from one generation to another and *'each clan acted as caretakers for those legends which were manifested in the topography of their region'* (Needham, 1981: 4).

The Wonnarua lived a semi nomadic life but, it was not random wanderings. The position of camps was often determined by the availability of natural resources, like food and water, which were sometimes seasonal or affected by floods, droughts and other climatic events. The availability of water was especially important in choosing a location, *'irrespective of the size of the watercourse.'* The smaller the waterway, the smaller the camp (Koettig, 1990). Many creeks and creek junctions were particularly popular, as is evident in the archaeological record of the Singleton, Muswellbrook and Jerrys Plain region (Brayshaw, 1987: 96). Koettig (1990: 118) reinforces this with her modelling of a variety of Indigenous sites types in the Hunter Valley, the vast majority of which are located in close proximity to water courses.

The sourcing of other natural resources besides food and water also dictated campsite locations. For example, the construction of a canoe being in proximity to a place with suitable trees that had just the right bark to construct it, as did the making of implements (like boomerangs and shields) or the sourcing of other raw materials, such as stone, ochre or resin (Umwelt 2011). Together with natural resources, a suitable vantage point in case of conflict was often considered when deciding on a camp site (Umwelt 2011).

At other times, social events and obligations also influenced a camp's location. Interaction between different nations and clans was an essential aspect of life for all Wonnarua. It provided them with opportunities to trade goods, participate in important ceremonies and strengthen kinship and trading relationships. During the hot summer months when fish were most plentiful, the Wonnarua visited the cooler coastal lands of the Worimi or Awabakal while in the cooler months, the neighbours journeyed to Wonnarua country and took part in *'ritual'* kangaroo hunts (Brayshaw 1987: 82). Such activities not only provided participants with food but also strengthened social and economic ties between the various groups.

Trading relationships between inland and coastal Indigenous communities provided each group with opportunities to procure items that were unavailable in their traditional lands or were in short supply. The Wonnarua traded possum skins for shells with coastal tribes as neither group could source such materials from their traditional lands. The shells were used for a range of purposes such as sharpening tools to fashioning fishhooks (Brayshaw 1987: 67).

Ceremonies were an important aspect of life for the Wonnarua. They were frequently held when natural resources, like food and water, were plentiful. There is now little evidence detailing where such events took place, but it is known that they rotated around various sites, thereby allowing *'the local environment to fully recover from periods of intensive exploitation'* (Umwelt 2011). Initiation ceremonies were important rites of passage for boys having reached puberty. It *'would make them spiritually as well as physically different from women. No longer would they eat the female species of game or collect fruits and yams or even eat with the women'* (Miller 1985). It was a time when they assumed greater responsibilities as they went from being a boy to a man. The actual ceremony was one occasion when neighbours participated in the event. A messenger would be sent to other clans or nations inviting them to the gathering. Two circular clearings would be prepared with a connecting pathway, creating sacred ground where certain parts of the ceremony would take place. These areas were known as 'Bora' grounds.

Being a hunter and gatherer society, much time was spent procuring food and it was frequently sourced within about five kilometres (or a day's walk) of the campsite. The Wonnarua consumed a diet high in protein and obtained this from kangaroo, emu, bandicoot, possum, native rats, fish, insect lava, lizards, snakes, grubs and caterpillars. The water lily was also a popular item of food (Fawcett 1898: 152). Food gathering was performed according to strict gender roles. Men fished, hunted larger game, like wallaby and kangaroo, and used bark nets knitted by women to catch eels, emus and other animals. Women, on the other hand, gathered fruits, grubs, roots, plants and hunted smaller animals, like lizards (Miller 1985).

The landscape provided the Wonnarua with all the tools and items they required for daily living. Bark was one of the most common materials used by the Wonnarua, possibly because of its adaptability (Brayshaw 1987: 59). It was utilised in the construction of many things, from shelters and transportation to shields and implements. Cord from different types of bark was also made and was used for a variety of purposes, such as in the weaving of nets or the securing of stone points to spear shafts (Brayshaw 1987: 60-63). The manufacture of string by women was a sight of interest and intrigue for some early Europeans:

They twist and roll the bark in a curious manner with the palm of the hand upon the leg; with this string they form nets of curious workmanship. In some the meshes are very small and neat, and the whole knit without a knot, excepting at its completion (Ebsworth in Brayshaw 1987: 63).

With a number of large rivers and creeks in the region, bark canoes were important objects for the Wonnarua. The canoes were usually made from one piece of bark and then shaped with the use of fire which made the material malleable (refer to Figure 3-2??). The Australian Museum's Morrison Collection has two bark canoes from the Hunter Valley region (Nolan 2012: 32). Since the vessels were not built to withstand the rigors of the ocean,

Nolan (2012, p. 34) speculates that they were constructed by one of the valley's inland tribes and used for some of the area's calmer waters.

Along with bark, hard wood was also used to create several different tools. Women's yam sticks, often left undecorated and used in food gathering and preparation, were constructed from wood and were sometimes up to two metres in length (Brayshaw 1987: 65). Hard wood shields and boomerangs were also made.

Boomerangs were important hunting and fighting implements. Their unique, aerodynamic shape enabled the hunter to kill or wound prey from a great distance and, in the hands of a skilled thrower, with great accuracy. They also served as percussive instruments during ceremonies and as fire lighting aids (Australian Museum, 2010.). The Morrison Collection also contains a number of boomerangs from the Hunter Valley region. Since Alexander Morrison sourced many of his artefacts from the St Clair Mission which accommodated a large number of Wonnarua people, it is possible that some of the boomerangs and other objects were made by the Wonnarua (Gray, 2010; Nolan, 2012).

Animals not only provided food for Indigenous communities but a variety of other items. Kangaroo bone was shaped into sewing implements, such as needles, which were needed for making animal skin capes, mending garments or the repair of other goods (Brayshaw 1987:67). Kangaroo and possum skins provided the Wonnarua with warmth and were often sewn together to create articles of clothing, like cloaks or the 'belts' men wore (Brayshaw 1987: 67). A cloak currently housed in the Smithsonian Institute in the United States of America was made in the Hunter Valley and comprises twenty-two possum (*Trichosurus vulpecula*) skins and one grey kangaroo (*Macropus giganteus*) skin (Brayshaw 1987: 72).

Aboriginal people were adept at modifying the landscape to suit their needs (Brayshaw 1987: 20). Fire was one of the tools the Wonnarua people used for 'herding' kangaroos. About a month prior to the hunt, Wonnarua people deliberately burnt areas of grassland, thereby attracting kangaroos when the newly germinated grasses grew some weeks later. One visitor to the region in 1830 observed 'a large flock of kangaroos feeding upon young and tender grass which had sprung up after a fire of the natives' (Brayshaw 1987: 21). The deliberate lighting of fire also increased an area's biodiversity and facilitated travel by destroying the undergrowth that sometimes-made movement through the country more arduous. The Wonnarua also altered waterways by creating weirs and fish traps to assist in the sourcing of fish, eels and other water creatures. This was sometimes achieved by the use of grasses (Brayshaw 1987: 77).

3.1.2 Post European Settlement

The first official European excursion into the Hunter Valley occurred in 1801 when Lieutenant-Colonel Paterson led a party of men along the Coal River (later Hunter River) to explore the region's coal supplies (Brayshaw 1987: 9). Just over a decade later, Europeans were residing at Patersons Plains and Wallis Plains (now known as Maitland) (Umwelt 2011). The establishment of a penal colony at Port Macquarie from 1804 to 1821 slowed the area's settlement but by 1821, the area near Ravensworth had been occupied by the new arrivals, thereby making James Bowman's Ravensworth property the most northern settlement in the valley. By 1826 surveying of the central Hunter Valley had been completed by Henry Dangar which only served to open it up to further development and exploitation (Brayshaw 1987: 9). Soon after completing his survey, Dangar commented on the speed of the transformation, writing that

'... this division of country ... which, in 1822, possessed little more than its aboriginal [sic] inhabitants, in 1826-7, more than half a million of acres were appropriated and in a forward state of improvement' (Brayshaw 1987: 10).

The Hunter Valley was one of the first areas in the new colony to be settled outside of Sydney and Newcastle. Land with river frontages along the Goulburn and Hunter Rivers and their larger tributaries were the first properties to be acquired by the new occupants. By 1827, 25% of the valley had been appropriated by Europeans (Daly & Brown 1964: 53). For the new settlers, the region 'seemed [like] a pastoral arcadia of thinly wooded alluvial flats, long grass and abundant game' where profits could be readily made (Nolan 2012: 15). In 1826, one man commented that 'in all these luxuriant plains there is scarcely a superfluous tree to be seen... [The land is] is only requiring the instrumentality of the plough to produce abundant crop' (Nolan 2012: 15).

With European settlement, radical changes to the landscape soon followed. Tracts of land were denuded of the already relatively sparse timber to make way for agriculture and livestock and coal was mined to build, develop and power the new colony. According to Dangar, 25,000 horned cattle and 80,000 sheep soon roamed the Valley (Brayshaw 1987: 10). Animals not only damaged native vegetation by eating and stamping on it, but also necessitated the felling of trees and the parcelling of land with fences to contain them and support the people who were entrusted with their care. Such actions affected the habitats and habits of the plants and animals that were central to the day to day existence of the Wonnarua.

As Europeans appropriated the central Hunter Valley for their own purposes, the Wonnarua were forced off their lands. Initially the settlers occupied the best, flat locations along rivers and creeks but soon spread further afield as they appropriated more and more land. This forced Indigenous clans to retreat further and further inland. Consequently, they were driven to seek resources beyond their traditional boundaries in ways that contravened millennia old systems of obligations, customs and responsibilities, and led to conflict with neighbouring groups. As Fawcett (1898: 152) described in 1898:

Their tribal boundaries were both well-defined and clearly understood both by themselves and the members of their neighbouring tribes. So strictly were all rights and privileges understood, that for one tribe to enter into the district of another in pursuit of game was considered an offence of great magnitude and a good ground for a hostile meeting.

As displacement became more widespread, violent disputes between the Wonnarua and European settlers intensified. Initially when Europeans settled in the region 'the natives were acknowledged to be a harmless, inoffensive race of people, and for the first two or three years they continued on the best terms with the colonists. Subsequently, however, quarrels arose through their ignorance of [English] laws relative to the right of property' (Breton 1833: 218-219). For the Europeans, land ownership equated to rights (such as restricted access) yet for the Wonnarua, it concerned both rights and obligations. While the new settlers saw the taking of their stock as theft, and therefore punishable, the Indigenous community perceived it very differently (Umwelt 2011). Not surprisingly, relations between the two deteriorated.

Some people in the Hunter Valley, like Reverent Lancelot Threlkeld, believed they were 'in a state of warfare' with the Indigenous population and, in 1826, landowners petitioned Governor Darling for protection from the armed 'tribes of black natives' as they feared the 'revenge and depredation of these infuriated and savage people' (Umwelt 2011). Darling's response to the petition may have inadvertently 'encouraged the settlers to use 'vigorous measures' to establish ascendancy over the Aboriginal resistance, resulting in the forming of many vigilante groups' (Umwelt 2011). European arms soon proved too powerful and that resistance by the valley's original occupants had largely ceased by 1830, less than three decades after Europeans arrived in the area.

The ensuing breakdown of Indigenous communities is largely attributed to the dispossession of their land, and the subsequent loss of traditional lifestyle, but this is not the only cause. The onset of new, introduced diseases, such as measles and smallpox, and infections such as sexually transmitted syphilis, decimated communities as they had no natural resistance to these ailments. The smallpox epidemic of 1789 killed many even before Europeans had forayed beyond Sydney and this was followed by a second outbreak in 1829-31 (Brayshaw 1987: 49). A submission from the Reverend William Ross, Minister of the Church of Scotland to a Select Committee of Inquiry, established to investigate Aboriginal affairs in the colony in 1846, noted that 'the number [of Indigenous people] has greatly diminished; within the last seven years the decrease has certainly been one-third of the number'. The writer explained that the camps of between eighty and ninety people he had seen seven years earlier were now no more than twenty-five (Select Committee on the Condition of the Aborigines, 1846).

Deaths resulting from disease or sickness frequently affected those most vulnerable - the young and the elderly, which had profound ramifications on Aboriginal communities long into the future. The death of the elderly not only meant that there were fewer and fewer elders to guide and unite communities, but also that the passing down of important responsibilities, teachings and knowledge from one generation to the next was irrevocably interrupted. The death of the young resulted in smaller communities since births could no longer replace those lost. The inability to produce future generations was further hampered by the spread of sexually transmitted diseases which left a large number of Indigenous adults infertile and increased the number of miscarriages and still births. Fawcett (1898: 153) lamented that *'half a century of British debauchery, disease, and vice and their accompaniments, have almost wiped [the Wonnarua] out altogether. A few years and their land will know them no more'.*

With the loss of their land and lifestyle, the *Wonnarua* were forced to rely ever more on European settlers. According to Umwelt (2011) the traditional way of life for the *Wonnarua*, including the continuation of their ceremonies, had all but gone by the 1870s and they began to increasingly adopt the ways of Europeans. Initially, Aboriginal farm labourers and itinerant workers were sought after, but this declined from the middle of the 1870s for a variety of reasons, including the introduction of wire fencing (which reduced the number of required farm hands) and the arrival of more white workers in the region.

Others settled on religious or government run reserves or missions. From the 1860s, reserves became increasingly popular in New South Wales as they were perceived as a means of controlling and attending to the welfare of Indigenous populations. The missions also provided Colonial authorities with the opportunity to *'civilise'* Aboriginal people by teaching them the English way of life, from customs and beliefs to daily activities and language [Nolan 2012, p. 24). Seldom does such civilisation come at such a high price.

From 1890, many of the local Indigenous population, including *Wonnarua, Awabakal, Worimi and Darkinung* people, resided at the St Clair mission. Founded by Reverend J S White, the sixty-acre property was established in Carrowbrook, between Muswellbrook and Singleton (Nolan 2012). There the residents farmed the land whilst maintaining some traditional aspects and rituals of their culture. In 1905, the Baptist run Aborigines Inland Mission took over the site and the continuation of traditional ways was no longer acceptable (Gray 2010). In 1918, the site came under the control of the Aborigines Protection Board and was renamed the Mount Olive Reserve. Under the new managers, adherence to strict rules was expected and any breaches resulted in removal (Umwelt, 2011). The reserve remained operational until 1923 when it closed, forcing its residents to move elsewhere. Many of these twice dispossessed people chose to settle around the township of Singleton and the surrounding region.

3.2 Comment on Potential Massacre Sites

The question as to whether massacre site(s) existed on the Ravensworth Estate has been addressed in several studies over the last 15 years and was central to the cultural values assessments undertaken for the Mount Owen ACHAR (2013). During the consultation processes for the Mt Owen ACHAR and this ACHAR specific concerns have been raised by the PCWP in regard to frontier violence during the early colonial period and the potential for evidence of massacre(s) to be present in the Project Area, in particular the 'Ravensworth Massacre' as noted in the AHIMS 37-3-0390 site card.

Conflict between Aboriginal people and white settlers is a common thread in Australia's early colonial history. The Hunter Valley is no exception, with widespread conflict being reported into the 1830's. In 1826, the perceived threat from Aboriginal people in the Hunter Valley was such that settlers petitioned Governor Darling for military protection. Darling's responded to the settlers that:

'Vigorous measures among yourselves would more effectively establish your ascendancy than the utmost power of the military...I strongly recommend you to take measures for your own defence, and you may be satisfied that in any exertion you make, you shall receive every necessary support (Darling quoted in Reynolds 1996: 39-40).

During the fieldwork and workshops undertaken for the Mount Owen Continued Operations project ACHAR (2011-2013) and this ACHAR, there were numerous comments from RAPs about the potential for evidence of massacre(s) to be present within the Project Area, and in particular the Ravensworth Massacre Site is thought by some to be in the Project Area.

This issue has also been addressed in other projects undertaken in close proximity to this ACHAR, and in particular by Umwelt (2004) in the archaeological values assessment for the Glendell Open Cut Mine, which is immediately to the south of the Project Area, and all located within what is known as the Ravensworth Estate. The Mount Owen ACHAR (ACHM 2013) assessed the cultural values over the same area prior to this ACHAR. The following section is from the Umwelt (2004) report to the DEC specifically in response to queries about potential or existing massacre sites in the vicinity of the historic Ravensworth estate.

In further response to this matter, as part of the GCOP, Glendell engaged Dr Mark Dunn to undertake a further detailed expert review of this period of history in and around the Project Area. This report is included in Appendix 11.6.

The following sections provide an overview of the relevant work addressing the massacre issue, including:

- Glendell Mine Assessment (Umwelt, 2004);
- Mt Owen Continued Operations Assessment (ACHM, 2013)
- Historical Research by Dr Mark Dunn (2019)

3.2.1 Umwelt (2004 assessment of the Ravensworth Massacre Site (#AHIMS 37-3-0390)

At the time of the preparation of the original Glendell material in 2003-2004 the site card for the Ravensworth massacre site was missing and discussions with the Aboriginal groups involved in the assessment failed to obtain any information in relation to the site. The site card, however, was later found by Steve Brown (NPWS) and information from the site card indicated that the recording of the site originated from a reference to the massacre in the book 'Waterloo Creek' written by Roger Milliss in 1992. The primary references were obtained from the Mitchell Library in order to obtain, if possible, further detail in relation to the nature and location of the Ravensworth Massacre Site.

The primary references provide the following details:

1. 28 August 1826: Aborigines killed two whites at Alcorn's hut within Bridgman Estate, on Fal Brook, one mile upstream from Dulwich (James Glennie) and a quarter of a mile from Chilcott's hut;

- 2. The Aborigines that took part in the attack are said to have headed in the direction of the mountains;
- 3. The Sydney Gazette (9 September 1826) noted that the Aborigines were part of a *'mountain tribe'* making them *'very difficult to capture or subdue'*;
- 4. On the morning or afternoon of the third day a pursuing party caught up and shot and killed between two and 18 Aborigines using muskets;
- 5. The Aborigines that were shot are said to have been pursued from Bridgman Estate for 20 miles or more; and
- 6. Scott and MacLeod (3 October 1826) mention a black woman that was taken prisoner (HRA XII: 612).

This evidence implies that the Aboriginal people who took part in the attack at Alcorn's Hut came from the mountains and were returning to the mountains when the reprisal attack took place. The account by Scott and MacLeod (HRA XII 1826: 612) also suggests that at least one woman was included in the Aboriginal group attacked. If the Aboriginal attackers had travelled 20 miles (approximately 32 kilometres) in the direction of the mountains (or even into the mountains) they could have travelled in a northerly or easterly or (less likely) southerly direction from Bridgman Estate. There are no mountains in a westerly direction (and no significant range to the south). A westerly direction would have taken the fleeing Aborigines and their pursuers up the valley rather than into the mountains. If the Aboriginal people that attacked the hut at Bridgman Estate travelled towards the mountains, they would have travelled away from the Project area. Thus, the massacre site is highly unlikely to be located within the Glendell ML or within the Ravensworth Estate. Even if the Aboriginal people had travelled in an easterly direction they would have passed through the area of the present Glendell ML and the Ravensworth Estate by the time they had travelled 7 miles, rather than the 20 miles they were reported as travelling prior to the pursuing party catching up with them.

Based on these conclusions the site recorded as the 'Ravensworth Massacre Site' cannot have been within the area now defined as the Ravensworth Estate and that the name given to the massacre site is misleading in this regard.

In relation to the Aboriginal people that were killed in the Ravensworth area, there was no anecdotal evidence located of how their bodies were disposed (except for one person executed by the police who was buried and then later exhumed and thrown in the river). They may have been buried/burned where they were killed by their attackers or their bodies may have been left where they fell. In the case of the Aborigines it is probable that they were collected by relatives and buried in an area dictated by custom if that was still possible under the circumstances, or somewhere where it was safe to perform the appropriate ceremonies if that was not possible.

3.2.2 Mt Owen ACHAR (ACHM 2013)

The question of a massacre within the Ravensworth Estate area arose once again during the consultation processes for the Mt Owen ACHAR between 2011 and 2013. ACHM reviewed the various literature sources and the Umwelt (2004) report and then mapped the various key historical places to determine the events of concern could not have happened at Ravensworth Estate.

The available historic evidence and analysis by Umwelt (2004) does not dispute that a mass killing of Wonnarua people took place in late 1826, however the conclusions drawn indicate that the murders reported in the book *'Waterloo Creek'* (Milliss 1992) occurred well beyond the Ravensworth Estate. Many Wonnarua people hold the view that there were numerous unreported and undocumented killings in the vicinity of Ravensworth estate in the early days of white settlement. While these views are important and deeply held, it is also difficult to establish the veracity of these widely held oral histories. Compounding the difficulty, there is no other primary recorded historical evidence documenting any other killings in the immediate vicinity of the Project Area. Consequently, there is currently no known *'massacre sites'* within the Project area, including the Ravensworth Estate, nor is likely that this type of place will be identified within the Project Area.

Using the historical evidence to map the huts mentioned (i.e. Alcorn's and Chilcot's huts) and utilising a more conservative 15-mile radius, it is possible to construct a map which shows an approximate area where the killings reported by Milliss (1992) *cannot* have occurred. We can hypothesize that it was not possible for this set of events to have occurred anywhere within the mapped circle, nor therefore in the Project Area. The historic evidence suggests that this event (Milliss 1992) took place at least '20 miles' from Alcorn's hut, well outside the zone mapped below (See Map 3-1).



Map 3-1: The 1826 killing of Wonnarua people was reported in the book 'Waterloo Creek' (Milliss, 1992) to have occurred at least 20 miles from Alcorn's and Chilcot's huts. The area mapped (circle) has a radius of 15 miles. The historical evidence suggests that these events cannot have occurred anywhere within this zone. The Project Area is well within this zone.

3.3 Dr Mark Dunn's Historical Research

Historian Dr Mark Dunn was commissioned by Glencore to further review the available historical documents and records relating to the early occupation of the Ravensworth Estate area, and particularly evidence of conflict between Aboriginal people and the early settlers between 1824 and the mid 1830's.

Dr Dunn has a master's degree in applied history from the University of Technology, Sydney and was awarded a PhD from the University of NSW for his thesis "A Valley in a Valley: Colonial Struggles over land and resources in the Hunter Valley, NSW 1820-1850". Dr Dunn has served as Chair of the Heritage Committee, NSW Heritage Office and Chair of the Professional Historians Association of NSW and ACT and has previously been the Deputy Chair of the Heritage Council NSW, and President of the History Council.

In his detailed historical report of early conflict (refer **Appendix 11.6** for a full transcript) Dunn (2019) concludes that:

'The years 1825-1827 cycled through a series of tit-for-tat attacks and retributions between Aboriginal people and Europeans in the middle Hunter Valley. A combination of increasing pressures on traditional food sources by the influx of settler's livestock, the locking off of land through fencing and farming, provocation by convicts against Aboriginal people all combined to create an atmosphere of tension and the potential for violence. A close reading of the available evidence, through newspapers, depositions and enquiries appears to show not a series of random attacks, or rampaging bands of warriors, but rather targeted attacks against individuals and isolated workers. Bowman's large estate was the site of three attacks resulting in two Europeans killed and two wounded, with one Aboriginal man wounded' (Dunn, 2019).

Dunn concluded that not all interactions between Aboriginal people and settlers during the 1820's and 1830's was violent. Indeed, 'many of the estates and farms also employed Aboriginal people in work, paying them with food, tobacco and blankets' (Dunn, 2019). There is, however, no evidence of James Bowman (owner of Ravensworth estate) employing Aboriginal workers at that time.

An attack by Robert Scott and a party of men which originated from James Glennies property (Fal Brook) and was eventually reported by *The Australian* occurred some 20 miles (32 kilometres) from Alcorn's Hut and resulted in the death of 18 Aboriginal people. Richard Alcorn was an overseer for Captain Robert Lethbridge and his hut was located in Fal Brook, now known as Glennies Creek. Even though the exact location of this event is unknown, the plotting of a 20-mile (32 kilometre) radius from Alcorn's Hut situates this event (often referred to as the 'Ravensworth massacre) well beyond Ravensworth Estate, which lies approximately 5 miles (8 kilometres) to the north-west (Dunn, 2019). Dr Dunn's conclusions concur with the previous conclusions of both the Mt Owen ACHAR and the Umwelt (2004) report.

3.4 Post-Contact Land Use within the Project Area

The land uses within the Project Area and surrounds are currently dominated by mining operations. Glencore operates the Mount Owen Complex, Integra Underground operations to the south-east, Liddell Coal Operations to the north-west and Ravensworth Surface Operations to the south-west (refer to Map 3-2). Ashton Coal Mine is located to the south of the Project Area while Rix's Creek North is located to the south-east of the Project Area.

Other land uses within the surrounding area include grazing and rural residential holdings and the Hebden and Wild Quarries to the north-of the Project Area. The Bayswater and Liddell Power Stations are located further to the west and north-west, respectively, of the Project Area. With a variety of landscapes, the Upper Hunter region supports a diverse range of agricultural industries. Similarly, Singleton and Muswellbrook LGAs have a long history of agricultural land use, particularly in regard to cropping and grazing. Cropping within the Project Area and immediate surrounds has historically been largely limited to the flatter alluvial terraces associated with Bowmans Creek. There has been limited cropping of alluvial terraces in recent years other than localised areas used for improved pastures for grazing.

Where not used for mining related activities, land owned by Glencore and its subsidiaries within and surrounding the Project Area is utilised for cattle grazing and rural residential leases (subject to environmental conditions). The cattle grazing operations are currently managed and operated by Colinta Holdings Pty Ltd, a Glencore subsidiary.

There are a number of rural localities within proximity to the Project Area including Hebden to the north, Falbrook and Middle Falbrook to the east and south respectively (refer to Map 3-2). Camberwell (refer to Map 3-2) is located approximately 1 km from the southern boundary of the Project Area where the majority of the existing residences are mine owned or have acquisition rights under approved mining development consents. Other rural residential land holdings are present within the surrounding area. These are predominantly located to the south-east of the Project Area (refer to Map 3-2).



Map 3-2: Tenements within the Project Area

4 Archaeology of the Project Area

4.1 Aboriginal Archaeological Impact Assessment

OzArk Environmental & Heritage Management Pty Limited (OzArk) were engaged by Umwelt Environmental & Social Consultants (Umwelt) to complete an Aboriginal Archaeology Impact Assessment (AAIA) for the Project.

The fieldwork component of the AAIA consisting of survey and test excavation was conducted by OzArk, with the assistance of Registered Aboriginal Parties (RAPs) and Wonnarua Knowledge Holders over the course of several weeks in April and September 2018. The field survey and the test excavation were conducted over five weeks and involved 25 field days in total.

69 sites were recorded during the survey consisting of:

- 39 artefact scatters,
- 29 isolated finds; and
- A scarred tree (located outside the disturbance zone)

Of the artefact scatters, 32 sites recorded less than 10 artefacts and no site contained more than 70 artefacts. Only at nine locations was it assessed that there are subsurface deposits. One of these sites was determined to have a moderate artefact density (Glendell North OS6), however, none of the recorded sites was remarkable in its manifestation; either in terms of the types of artefacts recorded, the raw material the artefacts were manufactured from or the density and nature of the surface artefact manifestation. The recorded sites are also very representative of artefact sites in the upper Hunter Valley both in terms of the types of artefacts recorded and the raw materials from which the artefacts were manufactured.

The test excavation program involved excavation of 152 0.5 m by 0.5 m excavation squares at 12 separate localities: a total of 38 square metres. From this area of excavation, 180 artefacts were recovered; an average of 4.7 artefacts per square metre or 1.18 artefacts per excavation square. This density of artefacts is extremely low and only two excavation squares that recorded artefacts in numbers greater than 15.

Most of the excavation squares did not have overt evidence of disturbance, apart from Area 12 where historic items we recorded in one of the excavation squares. However, as most of the squares had what can be described as a very truncated A1 Horizon and a leached A2 Horizon, the implication is that the landscape has been subject to the stripping of the A1 Horizon and the exposure of the A2 Horizon. The implicit conclusion is, therefore, that the landscape has undergone a high general disturbance from soil loss that has compromised the archaeological deposits across the Additional Disturbance Area. As such, the general condition of the archaeological landscape within the Additional Disturbance Area is assessed to be poor.

As a result, undertaking an assessment of scientific significance for all sites within the Additional Disturbance Area shows that 87.5% of sites have a low scientific significance as they are either isolated finds or low-density artefact scatters. A few sites have low–moderate scientific significance, five sites have moderate scientific significance, and no sites have been assessed as having high scientific significance.

An assessment of potential impacts to the archaeological values in the Additional Disturbance Area shows that 52 of the 69 newly recorded sites are within or in very close proximity to the Additional Disturbance Area and 44 previously recorded sites are within the Additional Disturbance Area.

In total, 91 sites are located within the Additional Disturbance Area and will be impacted should the Project be approved. 55 of these sites are artefact scatters (15 of which have Potential Archaeological Deposit (PAD) and 36 are isolated finds (one of which has PAD). In general, the artefact scatters have a low artefact density with most sites recording less than 10 artefacts.

Management recommendations are made in Section 4.3 to mitigate this loss of archaeological value. These recommendations include:

- Conserving all sites outside of the Additional Disturbance Area by extending the current site monitoring and verification protocols contained in the Mt Owen Aboriginal Cultural Heritage Management Plan (ACHMP);
- Undertaking a collection and recording of all surface artefacts at all sites within the Additional Disturbance Area where there is a surface manifestation of artefacts; and
- To undertake limited manual archaeological excavation at four locations to confirm the nature of the archaeological deposits.
4.2 Assessment of Scientific Significance

As a result, most newly recorded sites have a low scientific significance as they generally have:

- A low artefact density;
- No associated subsurface deposits;
- No remarkable features and are generally representative of other artefact sites in the upper Hunter Valley;
- A high likelihood of being in a secondary context; and
- A limited ability to inform on the nature and spatial extent of past Aboriginal occupation in the Additional Disturbance Area.

Table 4-1 lists the newly recorded sites and their associated scientific significance.

Table 4-1: Scientific significance of newly recorded sites

Site Name	Feature(s)	Potential for subsurface deposits	Scientific Significance	Justification
Glendell North OS1	Artefact scatter	Nil	Low	Low artefact density; lack of associated subsurface deposits; disturbed context
Glendell North OS2	Artefact scatter	Nil	Low	Low artefact density; lack of associated subsurface deposits; disturbed context
Glendell North OS3	Artefact scatter	Nil	Low	Low artefact density; lack of associated subsurface deposits; disturbed context
Glendell North OS4	Artefact scatter	Nil	Low	Low artefact density; lack of associated subsurface deposits; disturbed context
Glendell North OS5	Artefact scatter	Yes (low density)	Low- moderate	Low density with known subsurface deposits. Any information gained would only address limited research questions
Glendell North OS6	Artefact scatter	Yes (moderate density)	Moderate	Moderate artefact density and high probability of further subsurface deposits present
Glendell North OS7	Artefact scatter	Nil	Low	Low artefact density; lack of associated subsurface deposits; disturbed context
Glendell North OS8	Artefact scatter	Nil	Low	Low artefact density; lack of associated subsurface deposits; disturbed context
Glendell North OS9	Artefact scatter	Nil	Low	Low artefact density; lack of associated subsurface deposits; disturbed context
Glendell North OS10	Artefact scatter	Nil	Low	Low artefact density; lack of associated subsurface deposits; disturbed context
Glendell North OS11	Artefact scatter	Nil	Low	Low artefact density; lack of associated subsurface deposits; disturbed context
Glendell North OS12	Artefact scatter	Nil	Low	Low artefact density; lack of associated subsurface deposits; disturbed context
Glendell North OS13	Artefact scatter	Nil	Low	Low artefact density; lack of associated subsurface deposits; disturbed context
Glendell North OS14	Artefact scatter	Nil	Low	Low artefact density; lack of associated subsurface deposits; disturbed context
Glendell North OS15	Artefact scatter	Nil	Low	Low artefact density; lack of associated subsurface deposits; disturbed context
Glendell North OS16	Artefact scatter	Yes (low density)	Low- moderate	Low density with known subsurface deposits. Any information gained would only address limited research questions
Glendell North OS17	Artefact scatter	Nil	Low	Low artefact density; lack of associated subsurface deposits; disturbed context
Glendell North OS18	Artefact scatter	Nil	Low	Low artefact density; lack of associated subsurface deposits; disturbed context
Glendell North OS19	Artefact scatter	Yes (low density)	Low- moderate	Low density with known subsurface deposits. Any information gained would only address limited research questions
Glendell North OS20	Artefact scatter	Nil	Low	Low artefact density; lack of associated subsurface deposits; disturbed context
Glendell North OS21	Artefact scatter	Nil	Low	Low artefact density; lack of associated subsurface deposits; disturbed context
Glendell North OS22	Artefact	Nil	Low	Low artefact density; lack of associated subsurface

	scatter			deposits; disturbed context
Glendell North OS23	Artefact scatter	Nil	Low	Low artefact density; lack of associated subsurface deposits; disturbed context
Glendell North OS24	Artefact scatter	Nil	Low	Low artefact density; lack of associated subsurface deposits; disturbed context
Glendell North OS25	Artefact scatter	Yes (low density)	Low- moderate	Low density with known subsurface deposits. Any information gained would only address limited research questions
Glendell North OS26	Artefact scatter	Nil	Low	Low artefact density; lack of associated subsurface deposits; disturbed context
Glendell North OS27	Artefact scatter	Nil	Low	Low artefact density; lack of associated subsurface deposits; disturbed context
Glendell North OS28	Artefact scatter	Nil	Low	Low artefact density; lack of associated subsurface deposits; disturbed context
Glendell North OS29	Artefact scatter	Nil	Low	Low artefact density; lack of associated subsurface deposits; disturbed context
Glendell North OS30	Artefact scatter	Nil	Low	Low artefact density; lack of associated subsurface deposits; disturbed context
Glendell North OS31	Artefact scatter	Nil	Low	Low artefact density; lack of associated subsurface deposits; disturbed context
Glendell North OS32	Artefact scatter	Nil	Low	Low artefact density; lack of associated subsurface deposits; disturbed context
Glendell North OS33	Artefact scatter	Nil	Low	Low artefact density; lack of associated subsurface deposits; disturbed context
Glendell North OS34	Artefact scatter	Yes (low density)	Moderate	Low density with known subsurface deposits
Glendell North OS35	Artefact scatter	Yes (low density)	Low- moderate	Low density with low density subsurface deposits
Glendell North OS36	Artefact scatter	Yes (low density)	Low- moderate	Low density with known subsurface deposits. Any information gained would only address limited research questions
Glendell North OS37	Artefact scatter	Nil	Low	Low artefact density; lack of associated subsurface deposits; disturbed context
Glendell North OS38	Artefact scatter	Nil	Low	Low artefact density; lack of associated subsurface deposits; disturbed context
Glendell North OS39	Artefact scatter	Nil	Low	Low artefact density; lack of associated subsurface deposits as no A-Horizon present
Glendell North IF1	Isolated find	Nil	Low	Isolated artefact without associated subsurface deposits. Likely in a secondary context
Glendell North IF2	Isolated find	Nil	Low	Isolated artefact without associated subsurface deposits. Likely in a secondary context
Glendell North IF3	Isolated find	Nil	Low	Isolated artefact without associated subsurface deposits. Likely in a secondary context
Glendell North IF4	Isolated find	Nil	Low	Isolated artefact without associated subsurface deposits. Likely in a secondary context
Glendell North IF5	Isolated find	Nil	Low	Isolated artefact without associated subsurface deposits. Likely in a secondary context
Glendell North IF6	Isolated find	Nil	Low	Isolated artefact without associated subsurface deposits. Likely in a secondary context
Glendell North IF7	Isolated find	Nil	Low	Isolated artefact without associated subsurface deposits. Likely in a secondary context
Glendell North IF8	Isolated find	Nil	Low	Isolated artefact without associated subsurface deposits. Likely in a secondary context
Glendell North IF9	Isolated find	Nil	Low	Isolated artefact without associated subsurface deposits. Likely in a secondary context
Glendell North IF10	Isolated find	Nil	Low	Isolated artefact without associated subsurface deposits. Likely in a secondary context
Glendell North IF11	Isolated find	Nil	Low	Isolated artefact without associated subsurface deposits. Likely in a secondary context
Glendell North IF12	Isolated find	Nil	Low	Isolated artefact without associated subsurface deposits. Likely in a secondary context
Glendell North IF13	Isolated find	Nil	Low	Isolated artefact without associated subsurface deposits. Likely in a secondary context

Glendell North IF14	Isolated find	Nil	Low	Isolated artefact without associated subsurface deposits. Likely in a secondary context
Glendell North IF15	Isolated find	Nil	Low	Isolated artefact without associated subsurface deposits. Likely in a secondary context
Glendell North IF16	Isolated find	Nil	Low	Isolated artefact without associated subsurface deposits. Likely in a secondary context
Glendell North IF17	Isolated find	Nil	Low	Isolated artefact without associated subsurface deposits. Likely in a secondary context
Glendell North IF18	Isolated find	Nil	Low	Isolated artefact without associated subsurface deposits. Likely in a secondary context
Glendell North IF19	Isolated find	Nil	Low	Isolated artefact without associated subsurface deposits. Likely in a secondary context
Glendell North IF20	Isolated find	Nil	Low	Isolated artefact without associated subsurface deposits. Likely in a secondary context
Glendell North IF21	Isolated find	Nil	Low	Isolated artefact without associated subsurface deposits. Likely in a secondary context
Glendell North IF22	Isolated find	Nil	Low	Isolated artefact without associated subsurface deposits. Likely in a secondary context
Glendell North IF23	Isolated find	Nil	Low	Isolated artefact without associated subsurface deposits. Likely in a secondary context
Glendell North IF24	Isolated find	Nil	Low	Isolated artefact without associated subsurface deposits. Likely in a secondary context
Glendell North IF25	Isolated find	Nil	Low	Isolated artefact without associated subsurface deposits. Likely in a secondary context
Glendell North IF26	Isolated find	Yes (low density)	Low	Isolated subsurface artefact formerly present but now excavated during the test excavation program. Any information gained would only address limited research questions
Glendell North IF27	Isolated find	Nil	Low	Isolated artefact without associated subsurface deposits. Likely in a secondary context
Glendell North IF28	Isolated find	Nil	Low	Isolated artefact without associated subsurface deposits. Likely in a secondary context
Glendell North IF29	Isolated find	Nil	Low	Isolated artefact without associated subsurface deposits. Likely in a secondary context
Glendell North ST1	Scarred tree	Nil	Moderate	Relatively rare site type which remains extant within the Hunter Valley region

There are 40 previously recorded sites within the Additional Disturbance Area. All these sites were re-assessed during the 2018 survey to determine their current condition and significance.

Table 4-2 (below) lists the 40 previously recorded sites in the Additional Disturbance Area.

Table 4-2: Significance assessment of previously recorded sites.

ID	AHIMS	Site name	Site type	Scientific significance	Justification
70	37-3-0294	Site 2; (MORL2)	Artefact scatter	Low	Artefacts unable to be located
71	37-3-0343	Mt Owen 1 (1996)	Artefact scatter	Low	Precise location of site is unknown
73	37-3-0469	Bowmans/Swamp Creek Trench 1	Artefact scatter	Moderate	Moderate artefact density and high probability of associated subsurface deposits however these will be in a disturbed context
75	37-3-0521	MO-IF1	Isolated find	Low	Isolated artefact without associated subsurface deposits. Likely in a secondary context
76	37-3-0612	Bettys Creek 22	Isolated find	Low	Artefacts unable to be located
79	37-3-0689	G11 Glendell	Artefact scatter	Low	Low artefact density with low potential for further subsurface deposits
81	37-3-0744	York Creek 1	Artefact scatter	Low	Low artefact density; low potential for associated subsurface deposits; disturbed context
82	37-3-0745	York Creek 2	Artefact scatter	Low	Low artefact density; lack of associated subsurface deposits; secondary context

ID	AHIMS	Site name	Site type	Scientific significance	Justification
83	37-3-0746	York Creek 3	Artefact scatter	Low	Low artefact density; low potential for associated subsurface deposits; disturbed context
84	37-3-0747	York Creek 4	Artefact scatter	Low- moderate	Low density with known subsurface deposits. Any information gained would only address limited research questions
85	37-3-0748	York Creek 5	Artefact scatter	Low	Low artefact density; low potential for associated subsurface deposits; disturbed context
86	37-3-0749	York Creek 6	Artefact scatter	Low	Low artefact density; lack of associated subsurface deposits; disturbed context
87	37-3-0750	York Creek 7	Low-moderate	Low- moderate	Low density with known subsurface deposits. Any information gained would only address limited research questions
88	37-3-0751	York Creek 8	Isolated find	Low	Isolated artefact without associated subsurface deposits. Likely in a secondary context
89	37-3-0752	York Creek 9	Artefact scatter	Low	Low artefact density; lack of associated subsurface deposits; secondary context
90	37-3-0753	York Creek 10	Artefact scatter	Low	Low artefact density; lack of associated subsurface deposits; disturbed context
91	37-3-0754	York Creek 11	Artefact scatter	Low- moderate	Low density with known subsurface deposits. Any information gained would only address limited research questions
92	37-3-0755	York Creek 12	Artefact scatter	Low	Low artefact density; lack of associated subsurface deposits; disturbed context
93	37-3-0756	York Creek 13	Artefact scatter	Low	Low artefact density; lack of associated subsurface deposits; disturbed context
94	37-3-0757	York Creek 14	Isolated find	Low	Isolated artefact without associated subsurface deposits. Likely in a secondary context
95	37-3-0758	York Creek 15	Artefact scatter	Low	Low artefact density; lack of associated subsurface deposits; likely in secondary context
96	37-3-0759	York Creek 16	Artefact scatter	Low	Low artefact density and lack of associated subsurface deposits
97	37-3-0760	York Creek 17	Isolated find	Low	Isolated artefact without associated subsurface deposits. Likely in a secondary context
98	37-3-0761	York Creek 18	Artefact scatter	Low- moderate	Low density subsurface deposits present. Any information gained would only address limited research questions
99	37-3-0762	Bowmans Ck 6	Artefact scatter	Low	Low artefact density and lack of associated subsurface deposits
100	37-3-0763	Bowmans Ck 7	Artefact scatter	Low- moderate	Low density with known subsurface deposits. Any information gained would only address limited research questions
101	37-3-0764	Bowmans Ck 8	Artefact scatter	Low	Artefacts unable to be located
102	37-3-0765	Bowmans Ck 9	Artefact scatter	Low	Low density scatter without associated subsurface deposits. Likely in a secondary context
103	37-3-0766	Bowmans Ck 10	Artefact scatter	Low	Low artefact density; lack of associated subsurface deposits; secondary context
107	37-3-0773	Swamp Ck 10	Isolated find	Low	Low artefact density; lack of associated subsurface deposits; disturbed context
109	37-3-1155	MT OWEN ISOLATED FIND2	Isolated find	Low	Isolated artefact without associated subsurface deposits. Likely in a secondary context
110	37-3-1156	MT OWEN ISOLATED FIND1	Isolated find	Low	Isolated artefact without associated subsurface deposits. Likely in a secondary context
111	37-3-1158	RPS DLW IF1	Isolated find	Low	Isolated artefact without associated subsurface deposits. Likely in a secondary context

ID	AHIMS	Site name	Site type	Scientific significance	Justification
114	37-3-1198	MOCO OS-10	Artefact scatter	Low	Low artefact density; lack of associated subsurface deposits; disturbed context. Partially destroyed
115	37-3-1490	Swamp Creek IF-4	Isolated find	Low	Isolated find in a secondary context
116	37-3-1492	Swamp Creek IF-2	Isolated find	Low	Isolated find in a secondary context
117	37-3-1493	Swamp Creek IF-3	Isolated find	Low	Isolated find in a secondary context
118	37-3-1494	Swamp Creek IF-1	Isolated find	Low	Isolated artefact without associated subsurface deposits. Likely in a secondary context
122	37-3-1499	Swamp Creek-OS1	Artefact scatter	Low	Low artefact density; lack of associated subsurface deposits; disturbed context
124	37-3-1503	Yorks Creek 19	Artefact scatter	Low- moderate	Low density with known subsurface deposits. Any information gained would only address limited research questions

4.2.1 Likely Impacts to Aboriginal Cultural Heritage as a result of the Project

The AAIA has determined the following:

- 52 of the 69 newly recorded sites are within or in very close proximity to the Additional Disturbance Area; and
- 40 previously recorded sites are within the Additional Disturbance Area.

In total, 91 sites are located within the Additional Disturbance Area and will be impacted should the Project be approved. 55 of these sites are artefact scatters (15 of which have PAD) and 36 are isolated finds (one of which has PAD). In general, the artefact scatters have a low artefact density with most sites recording less than 10 artefacts.

Table 4-3 lists the 91 sites within the Additional Disturbance Area. As shown in Table 4-3, the majority of the sites that will be impacted by the Project have a low scientific significance. Thirteen of these sites have scientific values due to the presence of subsurface deposits.

ID	AHIMS ID	Site name	Easting	Northing	Site type	Scientific significance	Consequence of harm (Total/Partial/No Loss of Value)
2	37-3-1559	Glendell North OS2	317930	6413515	Artefact scatter	Low	Total loss of value
3	37-3-1558	Glendell North OS3	317792	6413230	Artefact scatter	Low	Total loss of value
4	37-3-1557	Glendell North OS4	317761	6413127	Artefact scatter	Low	Total loss of value
5	37-3-1569	Glendell North OS5	316619	6413304	Artefact scatter with PAD	Low-moderate	Total loss of value
6	37-3-1571	Glendell North OS6	316443	6413081	Artefact scatter with PAD	Moderate	Total loss of value
8	37-3-1549	Glendell North OS8	316386	6412999	Artefact scatter	Low	Total loss of value
11	37-3-1554	Glendell North OS11	318126	6412284	Artefact scatter	Low	Total loss of value
12	37-3-1553	Glendell North OS12	316810	6412250	Artefact scatter	Low	Total loss of value
13	37-3-1552	Glendell North OS13	317915	6411844	Artefact scatter	Low	Total loss of value
14	37-3-1551	Glendell North OS14	317705	6411820	Artefact scatter	Low	Total loss of value
15	37-3-1550	Glendell North OS15	317055	6412013	Artefact scatter	Low	Total loss of value
16	37-3-1573	Glendell North OS16	317599	6410970	Artefact scatter with PAD	Low-moderate	Total loss of value
17	37-3-1542	Glendell North OS17	317850	6410521	Artefact scatter	Low	Total loss of value
18	37-3-1541	Glendell North OS18	317852	6410274	Artefact scatter	Low	Total loss of value
19	37-3-1572	Glendell North OS19	317790	6410020	Artefact scatter with PAD	Low-moderate	Total loss of value
20	37-3-1540	Glendell North OS20	317856	6409957	Artefact scatter	Low	Total loss of value
21	37-3-1539	Glendell North OS21	318418	6410236	Artefact scatter	Low	Total loss of value
22	37-3-1538	Glendell North OS22	319293	6410281	Artefact scatter	Low	Total loss of value
23	37-3-1537	Glendell North OS23	318500	6410083	Artefact scatter	Low	Partial loss of value

Table 4-3: All known sites within or closely adjacent to the Additional Disturbance Area

25	37-3-1570	Glendell North OS25	318367	6408758	Artefact scatter with PAD	Low-moderate	Total loss of value
26	37-3-1548	Glendell North OS26	318224	6410798	Artefact scatter	Low	Total loss of value
29	37-3-1547	Glendell North OS29	318291	6408381	Artefact scatter	Low	Total loss of value
30	37-3-1546	Glendell North OS30	318530	6408206	Artefact scatter	Low	Total loss of value
31	37-3-1545	Glendell North OS31	318827	6407525	Artefact scatter	Low	Total loss of value
34	37-3-1574	Glendell North OS34	317447	6411053	Artefact scatter with PAD	Moderate	Total loss of value
35	37-3-1567	Glendell North OS35	317371	6411106	Artefact scatter with PAD	Low-moderate	Partial loss of value
36	37-3-1568	Glendell North OS36	316670	6413398	Artefact scatter with PAD	Low-moderate	Total loss of value
37	37-3-1562	Glendell North OS37	317843	6412369	Artefact scatter	Low	Total loss of value
38	37-3-1565	Glendell North OS38	317557	6411704	Artefact scatter	Low	Total loss of value
39	37-3-1576	Glendell North OS39	318028	6409888	Artefact scatter	Low	Total loss of value
41	37-3-1534	Glendell North IF2	317146	6413503	Isolated find	Low	Total loss of value
42	37-3-1533	Glendell North IF3	317120	6413414	Isolated find	Low	Total loss of value
43	37-3-1532	Glendell North IF4	316962	6412937	Isolated find	Low	Total loss of value
44	37-3-1531	Glendell North IF5	318054	6412783	Isolated find	Low	Total loss of value
47	37-3-1528	Glendell North IF8	316956	6412606	Isolated find	Low	Total loss of value
49	37-3-1526	Glendell North IF10	318745	6411655	Isolated find	Low	Total loss of value
50	37-3-1525	Glendell North IF11	317221	6411282	Isolated find	Low	Total loss of value
51	37-3-1524	Glendell North IF12	317765	6410903	Isolated find	Low	Total loss of value
52	37-3-1523	Glendell North IF13	317688	6410830	Isolated find	Low	Total loss of value
53	37-3-1522	Glendell North IF14	317752	6410825	Isolated find	Low	Total loss of value
54	37-3-1521	Glendell North IF15	317683	6410588	Isolated find	Low	Total loss of value
55	37-3-1520	Glendell North IF16	319072	6410845	Isolated find	Low	Total loss of value
56	37-3-1519	Glendell North IF17	317777	6409943	Isolated find	Low	Total loss of value
57	37-3-1518	Glendell North IF18	317723	6409918	Isolated find	Low	Total loss of value
59	37-3-1515	Glendell North IF20	318022	6409310	Isolated find	Low	Total loss of value
60	37-3-1514	Glendell North IF21	318328	6408936	Isolated find	Low	Total loss of value
61	37-3-1516	Glendell North IF22	317984	6410954	Isolated find	Low	Total loss of value
63	37-3-1512	Glendell North IF24	318253	6411466	Isolated find	Low	Total loss of value
65	37-3-1566	Glendell North IF26	318253	6408957	Isolated find with PAD	Low	Total loss of value
66	37-3-1564	Glendell North IF27	317260	6411851	Isolated find	Low	Total loss of value
67	37-3-1563	Glendell North IF28	317241	6411913	Isolated find	Low	Total loss of value
68	37-3-1575	Glendell North IF29	317613	6411755	Isolated find	Low	Total loss of value
70	37-3-0294	Site 2; (MORL2)	321168	6410327	Artefact scatter	Low	Total loss of value
71	37-3-0343	Mt Owen (1996) 1;MtO1;	318524	6414512	Artefact scatter	Low	Total loss of value
73	37-3-0469	Bowmans/Swamp Creek Trench 1	318072	6409137	Artefact scatter with PAD	Moderate	Total loss of value
75	37-3-0521	MO-IF1	319123	6410319	Isolated find	Low	Total loss of value
76	37-3-0612	Bettys Creek 22	321138	6410296	Isolated find	Low	Total loss of value
79	37-3-0689	G11 Glendell	319223	6410211	Artefact scatter with PAD	Low	Total loss of value
81	37-3-0744	York Creek 1	317440	6411356	Artefact scatter	Low	Total loss of value
82	37-3-0745	York Creek 2	317577	6411112	Artefact scatter	Low	Total loss of value
83	37-3-0746	York Creek 3	317745	6411008	Artefact scatter	Low	Total loss of value
84	37-3-0747	York Creek 4	317373	6411322	Artefact scatter	Low-moderate	Total loss of value
85	37-3-0748	York Creek 5	317365	6411471	Artefact scatter	Low	Total loss of value
86	37-3-0749	York Creek 6	317501	6411813	Artefact scatter	Low	Total loss of value
87	37-3-0750	York Creek 7	317484	6412170	Artefact scatter with PAD	Low-moderate	Total loss of value
88	37-3-0751	York Creek 8	317496	6412805	Isolated find	Low	Total loss of value
89	37-3-0752	York Creek 9	317685	6411312	Artefact scatter	Low	Total loss of value
90	37-3-0753	York Creek 10	317865	6412266	Artefact scatter	Low	Total loss of value

91	37-3-0754	York Creek 11	317782	6412443	Artefact scatter with PAD	Low-moderate	Total loss of value
92	37-3-0755	York Creek 12	317846	6412581	Artefact scatter	Low	Total loss of value
93	37-3-0756	York Creek 13	318352	6411400	Artefact scatter	Low	Total loss of value
94	37-3-0757	York Creek 14	318417	6411813	Isolated find	Low	Total loss of value
95	37-3-0758	York Creek 15	317849	6411202	Artefact scatter	Low	Total loss of value
96	37-3-0759	York Creek 16	317827	6411497	Artefact scatter	Low	Total loss of value
97	37-3-0760	York Creek 17	317626	6412595	Isolated find	Low	Total loss of value
98	37-3-0761	York Creek 18	317712	6412158	Isolated find with PAD	Low-moderate	Total loss of value
99	37-3-0762	Bowmans Ck 6	317645	6410765	Artefact scatter	Low	Total loss of value
100	37-3-0763	Bowmans Ck 7	316542	6413142	Artefact scatter with PAD	Moderate	Total loss of value
101	37-3-0764	Bowmans Ck 8	317205	6412329	Artefact scatter	Low	Total loss of value
102	37-3-0765	Bowmans Ck 9	316878	6412410	Artefact scatter	Low	Total loss of value
103	37-3-0766	Bowmans Ck 10	316833	6412566	Artefact scatter	Low	Total loss of value
107	37-3-0773	Swamp Ck 10	319006	6411169	Isolated find	Low	Total loss of value
109	37-3-1155	MT OWEN ISOLATED FIND2	317854	6411236	Isolated find	Low	Total loss of value
110	37-3-1156	MT OWEN ISOLATED FIND1	318001	6410455	Isolated find	Low	Total loss of value
111	37-3-1158	RPS DLW IF1	317148	6412677	Isolated find	Low	Total loss of value
114	37-3-1198	MOCO OS-10	317840	6409364	Artefact scatter	Low	Total loss of value
115	37-3-1490	Swamp Creek IF-4	318805	6407340	Isolated find	Low	Total loss of value
116	37-3-1492	Swamp Creek IF-2	318807	6407327	Isolated find	Low	Total loss of value
117	37-3-1493	Swamp Creek IF-3	318805	6407330	Isolated find	Low	Total loss of value
118	37-3-1494	Swamp Creek IF-1	318640	6407727	Isolated find	Low	Total loss of value
122	37-3-1499	Swamp Creek-OS1	318819	6407300	Artefact scatter	Low	Total loss of value
124	37-3-1503	Yorks Creek 19	317369	6411237	Artefact scatter with PAD	Low	Total loss of value

4.3 Archaeological Management of Known Aboriginal Sites

4.3.1 Archaeological salvage

As a result of the current and previous assessments, 91 sites have been recorded within the Additional Disturbance Area.

As seen in Table 4-4 (below) the most common management strategy recommended on archaeological grounds alone is for the salvage of a site through the recording and collection of surface artefacts. This recommendation is made due to:

- The nature of the recorded sites (84.6% of sites are isolated finds or low-density artefact scatters with no associated subsurface deposits);
- Generally thin A-Horizon soils that preclude subsurface archaeological deposits;
- Generally high previous disturbance from a range of factors including erosion and land use practices; and
- The low archaeological values assigned to the sites.

Sites designated for surface artefact collection have a very limited ability to further inform the community about the history and culture of the area. While any potential research questions are limited, some information can nevertheless be gained.

Table 4-4 sets out the recommended archaeological management of all sites within or adjacent to the Additional Disturbance Area.

Table 4-4: Management recommendations for sites within the Proposed Disturbance
Footprint

AHIMS ID	Site name	Site type	Scientific Significance	Degree of harm	Comment	Management strategy
37-3-1559	Glendell North OS2	Artefact scatter	Low	Total	Low density artefact scatter	Mapping, description and collection of surface artefact

37-3-1558	Glendell North OS3	Artefact scatter	Low	Total	Low density artefact scatter	Mapping, description and collection of surface artefact
37-3-1557	Glendell North OS4	Artefact scatter	Low	Total	Low density artefact scatter	Mapping, description and collection of surface artefact
37-3-1569	Glendell North OS5	Artefact scatter with PAD	Low - moderate	Total	Low density artefact scatter. Further archaeological excavation deemed unwarranted due to very low density of subsurface artefacts	No action required as no surface artefacts present
37-3-1571	Glendell North OS6	Artefact scatter with PAD	Moderate	Total	Moderate density artefact scatter with subsurface deposits	Mapping, description and collection of surface artefacts. Archaeological excavation to gain a better understanding of the nature of deposits on the spur landform adjacent to Bowman's Creek
37-3-1549	Glendell North OS8	Artefact scatter	Low	Total	Low density artefact scatter	Mapping, description and collection of surface artefact
37-3-1554	Glendell North OS11	Artefact scatter	Low	Total	Low density artefact scatter	Mapping, description and collection of surface artefact
37-3-1553	Glendell North OS12	Artefact scatter	Low	Total	Low density artefact scatter	Mapping, description and collection of surface artefact
37-3-1552	Glendell North OS13	Artefact scatter	Low	Total	Low density artefact scatter	Mapping, description and collection of surface artefact
37-3-1551	Glendell North OS14	Artefact scatter	Low	Total	Low density artefact scatter	Mapping, description and collection of surface artefact
37-3-1550	Glendell North OS15	Artefact scatter	Low	Total	Low density artefact scatter	Mapping, description and collection of surface artefact
37-3-1573	Glendell North OS16	Artefact scatter with PAD	Low - moderate	Total	Low density artefact scatter. Further archaeological excavation deemed unwarranted due to very low density of subsurface artefacts	Mapping, description and collection of surface artefact
37-3-1542	Glendell North OS17	Artefact scatter	Low	Total	Low density artefact scatter	Mapping, description and collection of surface artefact
37-3-1541	Glendell North OS18	Artefact scatter	Low	Total	Low density artefact scatter	Mapping, description and collection of surface artefact
37-3-1572	Glendell North OS19	Artefact scatter with PAD	Low - moderate	Total	Low density artefact scatter. Further archaeological excavation deemed unwarranted due to very low density of subsurface artefacts	Mapping, description and collection of surface artefact
37-3-1540	Glendell North OS20	Artefact scatter	Low	Total	Low density artefact scatter	Mapping, description and collection of surface artefact
37-3-1539	Glendell North OS21	Artefact scatter	Low	Total	Low density artefact scatter	Mapping, description and collection of surface artefact
37-3-1538	Glendell North OS22	Artefact scatter	Low	Total	Low density artefact scatter	Mapping, description and collection of surface artefact
37-3-1537	Glendell North OS23	Artefact scatter	Low	Total (although only part of the site extent is within the Additional Disturbance Area, it is recommended that the entire site be salvaged)	Low density artefact scatter	Mapping, description and collection of surface artefact
37-3-1570	Glendell North OS25	Artefact scatter with PAD	Low - moderate	Total	Further archaeological excavation deemed unwarranted due to very low density of subsurface artefacts	Mapping, description and collection of surface artefact
37-3-1548	Glendell North OS26	Artefact scatter	Low	Total	Low density artefact scatter	Mapping, description and collection of surface artefact

37-3-1508	Glendell North OS28	Artefact scatter	Low	Total	Low density artefact scatter	Mapping, description and collection of surface artefact
37-3-1547	Glendell North OS29	Artefact scatter	Low	Total	Low density artefact scatter	Mapping, description and collection of surface artefact
37-3-1546	Glendell North OS30	Artefact scatter	Low	Total	Low density artefact scatter	Mapping, description and collection of surface artefact
37-3-1545	Glendell North OS31	Artefact scatter	Low	Total	Low density artefact scatter	Mapping, description and collection of surface artefact
37-3-1574	Glendell North OS34	Artefact scatter with PAD	Moderate	Total (although only part of the site extent is within the Additional Disturbance Area, it is recommended that the entire site be salvaged)	Low density artefact scatter with known subsurface deposits	Mapping, description and collection of surface artefacts Archaeological excavation to gain a better understanding of the nature of deposits associated with the confluence of Yorks and Bowman's Creek (Section 9.5.2).
37-3-1567	Glendell North OS35	Artefact scatter with PAD	Moderate	Total (although only part of the site extent is within the Additional Disturbance Area, it is recommended that the entire site be salvaged)	Low density artefact scatter. Further archaeological excavation deemed unwarranted due to very low density of subsurface artefacts	No action required as no surface artefacts present
37-3-1568	Glendell North OS36	Artefact scatter with PAD	Low - moderate	Total	Low density artefact scatter. Further archaeological excavation deemed unwarranted due to very low density of subsurface artefacts	No action required as no surface artefacts present
37-3-1562	Glendell North OS37	Artefact scatter	Low	Total	Low density artefact scatter	Mapping, description and collection of surface artefact
37-3-1565	Glendell North OS38	Isolated find	Low	Total	Low density artefact scatter	Mapping, description and collection of surface artefact
37-3-1576	Glendell North OS39	Artefact scatter	Low	Total	Low density artefact scatter	Mapping, description and collection of surface artefact
37-3-1534	Glendell North IF2	Isolated find	Low	Total	Isolated artefact	Mapping, description and collection of surface artefact
37-3-1533	Glendell North IF3	Isolated find	Low	Total	Isolated artefact	Mapping, description and collection of surface artefact
37-3-1532	Glendell North IF4	Isolated find	Low	Total	Isolated artefact	Mapping, description and collection of surface artefact
37-3-1531	Glendell North IF5	Isolated find	Low	Total	Isolated artefact	Mapping, description and collection of surface artefact
37-3-1528	Glendell North IF8	Isolated find	Low	Total	Isolated artefact	Mapping, description and collection of surface artefact
37-3-1526	Glendell North IF10	Isolated find	Low	Total	Isolated artefact	Mapping, description and collection of surface artefact
37-3-1525	Glendell North IF11	Isolated find	Low	Total	Isolated artefact	Mapping, description and collection of surface artefact
37-3-1524	Glendell North IF12	Isolated find	Low	Total	Isolated artefact	Mapping, description and collection of surface artefact
37-3-1523	Glendell North IF13	Isolated find	Low	Total	Isolated artefact	Mapping, description and collection of surface artefact
37-3-1522	Glendell North IF14	Isolated find	Low	Total	Isolated artefact	Mapping, description and collection of surface artefact
37-3-1521	Glendell North IF15	Isolated find	Low	Total	Isolated artefact	Mapping, description and collection of surface artefact
37-3-1520	Glendell North IF16	Isolated find	Low	Total	Isolated artefact	Mapping, description and collection of surface artefact
37-3-1519	Glendell North IF17	Isolated find	Low	Total	Isolated artefact	Mapping, description and collection of surface artefact
37-3-1518	Glendell North IF18	Isolated find	Low	Total	Isolated artefact	Mapping, description and collection of surface artefact

37-3-1515	Glendell North IF20	Isolated find	Low	Total	Isolated artefact	Mapping, description and collection of surface artefact
37-3-1514	Glendell North IF21	Isolated find	Low	Total	Isolated artefact	Mapping, description and collection of surface artefact
37-3-1516	Glendell North IF22	Isolated find	Low	Total	Isolated artefact	Mapping, description and collection of surface artefact
37-3-1513	Glendell North IF23	Isolated find	Low	Total (although the site is located 5 m from the Additional Disturbance Area, it is recommended that the site be salvaged)	Isolated artefact	Mapping, description and collection of surface artefact
37-3-1512	Glendell North IF24	Isolated find	Low	Total	Isolated artefact	Mapping, description and collection of surface artefact
37-3-1566	Glendell North IF26	Isolated find with PAD	Low	Total	Isolated artefact with very low-density subsurface deposit. Further archaeological excavation deemed unwarranted due to very low density of subsurface artefacts	No action required as no surface artefacts present
37-3-1564	Glendell North IF27	Isolated find	Low	Total	Isolated artefact	Mapping, description and collection of surface artefact
37-3-1563	Glendell North IF28	Isolated find	Low	Total	Isolated artefact	Mapping, description and collection of surface artefact
37-3-1575	Glendell North IF29	Isolated find	Low	Total	Isolated artefact	Mapping, description and collection of surface artefact
37-3-0294	Site 2; (MORL2)	Artefact scatter	Low	Total	Low density artefact scatter	Mapping, description and collection of surface artefact
37-3-0343	Mt Owen (1996) 1;MtO1;	Artefact scatter	Low	Total	Low density artefact scatter	Mapping, description and collection of surface artefact
37-3-0360	Mt Owen (1996) 2;	Isolated find	Low	Total	Isolated artefact	Mapping, description and collection of surface artefact
37-3-0469	Bowmans/Swamp Creek Trench 1	Artefact scatter with PAD	Moderate	Total (already partially destroyed)	Moderate density artefact scatter	Mapping, description and collection of surface artefact Archaeological excavation to gain a better understanding of the nature of deposits associated with Bowman's and Swamp Creek (Section 9.5.2).
37-3-0521	MO-IF1	Isolated find	Low	Total	Isolated artefact	Mapping, description and collection of surface artefact
37-3-0612	Bettys Creek 22	Isolated find	Low	Total	Isolated artefact	Mapping, description and collection of surface artefact
37-3-0689	G11 Glendell	Artefact scatter with PAD	Low	Total	Low density artefact scatter. Further archaeological excavation deemed unwarranted due to very low density of subsurface artefacts	Mapping, description and collection of surface artefacts
37-3-0727	Yorks Creek (Mt Owen Mine) 2	Artefact scatter	Low	Total	Low density artefact scatter	Mapping, description and collection of surface artefacts
37-3-0744	York Creek 1	Artefact scatter	Low	Total	Low density artefact scatter	Mapping, description and collection of surface artefacts
37-3-0745	York Creek 2	Artefact scatter	Low	Total	Low density artefact scatter	Mapping, description and collection of surface artefacts
37-3-0746	York Creek 3	Artefact scatter	Low	Total	Low density artefact scatter	Mapping, description and collection of surface artefacts
37-3-0747	York Creek 4	Artefact scatter	Low - moderate	Total	Low density artefact scatter. Further archaeological	Mapping, description and collection of surface artefacts

					excavation deemed unwarranted due to very low density of subsurface artefacts	
37-3-0748	York Creek 5	Artefact scatter	Low	Total	Low density artefact scatter	Mapping, description and collection of surface artefacts
37-3-0749	York Creek 6	Artefact scatter	Low	Total	Low density artefact scatter	Mapping, description and collection of surface artefact
37-3-0750	York Creek 7	Artefact scatter with PAD	Low - moderate	Total	Low density artefact scatter. Further archaeological excavation deemed unwarranted due to very low density of subsurface artefacts	No action required as no surface artefacts present
37-3-0751	York Creek 8	Isolated find	Low	Total	Isolated artefact	Mapping, description and collection of surface artefact
37-3-0752	York Creek 9	Artefact scatter	Low	Total	Low density artefact scatter	Mapping, description and collection of surface artefact
37-3-0753	York Creek 10	Artefact scatter	Low	Total	Low density artefact scatter	Mapping, description and collection of surface artefact
37-3-0754	York Creek 11	Artefact scatter with PAD	Low- moderate	Total	Low density artefact scatter. Further archaeological excavation deemed unwarranted due to very low density of subsurface artefacts	Mapping, description and collection of surface artefacts
37-3-0755	York Creek 12	Artefact scatter	Low	Total	Low density artefact scatter	Mapping, description and collection of surface artefact
37-3-0756	York Creek 13	Artefact scatter	Low	Total	Low density artefact scatter	Mapping, description and collection of surface artefact
37-3-0757	York Creek 14	Isolated find	Low	Total	Isolated artefact	Mapping, description and collection of surface artefact
37-3-0758	York Creek 15	Artefact scatter	Low	Total	Low density artefact scatter	Mapping, description and collection of surface artefact
37-3-0759	York Creek 16	Artefact scatter	Low	Total	Low density artefact scatter	Mapping, description and collection of surface artefact
37-3-0760	York Creek 17	Isolated find	Low	Total	Isolated artefact	Mapping, description and collection of surface artefact
37-3-0761	York Creek 18	Artefact scatter with PAD	Low	Total	Low density artefact scatter. Further archaeological excavation deemed unwarranted due to very low density of subsurface artefacts	No action required as no surface artefacts present
37-3-0762	Bowmans Ck 6	Artefact scatter	Low	Total	Low density artefact scatter	Mapping, description and collection of surface artefacts
37-3-0763	Bowmans Ck 7	Artefact scatter with PAD	Moderate	Total	Moderate density artefact scatter with known subsurface deposits	Mapping, description and collection of surface artefacts. Archaeological excavation to gain a better understanding of the nature of deposits on the spur landform adjacent to Bowman's Creek (Section 9.5.2).
37-3-0764	Bowmans Ck 8	Artefact scatter	Low	Total	Low density artefact scatter	Mapping, description and collection of surface artefacts
37-3-0765	Bowmans Ck 9	Artefact scatter	Low	Total	Low density artefact scatter	Mapping, description and collection of surface artefacts
37-3-0766	Bowmans Ck 10	Artefact scatter	Low	Total	Low density artefact scatter	Mapping, description and collection of surface artefacts
37-3-0773	Swamp Ck 10	Isolated find	Low	Total	Isolated artefact	Mapping, description and collection of surface artefact

37-3-1155	MT OWEN ISOLATED FIND2	Isolated find	Low	Total	Isolated artefact	Mapping, description and collection of surface artefact
37-3-1156	MT OWEN ISOLATED FIND1	Isolated find	Low	Total	Isolated artefact	Mapping, description and collection of surface artefact
37-3-1158	RPS DLW IF1	Isolated find	Low	Total	Isolated artefact	Mapping, description and collection of surface artefact
37-3-1194	MOCO OS-6	Artefact scatter	Low	Partial (already partially destroyed)	Low density artefact scatter	Mapping, description and collection of surface artefacts
37-3-1198	MOCO OS-10	Artefact scatter	Low	Total (already partially destroyed). Although only part of the site extent is within the Additional Disturbance Area, it is recommended that the entire site be salvaged.	Low density artefact scatter	Mapping, description and collection of surface artefacts
37-3-1490	Swamp Creek IF-4	Isolated find	Low	Total	Isolated artefact	Mapping, description and collection of surface artefact
37-3-1492	Swamp Creek IF-2	Isolated find	Low	Total	Isolated artefact	Mapping, description and collection of surface artefact
37-3-1493	Swamp Creek IF-3	Isolated find	Low	Total	Isolated artefact	Mapping, description and collection of surface artefact
37-3-1494	Swamp Creek IF-1	Isolated find	Low	Total	Isolated artefact	Mapping, description and collection of surface artefact
37-3-1498	Swamp Creek- OS2	Artefact scatter	Low	Total	Low density artefact scatter	Mapping, description and collection of surface artefacts
37-3-1499	Swamp Creek- OS1	Artefact scatter	Low	Total	Low density artefact scatter	Mapping, description and collection of surface artefacts
37-3-1503	Yorks Creek 19	Artefact scatter with PAD	Low - moderate	Total	Low density artefact scatter. Further archaeological excavation deemed unwarranted due to very low density of subsurface artefacts	Mapping, description and collection of surface artefacts

4.3.2 Sites requiring specific management to prevent harm

There are three sites that are closely adjacent to the Additional Disturbance Area and may be unintentionally harmed by the Project unless specific management is undertaken to avoid impacts (See Table 4-5). Due to their close proximity to proposed works, these sites are at greater risk of unintentional impact when compared to sites located further away. These sites should be permanently fenced and signed prior to works beginning to provide adequate protection.

MOCO OS-6 is partially located within the Additional Disturbance Area, however, those portions of the site extent outside the Additional Disturbance Area will need to be fenced and signed.

AHIMS ID	Site name	GDA Zone 56 Easting	GDA Zone 56 Northing	Site type	Scientific Significance
37-3-1194	MOCO OS-6	320718	6409739	Artefact scatter	low
37-3-1560	Glendell North OS1	316820	6413702	Artefact scatter	Low
37-3-1543	Glendell North OS33	319166	6407069	Artefact scatter	Low

Table 4-5: Sites requiring specific management to ensure conservation

See Appendix 11.5 for full details of the sites requiring specific management measures.

4.3.3 Sites located on LCO owned land

There are six new and seven previously recorded sites that are located on land owned by Liddell Coal Operations?? (LCO), west of Bowmans Creek that were recorded or re-assessed during the survey lists these sites.

Table 4-6: Sites located on LCO owned land

AHIMS ID	Site Name	GDA Zone 56 Easting	GDA Zone 56 Northing	Site type	Notes
37-3-0686	Bowmans Ck 13	315983	6412942	Artefact scatter	
37-3-0688	G12	315806	6412691	Artefact scatter	
37-3-0768	Bowmans Ck_13	315982	6412940	Artefact scatter	Duplicate of 37-3-0686
37-3-0770	Bowmans Ck 11	315824	6412493	Artefact scatter	Same site as 37-3-0688
37-3-0771	Bowmans Ck 15	315825	6412677	Artefact scatter	Same site as 37-3-0688
37-3-1166	LIDEE - IF3	315930	6413149	Artefact scatter	
37-3-1503	Yorks Creek 19	317369	6411237	Artefact scatter	
37-3-1536	Glendell North OS7	316412	6413195	Artefact scatter	
37-3-1556	Glendell North OS9	315698	6412992	Artefact scatter	
37-3-1555	Glendell North OS10	315557	6412542	Artefact scatter	
37-3-1530	Glendell North IF6	315966	6412883	Isolated find	
37-3-1529	Glendell North IF7	315514	6412657	Isolated find	
37-3-1561	Glendell North ST1	316124	6412405	Scarred tree	

4.4 Historical Archaeology

This section provides a high-level summary of the historical archaeology research and fieldwork undertaken at the Ravensworth Estate homestead (See Figure 4-1, below).

Casey & Lowe, Archaeology & Heritage were engaged by Glencore to undertake historic archaeological test excavations on the Ravensworth Estate, situated within the original 1824 Ravensworth Estate land grant. The following information was prepared by Casey & Lowe (2019) to establish the historical archaeological potential and archaeological significance of the Ravensworth Estate to inform the EIS for the Project. For a complete discussion of the mining history and historical archaeology, please see Casey & Lowe (2019), which is an appendix to the Heritage Impact Statement within the EIS.



Figure 4-1: Front entrance of the Ravensworth Homestead (Photograph by Shaun Canning).

Seven key areas were identified for archaeological testing. Three of these were located to the west of Hebden Road and four were located to the east of it, where the current homestead is situated. The following is a brief description of each of the Test Areas.

The wider area surrounding the Project Area was first granted to James Bowman in 1824, who soon after occupied 12,160 acres of land, along with 2,000 sheep, 200 cattle and a number of convicts. The location of the first cottage on the property is approximately 850m west of the current homestead complex (Dunn, 2019).

4.4.1 Potential location of early house: Test Area 1

Test Area 1 is situated approximately 300 m west of Yorks Creek, on the opposite side of Hebden Road to the homestead. Testing in this area was based upon evidence from the natural topography and the presence of a building marked "house" in or around this area on Dixon's road plan and other historic plans. The area measured approximately 225 m from north to south and up to 95 m from east to west. The natural topography sloped off steeply to the south and west of this area. The area was sparsely covered in grass with occasional small bushes.

4.4.2 Potential agricultural/ garden features: Test Area 2

Test Area 2 was situated immediately west of Yorks Creek southeast of Test Area 1. It covered an area of 100 m from north to south by approximately 90 m from east to west. Testing for agricultural and garden features in this area was based on evidence present in LiDAR and aerial photography. The ground here was relatively flat. The area was covered by grass and occasional small bushes.

4.4.3 Main house and immediate surrounds: Test Area 3

Located around the Ravensworth homestead to the east of Hebden Road, this area covered approximately 140 m from east to west and 160 m from north to south. The area incorporated the domestic portion of the Ravensworth homestead and an area of farmland to the south and east of the homestead buildings. The area contained the main house and its associated extensions, an array of garden features (walls, flower beds, etc.), an ablution building, garden trees, a later sandstone turning circle, and a dirt track running from east to west to the north of the main house.

4.4.4 Potential convict barracks: Test Area 4

Situated to the north of the main house, this area extends from between two extant outbuildings into the paddock to the north. The test area measured approximately 60 m from north to south and 75 m from east to west. The area was divided into two by an east-west running stone wall. The area south of the dividing wall was covered in grass and contained several stone walls apparently used to corral livestock. The north part of the area was in a paddock and displayed a linear depression running parallel with the wall. This part of the area was strewn with stone blocks, several of which were worked architectural pieces. Re-used architectural pieces were also identified in the stone wall which divided the area.

4.4.5 Yards and Buildings: Test Area 5

Located immediately to the north of Test Area 4 and in the same paddock as the north part of it, this area measured approximately 125 m by 125 m. The area was covered in grass with some stone and occasional timber building components visible on the surface. A dirt track traversed the west side of this area in a north-south direction.

4.4.6 Buildings, Potential Gardens and Agricultural Features: Test Area 6

This was the largest of the test areas. It was located along the east bank of Yorks Creek, to the north and west of Test Area 5. The area covered an area measuring approximately 200 m from east to west and 350 m from north to south. The area was generally flat with a slight slope in places towards the creek. The area contained up to three linear-shaped dams, at least one of which was still functioning. A patch of herringbone brick paving was observed in the east of the area. A partially covered brick well was observed in the west of the area, not far from the creek. Two registered AHIMS artefact scatters Yorks Creek 10 (37-3-0753) and Yorks Creek 11 (37-3-0754) are located within the test area.

4.4.7 Potential European Burial: Test Area 7

Located on the west side of Hebden Road, this area is adjacent to the east bank of Yorks Creek. Ground penetrating radar (GPR) data revealed the remains of a possible rectangular structure in the east of the area. Most of the area was flat with a notable, sharp drop off in the west, down to the creek. The area measured approximately 20 m from east to west and 25 m from north to south. The surface was covered with grass and a linear stone feature measuring approximately 9 m from north to south was visible. This feature ran roughly parallel with the creek, close to where the land dropped off towards the east bank.

4.4.8 Results

The archaeological test excavation program at the Ravensworth Homestead and surrounds has confirmed the survival of early and later 19th and early 20th-century archaeological remains across the site. Testing confirmed the presence of intact archaeological remains dating to between 1830-1890s and has shown that their integrity is medium to high. The date and context of these remains means they are considered to be of State heritage significance.

The main archaeological results included:

- Intact archaeological remains of a large partitioned structure/ building in the form of foundations in the area that local oral history said contained the 'convict barracks' (Test Area 4).
- Intact archaeological remains of buildings / structures in the form of stone foundations, post holes, wall cuts and paths to the north / northwest of the main house (Test Areas 5 and 6).
- Evidence of a previously unknown structure but no burial (Test Area 7).
- Test Area 1 revealed no evidence of the earlier house site no historic features or relics were identified / recovered.
- Archaeological evidence of agricultural activity in various areas, including plough marks (Test Area 2, 6 and 8).

The archaeological remains across the Project Area have been variously impacted by 19th and 20th-century agricultural activities (including the demolition of structures and the loss of some underfloor deposits) and are being further truncated by environmental processes (wind, weathering, animals etc), all of which have contributed to the loss of topsoil (A horizon) across the site and the wider Project Area.

As a result, the archaeological remains are subject to ongoing environmental and land management processes, which will continue to impact and erode the archaeology over time.

The analysis of the archaeological relics recovered revealed an array of information regarding the dates and potential uses of the areas / structures including:

- Test excavations (Test Areas 3 and 4) beside the main house and immediate outbuildings revealed that the upper deposits and fills contained artefacts relating to the preparation, serving and consumption of food and drink. It is likely that more artefacts will be found nearby and underneath floors in more secure contexts that will provide greater insight into the lives of the many occupants of the farm over time.
- The architectural items reveal that bricks with wide shallow frog, used in association with sandstone masonry
 in some structures, were locally hand-made from the clays and gravels, most probably on the property
 somewhere along one of the creek lines. These have not been previously recorded. As they were probably
 made by convict or itinerant brickmakers for the original owner of Ravensworth homestead, James Bowman,
 they provide a significant contribution to our knowledge of early construction in the region and provide a
 good comparison for recent studies of early brickmaking in Sydney, Parramatta, and Newcastle. The bricks
 were used in a large well in Test Area 6 (context 158); herringbone paving (Context 126), a chimney and other
 components of a multiroom structure investigated in Test Area 6. Future work may determine if they were
 used to construct structural elements of the original house and outbuildings.
- Trenches to the north of the homestead complex (Test Area 5) revealed evidence of structures (walls, postholes, floors) and artefacts strongly indicating blacksmithing and horse farriering activities. These include large pieces of unworked and worked iron for structures, vehicles, various horse and possibly oxen shoes and equipage, and a leather hole punch presumably for straps and belts.
- Scattered within and around the various structures in Test Area 3-6 were numerous fragments of ceramics and glassware used by the occupants over time. The table and tea wares were mostly imported from the UK. The glass represented a range of beverages and food, various pharmaceuticals and other products.
- The investigation also recorded scatters and dumps of similar ceramics and glassware in different parts of the property, including the wall of the main dam and in several paddocks.
- Consumption of food by the residents at the site were represented by small numbers of animal bone, mostly from sheep. Several of the examples had butchery marks and one was burnt. In the future these may assist in our understanding of slaughtering practices at Ravensworth and what cuts of meat were preferred.

A full suite of recommendations is provided in the final report compiled by Casey & Lowe (2019).

4.4.9 Significance of Ravensworth Homestead

The Ravensworth Homestead is important as an archaeological landscape containing an 1830s colonial house and associated outbuildings which were modified throughout the 19th and 20th centuries, and the archaeology of the estate. The homestead buildings, the remnant 19th-century farm and garden layout built by assigned convicts all provide evidence of this landscape and its history. This can testify to the way in which this early occupation by Surgeon James Bowman with expansion of the wool industry into the Upper Hunter Valley, aided by assigned convicts, irrevocably changed the lives of Aboriginal people and modified the landscape of the Hunter Valley.

The archaeology of the place is associated with a number of prominent individuals: James Bowman, Mary Bowman (née Macarthur), John Macarthur, overseers James White and John Larnach, as well as later owners Captain William Russell and the Marshall family. This cultural landscape with its buried sites, works, relics, and ruins should provide evidence of technical achievements associated with an evolving pastoral activity, notably early wool production. Aspects of these archaeological values may? be important to the local community, notably evidence of the material culture and rural technology of the residents, the main families, lives of convicts and free persons.

The homestead's potential research significance relates to its ability to demonstrate the way of life, tastes, customs and functions in a rural context through the 19th to early 20th centuries. From its establishment, the site is a good example of a colonial rural estate built on convict labour. The intactness of the site's structures and their landscape settings enhances its role as a site of archaeological and scientific importance. Key research themes relate to the nature of lives on a newly-established frontier and contact with Aboriginal people, material culture and lives of significant colonial people, convict lives and the assignment system and how it is implemented within this landscape, use of technology and management of water, changing transportation and economics and how they shaped life on the estate.

The survival of the existing building indicates that archaeological excavation may contribute further information about the layout of the house, to understanding phases of its construction, potential alterations and the uses of rooms. These may be able to be interpreted and attributed to periods corresponding to the occupation of the Bowmans, White's or Lanarch's. In addition, underfloor deposits within the floor cavity are likely to be present in some rooms, surviving beneath original or later flooring. These deposits have the potential to tell us about the status of the household and the use of spaces, although they may not be directly attributable to the Bowman era or to later ownership.

The Ravensworth Estate is rare for its contribution as part of the new convict assignment system and the beginnings of sheep husbandry outside the Cumberland Plain and its association with the Macarthur and Bowman families. Representative values are expressed through its 1820-1840s homestead and estate, pattern of pastoralism and closer settlement. The archaeological landscape, sites and material culture of this place could be of both State and local significance.

5 Aboriginal Community Consultation

Aboriginal people have rights and interests in the assessment and control of cultural heritage objects and places. In recognising these rights and interests, all parties concerned with identifying, conserving and managing cultural heritage should acknowledge, accept and act on the principles that Aboriginal people:

- are the primary source of information about the value of their heritage and how this is best protected and conserved;
- must have an active role in any Aboriginal cultural heritage planning process;
- must have early input into the assessment of the cultural significance of their heritage and its management so they can continue to fulfil their obligations towards their heritage; and
- must control the way in which cultural knowledge and other information relating specifically to their heritage is used, as this may be an integral aspect of its heritage value.

Consultation with Aboriginal people about cultural heritage places and the way those places should be managed is required under Part 6 of the NP&W Act. The processes of consultation are specifically outlined in the Department of Environment, Climate Change and Water publication 'Aboriginal cultural heritage consultation requirements for proponents 2010'.

This project has followed these guidelines and has also been consistent with the DECC 2005 guidelines.

Table 11.1 in **Appendix 11** outlines the extensive series of consultation activities and workshops conducted by the Project throughout the preparation of this ACHAR.

5.1 Consultation Objectives and Approaches

'Consultation with Aboriginal people is an integral part of the process of investigating and assessing Aboriginal cultural heritage. Aboriginal people who hold cultural knowledge about the area, objects and places that may be directly or indirectly affected by the proposed activity must be given the opportunity to be consulted. This is done through the process of investigating, assessing and working out how to manage the harm from the proposed activity. Consultation must adhere to the requirements set out in Clause 80C of the NPW Regulation' (OEH 2011:2).

'Conservation, interpretation and management of a place should provide for the participation of people for whom the place has special associations and meanings, or who have social, spiritual or other cultural responsibilities for the place' (Australia ICOMOS 1999).

Based on the SEAR's and OEH guidelines for Aboriginal cultural heritage assessment in NSW, Aboriginal participation and involvement in all stages of cultural heritage assessment and management has been fundamental to the Project's ACHAR.

After formal notification and expressions of interest in the Project by the RAPs, Project staff approached the knowledge holder groups (WNAC and the PCWP) to understand if they wished to use the consultation model that has been developed during the consultation process for other Glencore sites (namely the Bulga Optimisation Project, the Mt Owen Continued Operations Project, the United Wambo JV Project and Mangoola Coal Continued Operations Project).

The consultation process was developed to encourage the active participation of all RAPs in the assessment of Project impacts, and the development of management recommendations and measures relevant to the Aboriginal cultural significance values statements and assessment concerns.

The steps employed in the cultural heritage assessment for the Project include(d):

- Workshop discussions with the Community RAPs
- Distribution of survey methodologies,
- Receiving comments and sharing of historic information including Project Area land use information;
- Reference to OzArk archaeological reports to gain an understanding of other components of the Aboriginal cultural heritage assessment;
- Facilitation of RAPs consultation on the cultural values of the Project Area, and Walks on Country to discuss Aboriginal cultural heritage values;
- Archival investigation;

- Consultation with OEH; and
- Assessment of the key cultural heritage issues for the Project, considering relevant guidelines, policies and plans and input from RAPs including Traditional Owners and Knowledge Holders.

As an outcome of this process, this ACHAR presents a combined understanding of Aboriginal cultural heritage values of the Project Area, as identified by all RAPs, historical research and the archaeological assessment, but excluding the PCWP who elected not to participate in the workshop or values reporting process at this time. This ACHAR also presents an impact assessment that incorporates the views of all RAPs (apart from the PCWP) and presents a series of management measures and recommendations that have been prepared in consultation with the RAPs who participated. The offer for PCWP involvement and consultation remains open.



Figure 5-1: The integrated ACHAR approach utilised for this Project.

Throughout the ACHAR process, Glendell has engaged with representatives of the PCWP to gain their input into the ACHAR as has been successfully undertaken with the PCWP for the Mount Owen, United Wambo JV and Mangoola ACHAR's. This has included numerous meetings and phone calls. At the time of writing the PCWP had not provided a Values and Recommendations Report or Statement, as was received for the Mount Owen ACHAR. The offer for inclusion of PCWP Values and Recommendations remains open through the assessment process.

The following sections provide a summary of the key stages of consultation with the involvement of the RAPs who chose to participate in the various consultation formats. The information gathered from the workshops combined with the results of the Project's archaeological assessments and historical research have been compiled to provide a comprehensive assessment of the cultural values of the Project Area, and to provide a consolidated management framework for the Project that are cognisant of intergenerational equity and Care and Control considerations.

5.2 Cultural Heritage Assessment Process for the Project

The key stages of the cultural heritage assessment process used by the Project are derived from the Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW (OEH 2011).

The stages of consultation and assessment, as described in the Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation (DEC 2005) include:

- Undertaking a preliminary assessment to determine if the Project is likely to have an impact on Aboriginal cultural heritage
- Identifying the Aboriginal cultural heritage values associated with the area through consultation with Aboriginal people with cultural knowledge or responsibilities for country in which the proposed project occurs, written and oral research and field investigations
- Understanding of the significance of the identified Aboriginal cultural heritage values
- Assessing the impacts of the proposed development on Aboriginal objects and Aboriginal places

- Describing and justifying the proposed outcomes and alternatives, and
- Documenting the Aboriginal cultural heritage impact assessment and the conclusion and recommendations to afford appropriate protection of Aboriginal cultural value.

5.2.1 Four Stages of Consultation and Assessment

Consultation consistent with the DEC (2005) and DECCW (2010a) guidelines and in accordance with the principles of the Burra Charter (Australia ICOMOS 1999) has involved four consultation stages as detailed in the DECCW (2010a) guidelines outlined below.

Stage 1: During Stage 1 the Project undertook formal notification of the proposed Project and the ACHAR process, and the opportunity for Aboriginal parties to formally register their interest in the Project. Stage 1 of the DECCW (2010) consultation process aims to '*Identify, notify and register Aboriginal people who hold cultural knowledge relevant to determining the cultural significance of Aboriginal objects and / or places in the area of the proposed Project'*.

5.2.2 Agency Notification

In accordance with Section 4.1.2 of DECCW (2010), the following organisations were notified about the project on the 24th November 2017, and the Project sought information on any Aboriginal people or organisations who may hold cultural knowledge relevant to determining any cultural values or significance associated with the Project Area.

Agency	Date Notified	Date Response	Response
Wanaruah Local Aboriginal Land Council (WLALC)	24/11/2017	27/11/2017	Provided a list of RAP's
Office of the Registrar of Aboriginal Land Rights Act (ORLAR)	24/11/2017	28/11/2017	Advised that there were no Registered Aboriginal Owners pursuant to Division 3 of the Aboriginal Land Rights Act 1983
Office of Environment and Heritage (OEH)	24/11/2017	04/12/2017	Responded with list of individuals who might have interests in the Project.
Native Title Services Corporation (NTSCorp)	24/11/2017		No response
National Native Title Tribunal (NNTT)	24/11/2017	28/11/2018	Advised that there are no overlapping native title claims over the Project Area
Muswellbrook Shire Council (MSC)	24/11/2017		No response
Hunter Local Land Services (HLLS)	24/11/2017		No response

5.2.3 Public Notification

Advertisements were placed in the following publications seeking registrations of interest for the Project

- Singleton Argus (20th December 2017)
- Muswellbrook Chronicle (22nd December 2017)

A copy of these advertisement is provided in **Appendix 11.3.2**.

5.2.4 Written Notification to invite Participation in the ACHAR Process

Following the newspaper advertisements and correspondence mentioned above, a comprehensive list was developed containing the contact details of 102 Aboriginal parties. A written notification was posted or emailed to each of these on 22nd November 2017 to provide the opportunity to register an interest in the Project and participate in the assessment activities.

As specified in Section 4.1.5 of DECCW (2010a) guidelines, all RAPs were afforded the opportunity to withhold their information being provided to OEH.

A copy of the initial letter sent to the identified individuals and organisations is shown in **Appendix 11.3.1**.

5.2.5 Registration of Aboriginal Parties

In accordance with Section 4.1.3 of DECCW (2010), all 102 Aboriginal parties identified through the process noted above were sent notification letters, introducing the Project and inviting their registrations of interest by 31st January 2018. At the close of the registration period, the Project had 32 Registered Aboriginal Parties.

A full list of all RAPs is included in Appendix 11.2.

During this phase (Stage 2) the Project, OzArk and ACHM conducted initial Project description consultation, which included presenting information on the proposed Project to all Aboriginal parties who registered an interest in **Stage 1**. Copies of this information was shared with all RAPs. Consultation with the RAPs involved a combination of consultation forums, including meetings, briefing sessions and included inspections of the Project Area. **Stage 2** also included the briefings to the PCWP and WNAC groups. In accordance with Section 4.2.1 of DECCW (2010a), the RAPs who had registered an interest in the Project during **Stage 1** were sent a letter on 16th March 2018 inviting their participation in the archaeological surveys commencing on the 9th April 2018.

5.2.6 Draft Archaeological Survey Methodology

In accordance with Sections 4.2, 4.3.1 and 4.3.2 of DECCW (2010a), the Draft Archaeological Survey Methodology, including a Project Community Information Sheet was mailed out to Registered RAPS for comment (28-day review) on 21st February 2018. This feedback is presented in **Appendix 11.3.9**.

5.2.7 Draft Archaeological Test Pitting Methodology

In accordance with Sections 4.2, 4.3.1 and 4.3.2 of DECCW (2010a), the Draft Archaeological Test Pitting Methodology and archaeological survey results summary was sent out to RAPS for comment (28-day review) on 6th April 2018. The Project received positive feedback from several RAPs.

This feedback is presented in Appendix 11.3.20.

Stage 3 of the DECCW (2010a) consultation process relates to (a) gathering information about the cultural significance and cultural values of an assessment area, (b) seeking Aboriginal registrant information that will enable the cultural significance of the place to be determined and (c) providing Aboriginal registrants with the opportunity to provide input on cultural heritage management options. During Stage 3, OzArk conducted extensive archaeological fieldwork and ACHM facilitated cultural values workshops, site visits and consultation with WNAC and the Community RAPs in conjunction with Umwelt and Glencore personnel.

As part of the overall assessment approach, Glencore personnel also conducted regular consultation; and provided feedback to the PCWP and WNAC in relation to the Project, and specifically in relation to the cultural values workshops. To assist the groups, Glencore provided access to materials and facilitated land access, to enable these groups to assess their cultural heritage values, the significance of Aboriginal cultural places and artefacts, the likely Project impacts, if approved, and their management measures. Many of the RAPs were also involved in the archaeological fieldwork.

The Project team (including Umwelt, Glencore and ACHM personnel) conducted workshop sessions during **Stage 3.** However, not all Community RAPs and Knowledge Holder Groups accepted the offer to attend those workshops. The intent of the workshops was to review and discuss the Community RAPs and the Knowledge Holder Group values and recommendations, prior to the issue of the ACHAR reports for their 28-day review period. This approach provided the opportunity for all RAPs to discuss recommendations and to provide further comment on Aboriginal cultural heritage values and management measures.

Glendell has engaged with the PCWP since the commencement of the GCOP. At the time of writing the PCWP had not provided a Values and Recommendations Report or Statement, as was received for the Mount Owen ACHAR. The offer for inclusion of PCWP Values and Recommendations remains open through the assessment process.

During Stage 3 activities included:

- WLAC cultural values site visit and workshop held 31st July 2018
- WNAC cultural values site visit and closed values meeting / workshops (held August 2nd and 17th-19th September 2018). The discussions from the 17th September meeting were not to be disclosed to the Project.
- Community RAP cultural values site visit and workshops (held July 1st August and 21st September 2018)
- Hickey Family cultural values workshop (held 1st August and 20th September 2018)
- Invitations to RAP's for participation in the archaeological survey (sent out 19th January 2018)
- Invitations to RAP's for participation in the archaeological test pitting (sent out 6th April 2018)
- Archaeological survey (including PCWP representatives in the fieldwork)
- Archaeological test excavation (including PCWP representatives in the fieldwork).

5.3 Stage 4 Consultation – Draft ACHAR Review

5.3.1 Comment on the Draft ACHAR

Continued consultation around the Draft ACHAR is scheduled for September 2019.

5.4 Summary of Consultation Activities

Appendix 11.1 provides a detailed log of all consultation activities undertaken for the Project.

6 Cultural Heritage Values and Significance Assessment

Assessing the cultural significance of cultural heritage sites or objects is central to both understanding and managing heritage places and is a requirement of the Aboriginal Cultural Heritage Assessment reporting process. This section briefly describes the process and presents the cultural significance assessment for the Aboriginal heritage in the Project Area.

This section of the report specifically recognises that Aboriginal people are the primary determinants of information regarding the significance of cultural heritage objects, places or values. Indeed, this primacy is explicitly recognised by the Office of Environment and Heritage:

OEH recognises and acknowledges Aboriginal people as the primary determinants of the cultural significance of their heritage. In recognising these rights and interests, all parties concerned with identifying, conserving and managing cultural heritage should acknowledge, accept and act on the principles that Aboriginal people:

- Are the primary source of information about the value of their heritage and how this is best protected and conserved,
- Must have an active role in any Aboriginal cultural heritage planning process,
- Must have early input into the assessment of the cultural significance of their heritage and its management so they can continue to fulfil their obligations towards their heritage, and
- Must control the way in which cultural knowledge and other information relating specifically to their heritage is used, as this may be an integral aspect of its heritage value.

6.1 Definition of Cultural Significance

Cultural significance can be associated with or attached to any place, concept or object by any group or groups of people and is embodied in the place itself (i.e. its fabric, use, associations, and meanings, relationship to other concepts, places or objects). Place means any geographically defined area, and may include features, elements, objects, spaces and views. The place may have tangible (physically identifiable) or intangible (conceptual ideas or spiritual beliefs) values or a combination of both, or a range of values held by different individuals or groups. Places can be large or small, discrete or widespread. The concept of place can embody all of the physically identifiable elements of a landscape (i.e. historical, indigenous or natural heritage values). Place may also exist in the intangible realm, where conceptual or spiritual values are held over places or landscapes with little observable physical evidence or fabric (Australia ICOMOS, 2013).

6.2 Nature of Cultural Significance

The nature of cultural significance is determined by understanding the interrelationship of the following core values, and the constituent factors assessed. These values are:

6.2.1 Aesthetic Value

A concept, place or object can have cultural significance if it is significant in exhibiting particular aesthetic characteristics. Such as:

- Importance to a community for aesthetic characteristics.
- Importance for its creative, design or artistic excellence, innovation or achievement.
- Importance for its contribution to the aesthetic values of the setting demonstrated by a landmark quality or having impact on important vistas or
- Otherwise contributing to the identified aesthetic qualities of the cultural environs or the natural landscape within which it is located.

6.2.2 Historic Value

A concept, place or object can have cultural significance if it is significant in exhibiting particular historic characteristics. Such as:

- It is significant in the evolution or pattern of the history of a locality, region, state, nation or people.
- Importance for the density or diversity of cultural features illustrating the human occupation and evolution of the locality, region, state or nation.

- Importance in relation to an event, phase or activity of historic importance in the region, state or nation
- Importance for close association with an individual or individuals whose life, works or activities have been significant within the history of the region, state or nation
- Importance as an example of technical, creative, design or artistic excellence, innovation or achievement in a period.

6.2.3 Scientific Value

A concept, place or object can have cultural significance if it is significant in exhibiting scientific characteristics. Such as:

- It has demonstrable potential to yield information that will contribute to an understanding of the natural or cultural history of the region, state or nation
- Importance for information contributing to a wider understanding of natural or cultural history by its use as a research site, teaching site, type locality, reference or benchmark site.
- Importance for its potential to yield information contributing to a wider understanding of the history of human occupation of the locality, region, state or nation.
- It is significant in demonstrating a high degree of technical innovation or achievement.

6.2.4 Social Value

A concept, place or object can have cultural significance if it is significant in exhibiting social characteristics. Such as:

- Association with a community or cultural group for social, cultural, educational or spiritual reasons.
- Importance as a concept, place or object highly valued by a community or cultural group for reasons of social, cultural; religious, spiritual, aesthetic or educational associations.
- Importance in contributing to a community's sense of place and/or identity.

6.2.5 Spiritual Value

The Draft 2013 ICOMOS practice note 'Understanding and Assessing Cultural Significance' defines 'spiritual value' as the 'intangible values and meanings embodied in or evoked by a place which give it importance in the spiritual identity, or the traditional knowledge, art and practices of a cultural group. Spiritual value may also be reflected in the intensity of aesthetic and emotional responses or community associations and be expressed through cultural practices and related physical structures' (ICOMOS, 2013: 1).

The physical qualities of the place may inspire a strong and/or spontaneous emotional or metaphysical response in people, expanding their understanding of their place and purpose in the world, particularly in relation to the spiritual realm. The term spiritual value was recognised as a separate value in the 1999 Burra Charter (Australia ICOMOS 1999). It is still included in the definition of social value in the Commonwealth and most state jurisdictions. Spiritual values may be interdependent on the social values and physical properties of a place and its surrounding landscape.

A place may exhibit spiritual values if:

- The place contributes to the spiritual identity or belief system of a cultural group
- The place is a repository of knowledge, traditional art or lore related to spiritual practice of a cultural group
- The place is important in maintaining the spiritual health and well-being of a culture or group
- The physical attributes of the place play a role in recalling or awakening an understanding of an individual or group's higher purpose and place in relation to the spiritual realm.
- The spiritual values of the place find expression in cultural practices or human-made structures or inspire creative works.

6.3 Degree of Cultural Significance

Once the nature of the cultural significance of a place or object is understood, it is essential to understand the extent or degree of that cultural significance. This is typically established by considering:

6.3.1 Rarity

A concept, place or object can have cultural significance if it:

- Demonstrates or possesses rare, uncommon or endangered aspects of the cultural heritage of a locality, region, state or nation.
- Demonstrates or possesses rare, endangered or uncommon structures, landscapes or phenomena.
- Demonstrates or possesses a distinctive way of life, custom, process, land-use, function or design no longer practiced in, or in danger of being lost from, or of exceptional interest to, the region, state or nation.

6.3.2 Representativeness

A concept, place or object can have cultural significance if it:

- Is significant in demonstrating the characteristics of a class of cultural concepts, objects, places or environments in the State.
- Is important in demonstrating the principal characteristics of a range of concepts, objects, landscapes or environments, the attributes of which identify it as being characteristic of its class.
- Is important in demonstrating the principal characteristic of the range of human activities (including way of life, philosophy, custom, process, land-use, function, design or technique) in the environment of the locality, region, state or nation.

6.3.3 Condition, Integrity and Authenticity

- Condition refers to the current state of the concept, place or object in relation to each of the values for which that concept, place or object has been assessed. Condition reflects the cumulative effects of management and environmental events.
- Integrity is a measure of the likely long-term viability or sustainability of the values identified, or the ability of the concept, place or object to restore itself or be restored, and the time frame for any restorative process.
- Authenticity refers to the extent to which the fabric of the concept, place or object is in its original state.

6.4 Collecting Cultural Values Information

Cultural Values information was collected during a series of site visits and two separate cultural values workshops for each group held during August and September 2018 respectively. During these activities, ACHM discussed the importance of including any '*cultural values*' in the ACHAR to both demonstrate connection to the places concerned but also to preserve any cultural knowledge which might exist regarding the Project Area.

Most of the outcomes from the cultural values workshops were more management oriented than an exposition of any cultural values.

Over the course of the cultural values workshops and site visits very little traditional or cultural knowledge was forthcoming, despite considerable efforts being applied to elicit any such knowledge or values. Many of the participants felt that this knowledge had generally been lost largely through historical circumstance (i.e. dispossession and forced resettlement) and through the passage of time (i.e. loss of elders and distance of contemporary people to past events).

Consistent with the results from previous ACHAR's (i.e. the Mount Owen Continued Operations ACHAR), the participants in the workshops and site visit expressed a strong contemporary *'connection to country'* and were generally opposed to mining and the environmental damage which this may entail, but did not demonstrate any traditional lore, ritualised usage or customary connection to the Project Area.

6.4.1 Questionnaire

During the workshops held in September 2018, a questionnaire was developed and handed out to workshop participants to augment the collection of cultural values information from the RAP's (see example in **Appendix 11.3.16**). The questionnaire was handed out to all participants in the workshops (for both Mangoola and this Project together), however only 17 were completed and returned. An analysis of the resulting information from those who completed the questionnaires (n=17) provided the following key focus areas.



Figure 6-1: Test analysis of the questionnaire responses from 17 of the RAPs who provided feedback.

6.5 WNAC Cultural Values Workshops

An initial workshop was held with the WNAC in Singleton in August 2018. A very well attended 2-day workshop was then held on the 18-19th September with WNAC in Singleton. This 2-day session followed a one-day 'in-house' workshop held by WNAC where the group assembled to discuss the Project with no outside attendees. The WNAC workshop focused broadly on employment, health, business opportunities and training for WNAC members, with only generic references to the cultural values of the Project Area.

6.6 Hickey's Cultural Values Workshops

Representatives of the Hickey family requested that they be consulted separately by the Project. To facilitate this, the Project arranged for separate workshops in August 2018 and September 2018. There were no attendees at the August 2018 workshop. Two individuals who were not RAPs attended the September 2018 workshop to represent the Hickey's; however, they did not feel comfortable commenting on behalf of the Hickey family. During the workshop discussions however, the two participants were provided with project updates and information to pass back to the Hickey Family. There were also discussions about the Aboriginal cultural values of the Project area.

6.7 Community RAPs Cultural Values

An initial workshop was held with the Community RAP group in Singleton in August 2018. A one-day workshop was then held on the 21 September with the Community RAP group in Muswellbrook. The workshop focused broadly on employment, health, business opportunities and training, with only generic references to the cultural values of the Project Area.

6.8 Dominant Themes

There can be little doubt that the wider region surrounding the Project Area is an area that holds high cultural value(s) for Wonnarua people. The wider landscape of the Hunter Valley is one deeply imbued with meaning to Wonnarua people.

Many of the values expressed by those consulted throughout this project (and also for neighbouring Glencore projects) related to the wider region rather than just the Project Area specifically. Senses of loss and longing, a variety of expressions of 'connectedness' and 'belonging' to landscapes, waterways, vegetation and animal communities, connection to other known significant places within the region (i.e. Baimie Cave or various waterways) were expressed by those consulted. Alongside the loss and longing, there is also an element of celebration in that those who are speaking for country today have survived for nearly 200 years since first settlement and have adapted to and overcome much adversity.

Many of the RAPs present at the workshops and site visit were deeply anti-mining, which is not an uncommon sentiment among many Aboriginal communities Australia-wide. Almost all the RAPs expressed strong connections to the archaeological sites which occur throughout the Project Area (and the wider region in general) even though some were highly critical of archaeologists and archaeological practices through time. It is not uncommon for archaeologists to be criticised for their role in Aboriginal cultural heritage management. Often, archaeologists are

viewed as the facilitators of cultural destruction by Aboriginal people and have been criticized for many years for having too much 'power' in the assessment of Aboriginal cultural heritage (*c.f.* Fourmile, 1989). Extensive consultation with Aboriginal communities about their 'cultural values' alongside robust archaeological assessment is a way of attempting to overcome this perception, as well as limiting the archaeological assessment to questions of scientific values rather than cultural values.

Discussions around the proposed relocation of the Ravensworth homestead complex elicited a range of mixed responses from the RAP's. Many of the RAP's present commented that they considered the former Ravensworth Estate to be significant to Wonnarua people as it was the location of both co-existence and conflict between Wonnarua people and the early settlers of the Hunter Valley. Many of the RAP's also commented that Wonnarua people would have lived and worked on Ravensworth estate, however there were no direct familial or traditional cultural links expressed by any of the RAP's.

Any destruction of landscapes, including the physical, spiritual, and natural values imbued in it are seldom condoned by Aboriginal people. One theme often repeated in Aboriginal communities is the concern that contemporary Aboriginal communities have for the opinion of future generations and the overwhelming fear that people in the future will think the people of today stood by and watched their 'country' being 'destroyed' without defending it (i.e. sense of guilt).

Collated responses from the workshop questionnaires are included in **Appendix 11.3.18.**

6.8.1 Limitations

There have been few limitations on the effective completion of this ACHAR.

Notably, the resources below have been incorporated into this report:

- Information from the WNAC, Hickey Family and Community RAPs workshops is included in this report where permission to disclose was provided.
- The PCWP have not provided direct input into the ACHAR process for this Project to date. PCWP have previously indicated that the greater Mount Owen area, including the Ravensworth Estate, was an area which possessed some cultural value to the group, but was not highly significant.
- A Section 10 application under the Commonwealth *Aboriginal and Torres Strait Islander Heritage Protection Act 1984* was lodged by the PCWP during the production of this ACHAR and was subsequently withdrawn in early September 2019. This is discussed further in Section 1.5.1.

Consolidated recommendations based on all the workshops and discussions with RAP's are presented in **Section** 8.

6.9 Consolidated Cultural Values

To the extent possible, given the paucity of information provided by the RAPs (apart from the PCWP) ACHM have constructed the following table of cultural values. These tables also include oral and written information gathered by ACHM through the workshop(s) and site visits with the Project RAPs.

A list of cultural values for the proposed Project Area is consolidated in Table 6-1 below.

Value / Theme	Hickey's Cultural Values Workshops	Community RAPs	WNAC Cultural Values Workshops
Ancestral Connections to Places	Expressed Verbally	Expressed Verbally	Strongly Expressed
Contemporary Connection to Country	Expressed Verbally	Expressed Verbally	Strongly Expressed
Attachment / Connection to the Ravensworth Homestead	None Expressed	None Expressed	Strongly Expressed
'Cultural Values' over the Proposed Project Area	None Expressed	None Expressed	Generic values but not specific to Project Area
Connection to Archaeological sites	Expressed Verbally	Expressed Verbally	Expressed
Song lines	None identified in the Project Area	None identified in the Project Area	None identified in the Project Area
Traditional Knowledge	None identified in the GCOP Additional Project Area	None identified in the GCOP Additional Project Area	None identified in the GCOP Additional Project Area
'Special' or Named Places	None identified in the GCOP Additional Project Area	None identified in the GCOP Additional Project Area	None identified in the GCOP Additional Project Area
'Dreaming Tracks'	None identified in the GCOP Additional Project Area	None identified in the GCOP Additional Project Area	None identified in the GCOP Additional Project Area
Creation Myths	None identified in the GCOP Additional Project Area	None identified in the GCOP Additional Project Area	None identified in the GCOP Additional Project Area
Mythological Associations	None identified in the GCOP Additional Project Area	None identified in the GCOP Additional Project Area	None identified in the GCOP Additional Project Area
Lore Grounds	None identified in the GCOP Additional Project Area	None identified in the GCOP Additional Project Area	None identified in the GCOP Additional Project Area
Resource Procurement / Extraction and Use Sites (i.e. Stone Quarry)	None identified in the GCOP Additional Project Area	None identified in the GCOP Additional Project Area	None identified in the GCOP Additional Project Area
Resource Procurement / Extraction and Use Sites- (i.e. Flora and Fauna)	None identified in the GCOP Additional Project Area	None identified in the GCOP Additional Project Area	None identified in the GCOP Additional Project Area
Massacre Sites	None identified in the GCOP Additional Project Area	None identified in the GCOP Additional Project Area	None identified in the GCOP Additional Project Area
Contact History	None identified in the GCOP Additional Project Area	None identified in the GCOP Additional Project Area	None identified in the GCOP Additional Project Area
Mission Period	None identified in the GCOP Additional Project Area	None identified in the GCOP Additional Project Area	None identified in the GCOP Additional Project Area

Table 6-1: Consolidated Cultural Values

6.10 Consolidated Statement of Significance

The assessment of cultural significance presented in this section relates primarily to the Project Area, but also includes commentary on the cultural significance of the wider region.

It is noted that the numerous Aboriginal stakeholders who participated in this cultural values assessment process hold values which relate to the wider Hunter Valley region generally, but less directly to the Project Area.

There was very little information presented in any of the workshops, site visits or written material which relate specifically to the Project Area, and no additional material and/or values were discussed or provided beyond those recorded during the Mount Owen Continued Operations ACHAR (2013) process.

A common theme in many Aboriginal cultural heritage assessments is the proprietary interest members of the relevant Aboriginal communities hold regarding the wider cultural landscape including archaeological sites or places within any given area. This Project is no exception in this regard. Within the context of the current assessment, there are strong on-going connections to places created and used by ancestors alongside demonstrably strong interests in the way those places are managed or harmed because of this Project. These sentiments are not unique and must certainly be considered in the overall assessment of the significance of the places in question. The connection to these places is noted as often being relatively unspecific and generally do not appear to relate to any surviving traditional knowledge or customary cultural practices.

The cultural values expressed by the participants in this assessment have been consistent in voicing an overarching concern for the wider landscape and criticism of the negative impact of mining on that landscape. Consistent in the material collected is a sense of 'loss' or 'outrage' and grief at the treatment of Aboriginal people since First Settlement (dispossession and genocide are mentioned repeatedly) through to more contemporary experiences (i.e. the Stolen Generation).

There is also a consistent theme of the '*powerlessness'* Aboriginal people often feel when confronted by situations where they feel disempowered or unable to exercise influence on decision makers. There is a sense of loss and lament for what once was, but with a very strong expression of '*corporate'* ownership of the wider region by the Wonnarua people (regardless of the variety of ways in which those groups represent their own interests). There is also an element of celebrating the survival of those who are now 'speaking for country'. While the entire estate of the Wonnarua people is significant to those concerned, there is little direct evidence (anecdotal or otherwise) of any particular or specific places or values of significance within the Project Area.

For many of the informants, the contemporary attachment to place appears based on the linkage to archaeological places which were created by 'the ancestors' and thereby constituting a connecting thread to a cultural world from another time. In a similar sense, there was some attachment to the Ravensworth Homestead expressed during the site visits. This attachment was based largely on the premise that Wonnarua people had <u>most likely</u> lived and worked on the estate through time, rather than any <u>specific</u> historical associations.

This general lack of direct or specific cultural knowledge in no way diminishes the strength of connection to the places within the Project Area. However, the attachment to place is one which is predominantly of contemporary association rather than traditional knowledge, custom, lore or practice.

It is noted that the surrounding area is held to be of higher significance to many members of the Wonnarua community, however the sites and/or places within the Project area held no higher significance or value(s) than any other.

Significantly, many of the comments during the workshops highlighted the benefits of this ACHAR process to the RAPs. Participants describe the process as having empowered the groups concerned by having provided the opportunity for the groups to get together to discuss the cultural values assessments and discuss how this process has benefited the group(s) as a whole.

6.10.1 Summary Opinion

Material presented or discussions with the participants often evoked the trauma of early European settlement and the lasting effects of frontier violence, dispossession and the importance of Wonnarua cultural survival through time. These effects are seen within the context of contemporary Aboriginal society, and the attempts by Aboriginal communities today to preserve remnants of cultural landscapes, places, lore, culture and belonging. This is in no way denying the *bona fides* of the individuals involved or their life experiences but is merely a comment on the events of the shared history of the Hunter Valley which has seen much of that rich past destroyed.

The material collected during the ACHAR process for this Project clearly communicates a deep contemporary attachment to place, although in common with most of the more urbanised regions of Australia, the understanding of '*place*' and the cultural lore and traditions associated with it only exist in a fragmentary state.

There has been some discussion of connections to apical ancestors who originate from within Wonnarua country. Members of the different knowledge holder groups claim connection to some (or all) of these apical ancestors (e.g. *Sarah Madoo*). There is, however, no evidence of any continuing traditional practices or observances of ritual or ceremony within the Project Area, which can be directly attributed to the post-European settlement disruption and dislocation of traditional Aboriginal culture throughout the Hunter Valley. Knowledge of some of these practices does still exist.

Much of the discussion surrounding the Project Area is descriptive and relates to generalised Aboriginal lifeways at the time of first settlement, and the historical impact of white settlement on Aboriginal people and is common to many Aboriginal groups throughout Australia, and does not relate to any direct knowledge of the Project Area.

The combined results of this and the Mount Owen assessments have also failed to provide any conclusive evidence that the encounter known as the 'Ravensworth Massacre' did in fact occur anywhere near the Project area.

6.11 Conclusions

The results of this assessment concur with the Mount Owen Continued Operations ACHAR (which also assessed the Project area) this ACHAR has ascertained that there are no *traditional cultural values* associated with the Project Area (directly and specifically) held by the participants in this ACHAR process. By '*traditional*' cultural values, we refer to these in the Native Title sense as an inherited and cohesive body of '*traditional*' knowledge, laws and customs that are still observed and maintained by a group. However, in common with many urbanised communities, strong contemporary cultural values exist in almost universal claims of 'connection' to the land in question, and a sense of anguish and/or anger at having been 'disconnected' from the land in question by historical circumstances.

It is the opinion of the author that the Project Area has undergone considerable modification since European settlement. Traditional Aboriginal lifeways and customs began to disappear in the early days of contact with Europeans and had largely disappeared before the turn of the 19th Century. Much of the natural landscape no longer exists in any cohesive manner, as the long history of agriculture in the area has irreversibly altered the landscape. Combining the historical disconnection of people from place with the extensive landscape modification since settlement means that the Project Area has a relatively low cultural significance when compared to other places within the wider region. This is also consistent with the archaeological assessment, which has determined that most of the archaeological sites are of low scientific significance.

7 Avoidance of harm

7.1 Project Rationale

The OEH (2011) guidelines state that an ACHA report must include 'Justification for any likely harm, including a discussion of any alternatives considered for the proposal. This must demonstrate how all feasible options to avoid or minimise harm were considered'.

In developing the footprint and the design of the proposed impacts for the Project, Glencore has considered mining options, layouts, overburden emplacements and infrastructure arrangements to optimise the Project's final design in conjunction with constraints and attempting to reduce the impacts to cultural heritage.

7.2 Opportunities to avoid impact

Throughout the design phase of the Project, efforts have been made to reduce the total amount of disturbance to the land. The completed design has been optimised and incorporates:

- a. Avoidance of Bowman's Creek by a minimum of 200 metres, and
- b. Avoidance of Significant Aboriginal sites

These efforts during the design phase of the Project have reduced the potential harm to Aboriginal cultural heritage within the Project area.

7.3 Sustainable Development Principles

This ACHAR has considered the impact of the proposed Project on the known Aboriginal objects of the Project Area and places external to it, and the range of cultural significance values associated with the Project Area.

Impact assessment has included consideration of the proposed activity and direct impacts, indirect impacts and cumulative impacts to archaeological and /or cultural places and ecologically sustainable development (ESD) principles. OEH (2011) requires that proposed development activities be discussed in the context of ESD, in particular the principles of precautionary approach and intergenerational equity.

As stated by OEH (2011):

- 1. The precautionary principle states that where there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation
- The principle of inter-generational equity holds that the present generation should make every effort to ensure the health, diversity and productivity of the environment – which includes cultural heritage – is available for the benefit of future generations.

The Project's RAPs have been involved in a formal and structured program of consultation and participation via site visits, workshops and producing their own reports.

The RAPs undertook inception briefings and task inductions prior to any archaeological or cultural survey, focusing on providing a clear understanding of the Project and its description, the Project Area, and the area proposed to be disturbed for the Project. The briefings described the types of activities proposed and their potential impacts, being the extension of the mining area, and the area required for the construction of associated infrastructure.

The following opportunities for consultation and site access were provided by the Project:

- Site visits (which were well attended). Site visits were available at any time throughout the Project.
- A series of RAP workshops were held in August and September 2018
- Archaeological survey results were sent by letter to all RAPs (including those who participated in the fieldwork).
- Archaeological sub-surface testing results were presented during the September 2018 workshops.
- Feedback was provided to all RAPs in order to understand the direct impacts, and the RAPs were given formal opportunities to comment on and provide feedback on indirect and cumulative harm.

The Project's proposed management measures including conservation, care and control and intergenerational equity were derived from the input and suggestions of the RAPs.

8 Recommendations

8.1 Introduction

As discussed in detail in Section 4, there are 91 archaeological sites located within the Proposed Disturbance Footprint that will be impacted by the Project. The Aboriginal Archaeological Impact Assessment has determined the following:

- 52 of the 69 newly recorded sites are within or in very close proximity to the Additional Disturbance Area; and
- 40 previously recorded sites are within the Additional Disturbance Area.

In total, 91 sites are located within the Additional Disturbance Area and will be impacted should the Project be approved. 55 of these sites are artefact scatters (15 of which have PAD) and 36 are isolated finds (one of which has PAD). In general, the artefact scatters have a low artefact density with most sites recording less than 10 artefacts.

The Project will also result in indirect impacts to Aboriginal cultural heritage values within the Project Area and the wider region and would also add to the cumulative loss of cultural heritage in the Hunter Valley.

The Project consulted with the RAPs (excluding PCWP) to seek input and then feedback into the development of management options and recommendations should the Project be approved or not approved.

For the Project, all Aboriginal registrants were afforded opportunities to identify mitigation and management, care and control considerations and intergenerational equity options to inform the consolidated management options presented in this ACHAR.

8.2 Management Measures

Management measures presented here are consistent with those developed for other recent Glencore projects in the Hunter Valley.

There are two types of management measures developed, namely:

- 1. On-Site Management Measures, and
- 2. Off-Site Management Measures

On-site management measures may include actions such as archaeological salvage, protective fencing, artefact analysis, curation arrangements, induction programmes and the development or updating of an ACHMP.

Off-site management measures may include actions such as community development programmes, scholarships, educational activities or elder's camps.

In these projects, management measures have aligned to the Strengthening Aboriginal Community Wellbeing Toolkit and criterion from OEH, in particular the elements that focus on 'Culture'. For the Project, of the 8 key principles of the toolkit, the following three are the basis of the management measures proposed:

- Sense of Community;
- Education and learning, and
- Cultural identity.

Some of the principles of the Toolkit (such as Infrastructure and services, economic strength and development, and community health and safety) are more closely aligned with the existing and ongoing Glencore Australia corporate activities.

The proposed management measures have been developed for the Project based on the assessment outcomes including recommendations from the workshops and other submissions. Whilst a range of different views and recommendations were provided some common themes were presented which strongly aligned with 'Sense of Community', 'Education' and 'Learning and Cultural Identity' principles.

This led the Project to propose funding projects in:

• **Caring for Land** – This was a common theme raised by the community. The program proposed focuses on Education and Learning from the Wellbeing Toolkit;

- Bringing People Together There were a range of management measures raised that involved bringing
 people together for community and/or Cultural purposes and activities. The program proposed focuses on
 the Sense of Community and Cultural Identity aspects of the Wellbeing Toolkit, and.
- Cultural Awareness/Education There were a range of management measures raised that involved Cultural Awareness/Education/Training, especially for younger people (both for Aboriginal and non-Aboriginal youth). The program focuses on Education and Learning with potential flow on effects to the Cultural Identity and Sense of Community aspects of the Wellbeing Toolkit.

The proposed management measures will also include:

- a. Alignment to the principles of the Aboriginal Community Wellbeing Toolkit (OEH 2012) that the project focuses on;
- b. Alignment with findings from this ACHA and the Archaeological assessment;
- c. the need for management options to be achievable for practical implementation;
- d. Provision of sustainable outcomes to promote intergenerational equity;
- e. Able to show value for money.

Table 8-4 contains the proposed management and mitigation measures which will be implemented should the Project be approved.

8.2.1 Aboriginal Cultural Heritage Management Plan

The Project existing Mount Owen Complex Aboriginal Cultural Heritage Management Plan will be revised to reflect the results of the archaeological assessment undertaken for the Project and this ACHAR.

8.2.2 The proposed management measures from the Knowledge Holder Groups and RAPs

The following care and control, conservation and intergenerational equity management measures have been compiled from verbal and written material collected from the RAPs during the site visits and workshops throughout 2018.

These measures are described in the following tables and have been summarised by themes and 'areas of commonality'. This has allowed the Project to formulate a set of common recommendations to mitigate or offset harm.

Rec No.	Community RAPs Recommendation
RAP01	Ensure equal participation in all cultural heritage work for all RAPs
RAP02	Return all cultural materials held by archaeological consultants to the GCOP Additional Project Area immediately, with materials to be stored on-site by Glencore until a suitable place for repatriation can be determined.
RAP03	Provide opportunities for training and education to Wonnarua people
RAP04	Glencore facilitate training and employment of young people in the mine other than through engagement in cultural heritage work
RAP05	Glencore to facilitate access to areas set aside as cultural heritage offsets
RAP06	Any materials repatriated from the archaeological salvage should be relocated as close to the point of origin as possible.

Table 8-1: Community RAP recommendations.

Table 8-2: Recommendations made by the Wanaruah Local Aboriginal Land Council.

Rec. No.	Wanaruah LALC Recommendations
WLALC01	Local Historical Research to fill in gaps or confirm existing knowledge
WLALC02	Creation of an Aboriginal controlled cultural education unit
WLALC03	Apprenticeships for 3-5 Wanaruah people
WLALC04	Support for Business Start-Ups

Table 8-3: Recommendations made by the Wonnarua Nation Aboriginal Corporation.

Rec No.	Wonnarua Nation Aboriginal Corporation
WNAC01	WNAC seek funding to augment an existing community-based health fund
WNAC02	WNAC seek funding for regular community gatherings to allow members to reconnect with people and country
WNAC03	WNAC seek funding for an arts fund
WNAC04	WNAC seek funding for education opportunities including options such as Clontarf / Polly Farmer / Scholarships / Apprenticeships

WNAC05	WNAC seeking funding for small business opportunities and capacity development
WNAC06	Request access to land to ensure continued cultural connection

8.2.3 Notes on RAP Recommendations

While certain specific items have been recommended by the RAP's (as outlined in the preceding tables) there are also a wide range of general themes that have emerged from our work with the same RAP's over the last 6 years. Sometimes however, individuals have difficulty articulating what they would like to see as outcomes from a specific project. The general themes are recurring and focus on (a) equity in heritage management field work (b) land access (c) business opportunities (d) education opportunities (e) heritage preservation / land management and (e) employment opportunities.

There are also circumstances where individuals and/or groups may not want to have their specific recommendations publicly disclosed as there may be existing commercial sensitivities or negotiations already underway.

Table 8-4 (below) builds on the specific recommendations provided by the RAPs in Tables 8-1 to Table 8-3.

Table 8-4: This table is a consolidated management recommendations and options table based on management recommendations from the WLALC, WNAC, PCWP and Community RAPs for this and other ACHAR's.

Action Area	Action Number	Theme	WNAC	WLALC	Community RAP	Hickey's	PCWP (from Mt Owen ACHAR)
	A1	Cultural Awareness Induction / Training					
ACHIMP	A2	Cultural Signage and Education					
ACHAR	A3	Recognition of Stakeholders in ACHAR					
Survey, Collection and Analysis	A4	Cultural Heritage Equity	х		х	Х	
	A5	Archaeological Methodology and protocols					Х
	A6	Archaeological Interpretation					Х
Care and Control	A7	Establish Artefact Storage facility / Keeping Place					
	A8	Learning and Land Access	х		х		
	A9	3D Scan / Modelling of Project Area					
	A10	Final landform and revegetation involvement	х				х
	A11	Mine site land management contracts	х				х
Research and Additional Assessment	A12	Wonnarua Cultural Mapping and recording			х		х
	A13	Museum Collections					х
	A14	Cultural Heritage Research			х		х
	A15	Flora and Fauna Research					х
Intergenerational Equity	A16	Cultural Heritage training					
	A17	Employment and Business Opportunities	х		Х		х
	A18	Regular Community Meetings / Meeting Place	Х				
	A19	Research on Wonnarua horticulture	х				
	A20	Wonnarua lore and custom training					
	A21	Wonnarua Educational Funding Scholarships / Apprenticeships / School Based	х		х		
	A22	Horticultural & Revegetation Training					
	A23	Rehabilitation / Land Management & Training	Х		Х		

8.2.4 Proposed Management Measures

Table 8-5 and Table 8-6 contain the Cultural Heritage Management and Conservation Measures which were developed from the management and conservation measures proposed by RAPs and Knowledge Holder groups during the Aboriginal Cultural Heritage Assessment undertaken for the Project. These have been derived by assessing each RAPs management and mitigation suggestions.

By providing common themes to the RAPs management and mitigation suggestions, the Project is better able to review and respond to the RAPs care and control, conservation and intergeneration equity recommendations.

The Project proposes management measures which address specific RAP derived issues. The Project have drawn out the consistent themes from the RAPs and have developed measures to be undertaken in the event of approval, which address these key themes.

	Action No	Action Item	Project Management Measure				
Aboriginal Cultural Heritage Management Plan (ACHMP)	R01	Update ACHMP	The existing Mt Owen Complex Aboriginal Cultural Heritage Management Plan (ACHMP) will be reviewed and updated to include the Project within 12 months of Project Approval to outline all Aboriginal heritage management measures for the Project, responsibilities of all parties and the timeframe for required heritage works.				
			The ACHMP will include a staged approach to the required research and salvage works to ensure that areas required for earliest disturbance are completed as a priority.				
	R02	ACHMP Dispute Resolution process	The revised ACHMP will include specific provisions regarding ongoing engagement with the RAPs and would include mechanisms for dispute resolution and communications protocols.				
Survey, collection and analysis	R03	Survey, collection and Analysis	Salvage (excavation, analysis and collection) as per the recommendations of the OzArk Aboriginal Archaeology Impact Assessment Report for the salvage of the archaeological sites to be harmed within the Additional Disturbance Area.				
			See the OzArk report - Management and Mitigation of Recorded Aboriginal Sites (Appendix 10.7) for further details.				
	R04	Discovery of previously unknown cultural heritage items	The Project agrees to follow all relevant NSW Government guidelines regarding the location of human skeletal remains. The Project will apply the precautionary principle to the development of management measures for the Additional Disturbance Area.				
			This approach will include the development of culturally appropriate management measures for the management of human remains, should this occur during the Project life. Protocols and approach will be developed in consultation with RAPs and updated in the revised ACHMP				
	R05	Recording of Archaeological Sites	The ACHMP will be revised to include the new sites identified in the Aboriginal Archaeology Impact Assessment Report completed for the Project				
F Care and Control	R06	Care and Control Measures regarding Aboriginal Objects	Care and control management measures will be developed and included in the ACHMP for Aboriginal objects recovered through the Archaeological research and salvage program implemented for the Project and for long term storage of artefacts recovered from previous research and salvage programs. The care and control management measures will have regard to cultural considerations. Glencore propose to store artefacts from the salvage program at the soon to be constructed Wollombi Brook Regional Keeping Place.				
	R07	Repatriation of artefacts from Project Area	Gencore propose to store artefacts from the salvage program at the soon to be constructed Wollombi Brook Regional Keeping Place.				
	R08	Sites not to Be Impacted	Glencore will implement the Aboriginal archaeological management measures program for sites in the Project Area that will not be impacted by the Project as recommended in the Aboriginal Archaeology Impact Assessment report for the Project. These measures will be further outlined in the updated ACHMP.				
Table 8-6: Proposed Off-Site Management Measures. The following are indicative off-site management measures and more detailed measures are being developed as the ACHAR process continues.

	Action No	Action Item	Project Proposed Management Measure		
	R09	Cultural Awareness and Education	Currently Glencore Coal Assets Australia (GCAA) through its voluntary Community Investment Program is committed to:		
			• The Galuwa Aboriginal School scholarship program which currently supports 30 scholarships for Aboriginal students from the Upper Hunter in years 6,7 and 8 to support their academic progress, cultural identity and career aspirations.		
			• Singleton Clontarf Academy supporting 80 Aboriginal boys and 4 staff at Singleton High School to support the personal development and education of these boys.		
			GCAA's approach to supporting Aboriginal education is to work closely with NSW Department of Education to provide meaningful and needed Aboriginal education support that compliments and does not duplicate existing initiatives within NSW Education and other providers who support Aboriginal Education.		
			Other initiatives and programs that would be considered include:		
			• Young Mob (a World Vision program) which aims to increase the cultural identity and connection to country of Indigenous youth through youth camps. A strong identity and connection to country have been identified as being vital to the health, social and emotional wellbeing of Indigenous youth.		
			• The Girls Academy which develops and empowers Aboriginal girls through leadership training, mentoring, sport and extra-curricular programs with the goal of creating an environment within schools where Aboriginal girls receive the support and programs needed to help them realise their full potential.		
Intergenerational Equity		Bringing people together	Knowledge holders and RAPs raised a range of issues and potential mitigation strategies with regards to cultural loss, these included:		
	R10		A desire for community (or groups) to come together outside of development application/disturbance processes, and		
			• A desire for a range of cultural experiences (such as cultural camps, Elders Camps, teaching to younger generations)		
			GCOP would consider supporting a program or activities to assist in promoting cultural awareness and education for young people.		
	R11	Employment	Through the ACHAR and Social Impact Assessment processes for a number of recent projects, and ongoing consultation with local Aboriginal parties, Glencore has heard the recommendations for a work experience program for local Aboriginal people in the Hunter Valley. Separate to the GCO Project, Glencore are currently planning for the roll out of a Program in 2020.		
	R12	Land Management	As part of the GCO Project, Glendell proposes to fund a traineeship or a work experience position in the area of cultural heritage management, biodiversity or land management, ecology, rehabilitation or other appropriately related field, through a third-party provider. Glendell will first approach the National Parks and Wildlife Service (NPWS) who offer a 2-year field officer traineeship in land management. In the event that this cannot be secured, Glendell would seek an alternate provider.		
			As part of the ACHMP development a process and criteria for the application for this support would be developed.		
	R13	Land Management	Yorks Creek realignment to receive appropriate riparian vegetation treatment post earthworks.		
	R14	Cultural Awareness and Education	Glendell would develop interactive and interpretive materials documenting the early conflict history between Aboriginal people and European settlers within and across Ravensworth Estate.		
Timing and Support for the Research, Caring for Land, Bringing People Together and Cultural Awareness and Education Programs		arch, Caring for Land, Bringing People and Education Programs	The support for these programs would be available for applications from the local Aboriginal community for a period of 3 years from the commencement of the Project. As part of the ACHMP development a process and criteria for the application for this support would be developed. A total budget of \$400,000 will be allocated for these programs, subject to approval of the Project.		

8.3 Management Measures - No Project Approval Scenario

Should the proposed Project not be approved the potential impacts would not occur, and there would be no risk to the cultural values and archaeological sites identified in this ACHAR.

In this scenario, the Project would not need to update the existing approved ACHMP and would continue to monitor and manage the identified Aboriginal archaeological and cultural heritage values related to the existing approved mining area through that management plan.

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10 Glossary

Absolute Dating: Is the process of determining a specific date for an archaeological or paleontological site or artefact. Some archaeologists prefer the terms chronometric or calendar dating, as use of the word "absolute" implies a certainty and precision that is rarely possible in archaeology. See also relative dating.

Adze: A stone tool made on flakes with steep flaking along the lateral margins and hafted for use as a wood working tool.

Alluvial Terrace: A terraced embankment of loose material adjacent to the sides of a river valley.

Amorphous: Showing no definite crystalline structure.

Angle of Applied Force: The angle at which the force of flaking is applied to a core.

Angular fragment: A piece of stone that is blocky or angular.

Anisotropic: Having some physical properties which vary in different directions.

Anvil: A portable stone, used as a base for working stone tools. Anvils most frequently have a small circular depression in the centre which is the impact damage from where cores were held while being struck by a hammer stone. An anvil may be a multifunctional tool also used as a grindstone and hammer stone.

Archaeological Context: The situation or circumstances in which a particular item or group of items is found.

Archaeological site types: The archaeological site types encountered in Australia can be divided into three main groups:

Historical archaeological site: An archaeological site formed since the European settlement containing physical evidence of past human activity (for example a structure, landscape or artefact scatter).

Aboriginal contact site: A site with a historical context such as an Aboriginal mission station or provisioning point, or a site that shows evidence of Aboriginal use of non-traditional Aboriginal materials and technologies (e.g. metal or ceramic artefacts).

Aboriginal prehistoric archaeological site: A site that contains physical evidence of past Aboriginal activity, formed or used by Aboriginal people before European settlement.

These sites may be:	
Artefact scatters	Scarred Trees
Isolated artefacts	Mounds
Rock shelters	Rock art
Burial Structures	Hearths
Shell middens	Quarries
Ethnographic Items	Grinding Patches

Archaeology: The study of the past through the systematic recovery and analysis of material culture. Archaeology relies heavily upon science and cognate disciplines to provide interpretations of the past life ways of the peoples under investigation.

Artefact: any movable object that has been utilised modified or manufactured by humans.

Artefact scatter: A surface scatter of cultural material. Aboriginal artefact scatters are often defined as being the occurrence of five or more items of cultural material within an area of about 10m x 10m.

Australian Height Datum: The datum used to determine elevations in Australia. The AHD is based on the mean coastal sea level being zero metres AHD.

Australian Small Tool Tradition: Stone tool assemblages found across Australia, with the exception of Tasmania, dating between 8000 BP to European contact. The tool types include hafted implements (e.g. Bondi points), bifacial and unifacial points, geometric microliths, and blades. The assemblage is named for its distinct lack of larger 'core tools' which characterised earlier assemblages.

Axe: A stone-headed axe or hatchet or the stone head alone, characteristically containing two ground surfaces which meet at a bevel.

Backed Artefact: Backed artefacts are flakes retouched until they have one or more steep and relatively thick surfaces that are covered with negative scars. Since the backing retouch was accomplished with a bipolar and/or anvil-rested knapping technique, these retouched surfaces typically show negative scars originating from two directions, a pattern that is sometimes described as "double backing". Backed pieces are a feature of the 'Australian small tool tradition', dating from about 8000 BP in southern Australia.

Bearing: An angle measured clockwise from a north line of 0° to a given surveyed line.

Bevelled Edge: An edge which has had its angle altered.

Biface: A flaked stone artefact which has flake scars on both ventral and dorsal surfaces.

Bipolar: Technique of knapping where a core is rested on an anvil and force applied to the core at an angle close to 900 in the direction of the core's contact with the anvil.

Blade: A flake at least twice as long as it is wide.

Blaze: A mark carved in a tree trunk at about breast height. This type of mark was traditionally used by explorers or surveyors to indicate a route of passage in a certain direction, or a particular camp location.

Bulb of Percussion: Is a convex protuberance located at the proximal end of the ventral surface of a flake, immediately below the ring crack.

Bulbar Scar: The negative scar on a core that results from the bulb of percussion on the extracted flake.

Burial site: Usually a sub-surface pit containing human remains and sometimes associated artefacts. Human burials can also occur above the ground surface within rock shelters or on tree platform burials.

Burin: A stone implement roughly rectangular in shape with a corner flaked to act as a point for piercing holes.

Cadastral: From the Latin, a cadastre is a comprehensive register of the real property of a country, and commonly includes details of the ownership, the tenure, the precise location (some can include GPS coordinates), the dimensions (and area), the cultivations if rural and the value of individual parcels of land.

Chert: Is a fine-grained silica-rich microcrystalline, cryptocrystalline or microfibrous sedimentary rock that may contain small fossils. It varies greatly in colour (from white to black), but most often manifests as gray, brown, greyish brown and light green to rusty red. Its colour is an expression of trace elements present in the rock, and both red and green are most often related to traces of iron (in its oxidized and reduced forms respectively).

Cleavage Plane: A plane of weakness or preferred fracture in a rock.

Composite: An artefact made up of two or more parts joined together.

Conchoidal Fracture: describes the way that brittle materials break when they do not follow any natural planes of separation. Materials that break in this way include flint and other fine-grained minerals, as well as most amorphous solids, such as obsidian and other types of glass. Conchoidal fractures often result in a curved breakage surface that resembles the rippling, gradual curves of a mussel shell; the word "conchoid" is derived from the word for this animal. A swelling appears at the point of impact called the bulb of percussion. Shock waves emanating outwards from this point leave their mark on the stone as ripples. Other conchoidal features include small fissures emanating from the bulb of percussion.

Conjoin: A physical link between artefacts broken in antiquity. A conjoin set refers to a number of artefacts which can be been refitted together.

Contours: Lines joining points of equal height on a topographic map. Contour lines that are relatively close together depict an area of steep terrain on the earth's surface; whereas lines depicted a distance apart represent flat areas on the earth's surface.

Core: An artefact from which flakes have been detached using a hammer stone. Core types include single platform, multi-platform, and bipolar forms.

Cortex: Weathered outer surface of rock, usually chemically altered.

Crazing: Production of visible surface cracks by uncontrolled heating of rock.

Crown land: Technically belonging to the reigning sovereign, is a class of public land, provided for the enjoyment and benefit of the people.

Crushing: Abrasion, small fracturing and the formation of ring cracks, usually along an artefacts edge.

Cryptocrystalline: Rock in which the crystal structure is too fine for clear resolution with an optical microscope.

Cultural significance: Cultural significance means aesthetic, historic, scientific, social or spiritual value for past, present or future generations (Australia ICOMOS Burra Charter 1999, Article 1.2).

Cultural Materials: The products of human behaviour, such as stone artefacts or food debris.

Datum: In surveying and geodesy, a datum is a reference point or surface against which position measurements are made, and an associated model of the shape of the earth for computing positions. Horizontal datum's are used for describing a point on the earth's surface, in latitude and longitude or another coordinate system. Vertical datum's are used to measure elevations or underwater depths. The previous datum used in Australia was known as the Australian Geodetic Datum (AGD). However, this was restricted because it was defined to best fit the shape of the earth in the Australian region only. The change in datum's had a major consequence to all coordinates. Both latitudes/longitudes and eastings/northings were shifted by approximately 200 metres in a north-easterly direction.

Debitage: The term debitage refers to the totality of waste material produced during lithic reduction and the production of chipped stone tools. This assemblage includes, but is not limited to, different kinds of lithic flakes, shatter, and production errors and rejects.

Decortication: Removal of cortex from a stone artefact.

Dendrochronology: Is the method of scientific dating based on the analysis of tree-ring growth patterns.

Denticulated: Describes a stone tool which has one edge worked into a series of notches giving a toothed or serrated cutting edge.

Discard: The movement of an object from its systemic context to an archaeological context.

Distal: The end of a flake opposite the bulb; the area of a flake containing its termination.

Direct Freehand Knapping: A method of holding the material to be flaked in the unsupported hand and directing the hammer stone with the other hand.

Dorsal Surface: The face of a flake which was the core surface prior to flake removal and may therefore retain negative flake scars or cortex.

Edge ground implement: A tool, such as an axe or adze which has been flaked to a rough shape and then ground against another stone to produce a sharp edge.

Edge modification: Irregular small flake scarring along one or more margins of a flake, flaked piece or core, which is the result of utilisation/retouch or natural edge damage. Edge damage refers to the removal of small flakes from the edge of an artefact.

Elevation: The height above mean sea level.

Eraillure Flake: A flake formed between the bulb of force and the bulbar scar. Sometimes the eraillure flake adheres to the core in the bulbar scar. The eraillure flake leaves no scar on the core, but always leaves a scar on the ventral surface of the flake. The eraillure flake is convex / concave (like a meniscus lens), has no distinct features on the "dorsal face", but may contain compression rings on the bulbar face.

Ethno-archaeology: The study of human behaviour and of the material culture of living societies in order to learn how items enter the archaeological record, thus allowing the formation of hypotheses as to how items of material culture entered the archaeological record in pre-history.

Ethnographic Site: Often overlooked in cultural heritage management, an ethnographic site is one which has particular spiritual or ritual significance to a particular group of people. They are more commonly referred to as 'dreaming sites' in Australia, and most appropriately recorded by someone with anthropological qualifications.

Excavation: The systematic recovery of archaeological data through the exposure of buried sites and artefacts. Excavation is a destructive process, and hence it is accompanied by comprehensive recording of every aspect.

Excavation Report: Once an excavation has finished, a report outlining the reasons, aims, methods used and findings from the excavation as well as some conclusions drawn from interpreting the artefacts.

Faceted Platform: A platform which is created by the removal of a number of flake scars.

Feather Termination: A termination of the fracture plane that occurs gradually (i.e. there are no sharp bends in the plane), producing a thin, low angled distal margin.

Feature: In excavations, a feature is something that a human made in the past that has not been or cannot be moved. Examples of this would be a house floor or a hearth (fire pit). When archaeologists are excavating, they often come across features.

Flake: A piece of stone removed from a core during the process of knapping by the application of external force, which characteristically shows traces of the processes of removal: concentric fracture ripples and a bulb of percussion. Flakes with a length: breadth ratio of 2:1 or more are usually referred to as blades. In some cases flakes are the result of shaping a block of stone into a tool of some kind. When removed from a prepared core, however, they were usually used as blanks for making tools. Primary flakes (also called decortication flakes) are large, thick flakes struck off a core when removing the cortex and preparing it for working. Secondary flakes (also called reduction flakes) are large flakes struck off a piece to reduce its size or thickness. Tertiary flakes are small flakes struck off when shaping the detail of a piece to make a specific tool. Retouching flakes are tiny, extremely thin flakes pinched or pushed off a piece to finish it, to fineshape part of the surface, sharpen it, or resharpen it. Notching flakes are produced when putting hafting notches in stone tools.

Force: The quantity of energy exerted by a moving body; power exerted; energy exerted to move another body from a state of inertia.

Formal tool: an artefact that has been shaped by flaking, including retouch, or grinding to a predetermined form for use as a tool. Formal tools include scrapers, backed pieces, adzes and axes.

Fracture: Irregular surface produced by breaking a mineral across rather than along cleavage planes.

GDA94: Geocentric Datum of Australia. A spatial reference system which is universally implemented across Australia. The Geocentric Datum of Australia (GDA) is a coordinate reference system that best fits the shape of the earth as a whole. It has an origin that coincides with the centre of mass of the earth, hence the term 'geocentric'

Geodesy: The science and mathematical calculations of the shape and size of the Earth.

Geographic coordinates: a geographic coordinate system enables every location on the earth to be specified, using mainly a spherical coordinate system. There are three coordinates: latitude, longitude and geodesic height.

Geographic Information Systems: Is any system for capturing, storing, analysing, managing and presenting data and associated attributes which are spatially referenced to Earth. GIS is a system or tool or computer based methodology to collect, store, manipulate, retrieve and analyse spatially (georeferenced) data.

Geometric microlith: A small tool that has been fashioned from breaking apart a microblade. The piece is then retouched or backed and a small tool formed.

Gilgai soils: Soils with an undulating surface, presenting as a pattern of mounds and depressions. Gilgai soils contain swelling clays, which shrink and swell with alternate drying and wetting cycles. They display strong cracks when dry. Elements of the soil circulate and move during the shrink-swell process.

Global Positioning System: GPS is a satellite based navigation system originally developed by the United State's Department of Defence. A GPS receiver calculates a position by measuring distances to four or more satellites of a possible 24. These orbit the Earth at all times.

Grain: A description of the size of particles or crystals in rocks or sand. Coarse grained rocks have particles or crystals which are large (1mm or more), and fine grained rocks have particles which are small (0.1mm or less).

Greywacke: Hard fine-grained rock of variable composition containing some quartz and feldspar but mostly very fine particles of rock fragments.

Graticule: A network of crossing lines on a map representing parallels of latitude and meridians of longitude as defined by the projection.

Grid: The division of an archaeological site into small squares that denote different areas of excavation, making it easier to measure and document the site.

Grid coordinates: A point on a map given as an easting and northing reading. The values are given in metres.

Grindstone: The abrasive stone used to abrade another artefact or to processes food. Upper and lower grind stones used to grind plants for food and medicine and/or ochre for painting. A hammer stone sometimes doubles as a hammer stone and/or anvil.

Hammer stone: a piece of stone, often a creek/river pebble/cobble, which has been used to detach flakes from a core by percussion. During flaking, the edges of the hammer stone become 'bruised' or crushed by impact with the core. Hammer stones may also be used in the manufacture of petroglyphs.

Hand-Held: Description of the method used to immobilize the rock during knapping, it which it is held in one hand and struck by a hammer stone held in the other hand.

Hardness: Resistance of material to permanent deformation.

Hearth: Usually a sub-surface feature found eroding from a river or creek bank or a sand dune – it indicates a place where Aboriginal people cooked food. The remains of hearth are usually identifiable by the presence of charcoal and sometimes clay balls (like brick fragments) and hearth stones. Remains of burnt bone or shell are sometimes preserved with a hearth.

Heat treatment: The thermal alteration of stone (including silcrete) by stone workers to improve its flaking qualities.

Heritage: The word 'heritage' is commonly used to refer to our cultural inheritance from the past that is the evidence of human activity from Aboriginal peoples through successive periods of later migration, up to the present day. Heritage can be used to cover natural environment as well, for example the Natural Heritage Charter. Cultural heritage can be defined as those things and places associated with human activity. The definition is very broad, and includes Indigenous and historic values, places and objects, and associated values, traditions, knowledge and cultures.

Heritage Place: A place that has aesthetic, historic, scientific or social values for past, present or future generations – 'this definition encompasses all cultural places with any potential present or future value as defined above'. Heritage place can be subdivided into Aboriginal place and historical place, for the purposes of this document.

Hinge Termination: A fracture plane that turns sharply toward the free surface of the core immediately prior to the termination of the fracture. The bend of the ventral surface is rounded and should not be confused with a step termination.

Historic place: A place that has some significance or noted association in history.

Homogeneous: Uniform structure and property throughout the material.

Hunter-gatherer: A member of a society who gains their subsistence in the wild on food obtained by hunting and foraging.

Hydrology: Is the study of the movement, distribution, and quality of water throughout the Earth.

ICOMOS (International Council on Monuments and Sites): ICOMOS is a nongovernment professional organisation closely linked to UNESCO, with national committees in some 100 countries with the headquarters in France. ICOMOS promotes expertise in the conservation of cultural heritage. It was formed in 1965, and has a responsibility to advise UNESCO in the assessment of sites proposed for the World Heritage List. Australia ICOMOS was formed in 1976. Its fifteen member executive committee is responsible for carrying out national programmes and participating in decisions of ICOMOS. **Incipient Crack**: A crack or line of weakness in the rock.

Inclusion: An impurity or foreign body in the stone that reduces the homogeneity of the rock.

Indirect Percussion: Punch technique.

Interpretation: The process of explaining the meaning or use of an artefact.

Inward Force: Force applied to the platform, and directed into the body of the core.

Isolated artefact: The occurrence of less than five items of cultural material within an area of about 100 sq. metres. It/they can be evidence of a short-lived (or one-off) activity location, the result of an artefact being lost or discarded during travel, or evidence of an artefact scatter that is otherwise obscured by poor ground visibility.

Knapper: A person who creates stone artefacts by striking rocks and causing them to fracture.

Knapping Floor: The debris left on one spot and resulting from the reduction of one block of raw material. A knapping location is a site comprised of one or more knapping floors.

Koori: Koori is an Aboriginal term used to describe Indigenous people from Victoria and southern New South Wales.

Lateral Margins: The margins of a flake either side of the percussion axis.

Latitude: The angular distance along a meridian measured from the Equator, either north or south.

Layer: The layer is the level in which archaeologists dig. All excavation sites have different numbers of layers. Archaeologists try to work out when they are moving to a new layer by cultural or man-made clues like floors, but sometimes they will go by changes in soil colour or soil type.

Longitude: The angular distance measured from a reference meridian, Greenwich, either east or west.

Longitudinal Cross Section: The cross-section of a flake along its percussion axis.

Magnetic north: The direction from a point on the earth's surface to the north magnetic pole. The difference between magnetic north and true north is referred to as magnetic declination.

Maintenance: The process of keeping an artefact in a particular state or condition. An edge which is being used is maintained by flaking off blunted portions. A core is maintained by keeping its characteristics within the limits required for certain types of flaking.

Manufacture: The process of making an artefact.

Manuport: Foreign fragment, chunk or lump of stone that shows no clear sings of flaking but is out of geological context and must have been transported to the site by people.

Map scale: The relationship between a distance on a map and the corresponding distance on the earth's surface.

Margin: Edge between the ventral and dorsal surfaces of a flake.

Material culture: A term that refers to the physical objects created by a culture. This could include the buildings, tools and other artefacts created by the members of a society.

Mercator projection: A conformal cylindrical projection tangential to the Equator. Rhumb lines on this projection are represented as straight lines.

Meridian: A straight line connecting the North and South Poles and traversing points of equal longitude. **MGA94**: The Universal Transverse Mercator coordinates of eastings, northings, and zones generated from GDA94 are called Map Grid of Australia 1994 coordinates.

Microblade: A very small narrow blade.

Microcrystalline: Rocks in which the crystals are very small but visible in an optical microscope.

Microwear: Microscopic use-wear.

Moiety: A moiety is a half. Tribes were composed of two moieties (halves) and each clan belonged to one of the moieties.

Mound: These sites, often appearing as raised areas of darker soil, are found most commonly in the volcanic plains of western Victoria or on higher ground near bodies of water. The majority were probably formed by a slow buildup of debris resulting from earth-oven cooking: although some may have been formed by the collapse of sod or turf structures. It has also been suggested some were deliberately constructed as hut foundations.

Morphology: The topographical characteristics of the exterior of an artefact.

Mosaic: A number of continuous aerial photographs overlapped and joined together by way of 'best fit' to form a single non-rectified image.

Negative Bulb of Force: The concave surface left after a flake has been removed. See Bulbar Scar.

Notched: Serration or series of alternating noses and concavities.

Obtrusiveness: How visible a site is within a particular landscape. Some site types are more conspicuous than others. A surface stone artefact scatter is generally not obtrusive, but a scarred tree will be.

Overhang: The lip on a core or retouched flake, caused by the platform being undercut by the bulb on the flake removed.

Overhang Removal: The act of brushing or tapping the platform edge in order to remove the overhang in a series of small flakes.

Overlays: The Victorian Planning Provisions establish a number of different Overlays to show the type of use and development allowed in a municipality. Heritage Overlays will list places of defensible cultural heritage significance. **Patina**: An alteration of rock surfaces by molecular or chemical change (but not by attrition, hence not to be confused with sand blasting).

Pebble/cobble: Natural stone fragments of any shape. Pebbles are 2-60 mm in size and cobbles are 60-200 mm in size.

Percussion: The act of hitting a core with a hammer stone to strike off flakes.

Percussion Flaking: The process of detaching flakes by striking with a percussor.

Percussion Length: The distance along the ventral surface from the ring crack to the flake termination.

Place: Place means a site, area, land, landscape, building or other works, group of buildings or other works, and may include components, contents, spaces and views. (Australia ICOMOS Burra Charter 1999, Article 1.1)

Plane of Fracture: The fracture path which produces the ventral surface of a flake.

Planning scheme: The legal instrument that sets out the provisions for land use, development, and protection in Victoria. Every municipality in Victoria has a planning scheme.

Platform: Any surface to which a fabricator is applied when knapping.

Platform Angle: 1. The angle between the platform and core face on a core. 2. The angle between the platform and dorsal surface on a flake. 3. The angle between the platform and flaked surface on a retouched flake.

Platform Preparation: Alteration of the portion of the platform which receives the fabricator by grinding, polishing or flaking. Removal of small flake scars on the dorsal edge of a flake, opposite the bulb of percussion. These overhang removal scars are produced to prevent a platform from shattering.

Platform removal flake: A flake which contains a platform on the dorsal surface.

Point of force application: The area of the platform in contact with the indenter during knapping. Also known as point of contact.

Positive Bulb of Force: Bulb of force.

Post-depositional processes: The natural or cultural processes which may differentially impact upon archaeological sediments after they deposited.

Potlids: A concave-convex or plano-convex fragment of stone. Potlids never have a ringcrack or any other feature relating to the input of external force. They often have a central protuberance which indicates an internal initiation to the fracture. Potlids are the result of differential expansion of heated rock.

Pre-contact: Before contact with non-Aboriginal people.

Post-contact: After contact with non-Aboriginal people.

Pressure Flaking: The process of detaching flakes by a pressing force. Also Static Loading.

Primary decortication: The first removal of cortex from a core, creating a primary decortication flake. The flake will have a dorsal surface covered entirely by cortex.

Procurement: Obtaining raw materials.

Provenance: The location of an artefact or feature both vertically and horizontally in the site. Archaeologists record the provenance of artefacts and features in their field books and on the artefact bag. Provenance is important because it gives archaeologists the history and context of an object, i.e., exactly where it was found on the site.

Punch: An object which is placed on a core or retouched flake and receives the blow from the percussor.

Quarry: A place where humans obtained stone or ochre for artefact manufacture. A place where stone or ochre is exposed and has been extracted by Aboriginal people. The rock types most commonly quarried for artefact manufacture in Victoria include silcrete, quartz, quartzite, chert and fine-grained volcanics such as greenstone.

Quartz: A form of silica.

Quartzite: Sandstone in which the quartz sand grains are completely cemented together by secondary quartz deposited from solution.

Radiocarbon Dating: Also called carbon dating and C-14 dating. It is used to work out the approximate age of an artefact by measuring the amount of carbon 14 it contains. This dating technique is not perfect. It can only be used on organic remains (typically wood or charcoal). Also radiocarbon is only accurate to ±50 years, and cannot accurately date objects more than 50,000 years old.

Redirecting Flake: A flake which uses an old platform as a dorsal ridge to direct the fracture plane.

Redirection: Rotation of a core and initiation of flaking from a new platform situated at right angles to a previous platform. It produces a redirecting flake.

Reduction: Process of breaking down stone by either flaking or grinding.

Reduction Sequence: A description of the order in which reduction occurs within one block of stone.

Rejuvenate: The process of flaking in such a way that further reduction is possible or is easier. This usually involves removing unwanted features, such as step terminations, or making unsuitable characteristics more favourable, for example changing the platform angle. A Rejuvenation flake is a flake that has been knapped from a core solely for the purpose of preparing a new platform and making it easier to get flakes off a core, as it reduces that angle between platform and core surface. **Relative Dating**: A general method of dating objects, which uses their relation to other objects. For example, artefacts found in lower layer are typically older than artefacts in higher layer.

Relic: Deposit, object or material evidence of human past.

Replica: A copy of a prehistoric artefact made by a modern investigator for research purposes.

Replicative Systems Analysis: A method of analysing prehistoric artefacts by creating exact replicas of all the manufacturing debris.

Reserves: The word 'reserve' derives from the land being reserved for a particular public use. Crown land retained in public ownership, but not reserved is termed unreserved Crown land.

Resharpening: The process of making a blunt edge sharper by grinding or flaking.

Retouched Flake: A flake that has subsequently been re-flaked. A flake, flaked piece or core with intentional secondary flaking along one or more edges.

Retouching: The act of knapping a flake into a retouched flake.

Ridge: The intersection of two surfaces, often at the junction of two negative scars.

Ring Crack: A circular pattern of micro-fissures penetrating into the artefact around the Point of Force Application and initiating the fracture. It appears on the ventral surface usually as a semicircular protuberance on the edge of the platform.

Rock art: Paintings, engravings and shallow relief work on natural rock surfaces. Paintings were often produced by mineral pigments, such as ochre, combined with clay and usually mixed with water to form a paste or liquid that was applied to an unprepared rock surface.

Run: A large area of land in which squatters could pasture their stock without a lot of fencing necessary. Employed shepherds looked after various areas of the runs. Runs became consolidated pastoral holdings. Many of the runs were about 25 sq miles in area and later became parishes.

Sand: Quartz grains with only a small content of other materials. Grain size 2.00 mm to 0.05 mm.

Sandstone: A sedimentary rock composed of sand, and with only a small amount of other material, which has been consolidated by argillaceous or calcareous bonding of grains.

Sahul: This is the name given to the continent when Australia and New Guinea were a single landmass during the Pleistocene era. During this period, sea levels were approximately 150 metres lower than present levels.

Scar: The feature left on an artefact by the removal of a flake. Includes negative bulb, negative ring crack and negative termination.

Scarred tree: Scars on trees may be the result of removal of strips of bark by Aborigines e.g. for the manufacture of utensils, canoes or for shelter; or resulting from small notches chopped into the bark to provide hand and toe holds for hunting possums and koalas. Some scars may be the result of non-Aboriginal activity, such as surveyors' marks.

Scraper: A flake, flaked piece or core with systematic retouch on one or more margins.

Screen: A screen is used by an archaeologist to sift excavated soil in search of small artefacts like nails, ceramic fragments, and organic material like seeds, shell, and bone. Can be either manual (hand held) or mechanical.

Secondary Decortication: The removal of cortex from a core after the primary decortication flake. A secondary decortication flake is one that has both cortex and flake scars on the dorsal surface.

Selection: Runs were subdivided into selections for farming, agriculture and grazing homesteads. After a period of yearly rental payments, the selector could often obtain freehold ownership.

Shell midden: A surface scatter and/or deposit comprised mainly of shell, sometimes containing stone artefacts, charcoal, bone and manuports. These site types are normally found in association with coastlines, rivers, creeks and swamps – wherever coastal, riverine or estuarine shellfish resources were accessed and exploited.

Sieve: See Screen.

Significance: Significance is a term used to describe an item's heritage value. Values might include natural, Indigenous, aesthetic, historic, scientific or social importance.

Silica: Silicon dioxide.

Silcrete: A silicified sediment.

Siliceous: Having high silica content.

Site: An area designated for archaeological exploration by excavation and/or survey usually due to the presence of a concentration of cultural material.

Step Termination: A fracture plane that turns sharply towards the free surface of the core immediately prior to the termination of the fracture. The bend of the ventral surface is sharp, often a right angle.

Stratification: Over time, debris and soil accumulate in layers (strata). Colour, texture, and contents may change with each layer. Archaeologists try to explain how each layer was added--if it occurred naturally, deliberately (garbage), or from the collapse of structures-and they record it in detailed drawings so others can follow. Stratigraphy refers to the interpretation of the layers in archaeological deposits. Usually, the artefacts found on top are the youngest (most recent), while those on the bottom are the oldest. **Structures (Aboriginal)**: Can refer to a number of different site types, grouped here only because of their relative rarity and their status as built structures. Most structures tend to be made of locally available rock, such as rock arrangements (ceremonial and domestic), fish traps, dams and cairns, or of earth, such as mounds or some fish traps.

Surface Site: A site where artefacts are found on the ground surface.

Taphonomy: The study of the depositional andpreservationprocesseswhichproducearchaeological or paleontological material.

Termination: The point at which the fracture plain reaches the surface of a core and detaches a flake.

Tertiary Flake: A flake without cortex.

Theodolite: Instrument used by a surveyor for measuring horizontal and vertical angles.

Thermal Treatment: Alteration of siliceous materials by controlled exposure to heat.

Thickness: Measurement of the distance between the dorsal and ventral surfaces of a flake.

Thumbnail scraper: A convex edged scraper that is small, generally the size of a thumbnail.

Tool: Any object that is used.

Topographic map: A detailed representation of cultural, hydrographic relief and vegetation features. These are depicted on a map on a designated projection and at a designated scale.

Transverse Cross Section: The cross section of a flake at 90° to the length.

Transverse Mercator projection: A projection similar to the Mercator projection, but has the cylinder tangent at a particular meridian rather than at the equator.

True north: The direction to the Earth's geographic North Pole.

Tula: A flake with a prominent bulb, large platform and platform/ventral surface angle of about 1300, which is retouched at the distal end. Not to be confused with a Tula Adze.

Tula Adze: A composite tool observed ethnographically, consisting of a stone artefact (often a Tula), a wooden handle and resin.

Unidirectional Core: Core from which flakes were removed from one platform surface and in only one direction.

Unifacial: Artefact flaked on only one side.

Unit: Archaeologists lay out a grid over a site to divide it into units, which may vary in size, and then figure out which units will be dug. Archaeologists dig one unit at a time. Keeping track of specific measurements between artefacts and features gives archaeologists the ability to draw an overall map looking down on the site (called a floor plan), to get the bigger picture of the site.

Use-wear: Damage to the edges or working surfaces of tools sustained in use.

Ventral Surface: The surface of a flake created when it is removed and identified mainly by the presence of a ring crack.

Visibility: The degree to which the surface of the ground can be seen. This may be influenced by natural processes such as wind erosion or the character of the native vegetation, and by land-use practices, such as ploughing or grading. Visibility is generally expressed in terms of the percentage of the ground surface visible for a project area.

11 Appendices

11.1 Table of all Consultation Activities

Table 11-1: Consultation Activities

Date	Stage	Consultation Type	OEH Requirement Section	Description	To/From Who
24-Nov-17	1	Letters to Agencies	4.1.2	Letter requesting RAP contacts	Hunter Local Land Services (HLLS)
24-Nov-17	1	Letters to Agencies	4.1.2	Letter requesting RAP contacts	Office of Environment and Heritage (OEH)
24-Nov-17	1	Letters to Agencies	4.1.2	Letter requesting RAP contacts	Native Title Services Corporation (NTSC)
24-Nov-17	1	Letters to Agencies	4.1.2	Letter requesting RAP contacts	Muswellbrook Shire Council (MSC)
24-Nov-17	1	Letters to Agencies	4.1.2	Letter requesting RAP contacts	Singleton Council
24-Nov-17	1	Letters to Agencies	4.1.2	Letter requesting RAP contacts	Office of the Registrar of Aboriginal Land Rights Act
24-Nov-17	1	Letters to Agencies	4.1.2	Letter requesting RAP contacts	National Native Title Tribunal (NNTT)
24-Nov-17	1	Letters to Agencies	4.1.2	Letter requesting RAP contacts	Wanaruah Local Aboriginal Land Council (WLALC)
24-Nov-17	1	Letter to PCWP		Letter requesting RAP contacts	Plains Clan of Wonnaruah People (PCWP)
27-Nov-17	1	Letters to Agencies		Receiving information regarding RAPs	WLALC
28-Nov-17	1	Letters to Agencies		Receiving information regarding RAPs	Office of the Registrar
28-Nov-17	1	Letters to Agencies		Receiving information regarding RAPs	NNTT
04-Dec-17	1	Letters to Agencies		Receiving information regarding RAPs	OEH
04-Dec-17	1	Letter to PCWP		Letter issued to PCWP regarding the Aboriginal Cultural Heritage Values Report	PCWP (Scott Franks)
20-Dec-17	1	Public Notices RAPs	4.1.3, 4.1.4	Public Notice in Newspaper	Singleton Argus
22-Dec-17	1	Public Notices RAPs	4.1.3, 4.1.4	Public Notice in Newspaper	Muswellbrook Chronicle
20-Dec-17 to 22-Dec- 17	1	Letter sent to known parties	4.1.3, 4.1.4, 4.1.5, 4.2	Invitation to register as a Glendell Continued Operations Project RAP	102 contacts
22-Dec-17 to 31-Jan- 18	1	Letters of registration from RAPs		RAP Registration	24 registrations received
19-Feb-18	2	Send Draft Archeological Survey Methodology to RAPs for Comment	4.2, 4.3.1, 4.3.2	Draft Archeological Survey Methodology, mailed out to Registered RAPS for comment (28-day comment period)	25 Registered contacts (RAPs) as listed in RAP database
19-Feb-18	2	Send Draft Archeological Survey Methodology to RAPs for Comment	4.2, 4.3.1, 4.3.2	Draft Archeological Survey Methodology, emailed out for comment (28-day comment period) to all registered RAPs with an email address	All RAP emails on Registered RAP list
20-Feb-18		Archaeological Survey Methodology – RAP comment		Archaeological Survey Methodology – RAP comment	Culturally Aware (Tracey Skene)
21-Feb-18		Send follow-up email to all contacts who have not responded to EOI for RAP registration		Email sent to all contacts who had not responded to EOI for RAP registration offering them to still register as a RAP for the Project	All contacts who had not responded to EOI
21-Feb-18		Phone call to all contacts who have not responded to EOI for RAP registration		Phone call sent to all contacts who had not responded to EOI for RAP registration offering them to still register as a RAP for the Project	All contacts who had not responded to EOI
27-Feb-18		Archaeological Survey		Archaeological Survey Methodology – RAP comment	Lower Hunter Aboriginal Incorporated (David Ahoy)

		Methodology – RAP comment			
28-Feb-18	1	Copy of EOI Letters, Registered RAPs List and Public Notices	4.1.6	Email submission as per Section 4.1.6	OEH - Steven Cox and Nicole Davis
28-Feb-18	1	Copy of EOI Letters, Registered RAPs List and Public Notices	4.1.6	Email submission as per Section 4.1.6	Response from Nicole Davis as acknowledgement of receipt
6-Mar-18		Archaeological Survey Methodology – RAP comment		Archaeological Survey Methodology – RAP comment	Nyanga Walang (Kevin Duncan)
16-Mar-18	2	Letter of Engagement - Seek Cultural Information from RAPs (General)	3.4, 4.3.3	Provision of field work details/expectations/Registration of Engagement Form/Field Worker Application Form	28 Registered contacts (RAPs) as listed in RAP database
16-Mar-18	2	Letter of Engagement - Seek Cultural Information from RAPs (PCWP)	3.4, 4.3.3	Provision of field work details/expectations/Umbrella Agreement	Scott Franks (PCWP)
16-Mar-18	2	Letter of Engagement - Seek Cultural Information from RAPs (HVAC)	3.4, 4.3.3	Provision of field work details/expectations/Umbrella Agreement	Ross Pahuru (HVAC)
16-Mar-18	2	Letter of Engagement - Seek Cultural Information from RAPs (WNAC)	3.4, 4.3.3	Provision of field work details/expectations/Umbrella Agreement	Laurie Perry (WNAC)
29-Mar-19		Archaeological Survey Methodology – RAP comment		Archaeological Survey Methodology – RAP comment	PCWP (Scott Franks)
9-Apr-18	2	Archeological Survey of the Project Area	4.3.3	Conducted by OzArk. 2 teams consisting of 2 Archaeologists + 4 RAPs	
10-Apr-18	2	Archeological Survey of the Project Area	4.3.3	Conducted by OzArk. 2 teams consisting of 2 Archaeologists + 4 RAPs	
11-Apr-18	2	Archeological Survey of the Project Area	4.3.3	Conducted by OzArk. 2 teams consisting of 2 Archaeologists + 4 RAPs	
12-Apr-18	2	Archeological Survey of the Project Area	4.3.3	Conducted by OzArk. 2 teams consisting of 2 Archaeologists + 4 RAPs	
13-Apr-18	2	Archeological Survey of the Project Area	4.3.3	Conducted by OzArk. 2 teams consisting of 2 Archaeologists + 4 RAPs	
16-Apr-18	2	Archeological Survey of the Project Area	4.3.3	Conducted by OzArk. 2 teams consisting of 2 Archaeologists + 4 RAPs	
17-Apr-18	2	Archeological Survey of the Project Area	4.3.3	Conducted by OzArk. 2 teams consisting of 2 Archaeologists + 4 RAPs	
18-Apr-18	2	Archeological Survey of the Project Area	4.3.3	Conducted by OzArk. 2 teams consisting of 2 Archaeologists + 4 RAPs	
19-Apr-18	2	Archeological Survey of the Project Area	4.3.3	Conducted by OzArk. 2 teams consisting of 2 Archaeologists + 4 RAPs	
20-Apr-18	2	Archeological Survey of the Project Area	4.3.3	Conducted by OzArk. 2 teams consisting of 2 Archaeologists + 4 RAPs	
30-Apr-18	2	Archeological Survey of the Project Area	4.3.3	Conducted by OzArk. 2 teams consisting of 2 Archaeologists + 2 RAPs	
1-May-18	2	Archeological	4.3.3	Conducted by OzArk. 2 teams consisting of 2	

		Survey of the Project Area		Archaeologists + 2 RAPs	
4-Jun-18		Aboriginal Cultural Heritage Values Methodology		Issue Aboriginal Cultural Heritage Values Methodology to all contacts in RAP database	29 contacts as listed in RAP database
6-Jun-18		Aboriginal Cultural Heritage Values Methodology – RAP reply		Aboriginal Cultural Heritage Values Methodology – RAP comments	Murra Bidgee Mullangari Aboriginal Corporation (Ryan Johnson)
19-Jul-18	2	Test Excavation Methodology - RAP comment request	4.2, 4.3.1, 4.3.2	Draft Test Excavation Methodology mailout to all Registered RAPS for comment (28-day comment period)	All contacts in RAP database without an email address provided
19-Jul-18	2	Test Excavation Methodology - RAP comment request)	4.2, 4.3.1, 4.3.2	Draft Test Excavation Methodology emailed for comment (28-day comment period)	29 contacts as listed in RAP database
19-Jul-18	2	Test Excavation Methodology - RAP Reply	4.3.3	Test Excavation Methodology - RAP Comments	Murra Bidgee Mullangari Aboriginal Corporation (Ryan Johnson)
19-Jul-18	2	Test Excavation Methodology - RAP Reply	4.3.3	Test Excavation Methodology - RAP Comments	Muragadi Heritage Indigenous Corporation (Jesse Carroll-Johnson)
19-Jul-18	2	Test Excavation Methodology - RAP Reply	4.3.3	Test Excavation Methodology - RAP Comments	WNAC (Laurie Perry)
20-Jul-18	3	Invitation to Cultural Values Workshops/Site tour	4.3.3	Mailout Cultural Values Workshop invite	Un-aligned RAPs (23 RAP groups)
20-Jul-18	3	Invitation to Cultural Values Workshops/Site tour	4.3.3	Mailout Cultural Values Workshop invite	Hickeys (3 RAP groups)
20-Jul-18	3	Invitation to Cultural Values Workshops/Site tour	4.3.3	Mailout Cultural Values Workshop invite	WNAC (3 RAP groups)
20-Jul-18	3	Invitation and schedule regarding Values Workshops (email)	4.3.3	Email Cultural Values Workshop invite to those RAPs with an email address	Un-aligned RAPs (23 RAP groups)
20-Jul-18	3	Invitation and schedule regarding Values Workshops (email)	4.3.3	Email Cultural Values Workshop invite to those RAPs with an email address	Hickeys (3 RAP groups)
20-Jul-18	3	Invitation and schedule regarding Values Workshops (email)	4.3.3	Email Cultural Values Workshop invite to those RAPs with an email address	WNAC (3 RAP groups)
23-Jul-18	2	Test Excavation Methodology - RAP Reply	4.3.3	Test Excavation Methodology - RAP Comments	Nyanga Walang (Kevin Duncan)
31-July-18		Cultural Values Workshop and Site Tour	4.3.3	Workshops held at Glendell Mine Training Room and included a bus tour of the Project area	WNAC (12 RAPs) and Unaligned (7 RAPs)
1-Aug-18		Cultural Values Workshop and Site Tour	4.3.3	Workshops held at Glendell Mine Training Room and included a bus tour of the Project area	Hickey's (2 RAPs) and Unaligned (4 RAPs)
13-Aug- 2018	2	Test Excavation Notification to OEH	Requirement 15c of the Code of Practice	Notification to OEH re: Test Excavation date (14 days prior to activity)	Sent to regional mail address (rog.hcc@environment.nsw.gov.au) which is the standard address for all Project queries and notifications
16-Aug-18	2	Test Excavation Fieldwork – invitations		Invitations issued to RAPs to participate in the Test Excavation Fieldwork	26 contacts
3-Sep-18		Invitation to Cultural Values Workshop #2	4.3.3	Cultural Values Workshop #2 invite emailed to those RAPs with an email address	Hickeys (3 RAP groups)
3-Sep-18		Invitation to Cultural Values Workshop #2	4.3.3	Cultural Values Workshop #2 invite emailed to those RAPs with an email address	Unaligned (22 RAP groups)

3-Sep-18		Invitation to Cultural Values Workshop #2	4.3.3	Cultural Values Workshop #2 invite emailed to those RAPs with an email address	WNAC (5 RAP groups)
3-Sep-18		Invitation to Cultural Values Workshop #2	4.3.3	Cultural Values Workshop #2 invite mailout to RAPs who do not have an email address provided	Hickeys (3 RAP groups)
3-Sep-18		Invitation to Cultural Values Workshop #2	4.3.3	Cultural Values Workshop #2 invite mailout to RAPs who do not have an email address provided	Unaligned (22 RAP groups)
3-Sep-18		Invitation to Cultural Values Workshop #2	4.3.3	Cultural Values Workshop #2 invite mailout to RAPs who do not have an email address provided	WNAC (5 RAP groups)
3-Sep-18	3	Test Excavation (12 sites)	4.3.3	Test excavation of 12 sites that included 2 archeologists and 6 RAPs	
4-Sep-18	3	Test Excavation (12 sites)	4.3.3	Test excavation of 12 sites that included 2 archeologists and 6 RAPs	
5-Sep-18	3	Test Excavation (12 sites)	4.3.3	Test excavation of 12 sites that included 2 archeologists and 6 RAPs	
6-Sep-18	3	Test Excavation (12 sites)	4.3.3	Test excavation of 12 sites that included 2 archeologists and 6 RAPs	
7-Sep-18	3	Test Excavation (12 sites)	4.3.3	Test excavation of 12 sites that included 2 archeologists and 6 RAPs	
10-Sep-18	3	Test Excavation (12 sites)	4.3.3	Test excavation of 12 sites that included 2 archeologists and 6 RAPs	
11-Sep-18	3	Test Excavation (12 sites)	4.3.3	Test excavation of 12 sites that included 2 archeologists and 6 RAPs	
12-Sep-18	3	Test Excavation (12 sites)	4.3.3	Test excavation of 12 sites that included 2 archeologists and 6 RAPs	
13-Sep-18	3	Test Excavation (12 sites)	4.3.3	Test excavation of 12 sites that included 2 archeologists and 6 RAPs	
14-Sep-18	3	Test Excavation (12 sites)	4.3.3	Test excavation of 12 sites that included 2 archeologists and 6 RAPs	
17-Sep-18	3	Test Excavation (12 sites)	4.3.3	Test excavation of 12 sites that included 2 archeologists and 6 RAPs	
18-Sep-18	3	Test Excavation (12 sites)	4.3.3	Test excavation of 12 sites that included 2 archeologists and 6 RAPs	
18-Sep-18	3	Cultural Values Workshop #2	4.3.3 - 4.3.7	Cultural Values Workshop #2 (Day 1) held in Singleton for WNAC (5 RAPs and 15 Elders)	
19-Sep-18	3	Test Excavation (12 sites)	4.3.3	Test excavation of 12 sites that included 2 archeologists and 6 RAPs	
19-Sep-18	3	Cultural Values Workshop #2	4.3.3 - 4.3.7	Cultural Values Workshop #2 (Day 2) held in Singleton for WNAC (5 RAPs and 15 Elders)	
20-Sep-18	3	Cultural Values Workshop #2	4.3.3 - 4.3.7	Cultural Values Workshop #2 held in Muswellbrook for Hickeys (2 RAPs)	
21-Sep-18	3	Cultural Values Workshop #2	4.3.3 - 4.3.7	Cultural Values Workshop #2 held in Muswellbrook for Unaligned (11 RAPs)	
04-Mar-19		Letter to PCWP		Letter issued to PCWP regarding PCWP input into the ACHAR and seeking input	

11.2 List of RAPs for the Project

- 1. Adam Sampson
- 2. Aliera French
- 3. Allen Paget
- 4. Arthur Fletcher
- 5. Ashley Sampson
- 6. Darleen Johnson-Carroll
- 7. David Horton
- 8. Derrick Vale Sr
- 9. Des Hickey
- 10. Donna Sampson
- 11. George Sampson
- 12. Georgina Berry
- 13. Gordon Griffiths
- 14. Gregory Sampson
- 15. Irene Ardler
- 16. Jeffery Matthews
- 17. Jenny-Lee Chambers
- 18. Jesse Carroll Johnson
- 19. John Matthews
- 20. Kathleen Steward Kinchela
- 21. Kevin Duncan
- 22. Laurie Perry
- 23. Les Ahoy
- 24. Lilly Carrol
- 25. Luke Hickey
- 26. Maree Waugh
- 27. Margaret Matthews
- 28. Noel Downs
- 29. Paul Boyd
- 30. Rhoda Perry
- 31. Rhonda Griffiths
- 32. Rhonda Ward
- 33. Ryan Carroll Johnson
- 34. Scott Franks
- 35. Thomas Miller
- 36. Tim Smith
- 37. Tracey Skene

11.3 Consultation Documentation

11.3.1 Example Letter seeking Registrations

GLENCORE

21 December 2017



Aboriginal Cultural Heritage Assessment Glendell Continued Operations Project (GCOP)

The Mount Owen Complex, operated by Glencore, includes approved open cut coal mining operations in three pit areas, the Bayswater North Pit and North Pit (both approved under the Mount Owen Continued Operations Consent) and the Barrett Pit, approved under the Glendell Consent. The Glendell Continued Operations Project (Project) seeks to extend the life of the Glendell mine to 2040, with an overall increase in extraction rate up to 10 million tonnes per annum (Mtpa) from the current approved 4.5 Mtpa.

The Project study area includes an additional approximately 1060 hectares of land outside of currently approved mining disturbance areas and is located approximately 16 kilometres (km) northwest of Singleton and 24 km southeast of Muswellbrook in the Upper Hunter Valley (see attached **Figure 1**). The Project is located to the east of Bowmans Creek and the New England Highway.

Umwelt (Australia) Pty Ltd have been engaged by Glencore to manage and prepare the Environmental Impact Statement for the Project. To support the assessment of Aboriginal cultural heritage values within the Project Study Area, Glencore is undertaking Aboriginal community consultation as per the Office of Environment and Heritage's Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010.

Accordingly, Glencore is seeking Expressions of Interest from relevant Aboriginal groups and individuals in the Singleton/Muswellbrook area to form a group of Registered Aboriginal Parties (RAPs). The RAPs will assist Glencore to develop an Aboriginal Cultural Heritage Assessment and assist Glencore to understand the cultural values of the Project study area.

If you hold knowledge relevant to determining the cultural significance of the Project area, please register your interest to be a RAP by post: PO Box 320, Singleton NSW 2330, email: Bradly.Snedden@glencore.com.au, or by phoning Bradly Snedden at Glencore between 8.00am and 4.00pm week days on 02 6520 2684. The closing date for Expressions of Interest is by COB 31 January 2018 or sooner if possible.

If you wish to register to be regarded as a RAP, it should be noted that as per the OEH guidelines. Glencore is required to provide your details to the OEH unless advised you do not wish your details to be released.

Once relevant groups and individuals have been identified, they will form part of the formal consultation process for the project.

Kind regards,

Bradly Snedden Glendell Continued Operations Project

> Private Mail Bag 8. Singleton, NSW 2330 567 Broke Road, Singleton, NSW 2330 T + 61 2 6570 2416 F + 61 2 6570 2520 www.glencore.com

Expression of Interest Cultural Heritage Management

Glendell Tenements Pty. Limited, a subsidiary of Glencore Coal Pty Limited (Glencore), seeks registration of Aboriginal groups or individuals who are interested in being consulted regarding an Aboriginal Cultural Heritade proposed Assessment for the Glendell Continued Operations Project (Project). The Project seeks to extend the life of the Glendell mine located between Muswellbrook and Singleton in the Upper Hunter Valley, NSW.

This consultation will assist Glencore to develop an Aboriginal Cultural Heritage Assessment and understand the Aboriginal cultural values of the Project area.

If you hold cultural knowledge relevant to determining the cultural significance of the Glendell mine area, please register your interest by post: PO Box 320, Singleton NSW 2330,

email: Bradly.Snedden@glencore.com.au or by phoning Glendell between 8.00am and 4.00pm week days on 02 6520 2684.

All submissions should be received no later than **4pm on 31 January 2018**.

Figure 11-1: Public Notice in the Muswellbrook Chronicle

Expression of Interest Cultural Heritage Management

Glendell Tenements Pty. Limited, a subsidiary of Glencore Coal Pty Limited (Glencore), seeks registration of Aboriginal groups or individuals who are interested in being consulted reaardina an Aboriginal Cultural Heritade the Glendell Assessment for proposed Operations Project (Project). Continued The Project seeks to extend the life of the Glendell located between Muswellbrook and mine Singleton in the Upper Hunter Valley, NSW.

This consultation will assist Glencore to develop an Aboriginal Cultural Heritage Assessment and understand the Aboriginal cultural values of the Project area.

If you hold cultural knowledge relevant to determining the cultural significance of the Glendell mine area, please register your interest by post: PO Box 320, Singleton NSW 2330,

email: Bradly.Snedden@glencore.com.au or by phoning Glendell between 8.00am and 4.00pm week days on 02 6520 2684.

All submissions should be received no later than **4pm on 31 January 2018**.

Figure 11-2: Public Notice in the Singleton Argus.

24 November 2017

Hunter Local Land Services 98 John St SINGLETON 2330

Dear Sir,

Aboriginal Cultural Heritage Assessment Glendell Continued Operations Project

The Mount Owen Complex (operated by Glencore) includes approved open cut operations in three pit areas, the Bayswater North Pit and North Pit (both approved under the Mount Owen Continued Operations Consent) and the Barrett Pit, approved under the Glendell Consent. The Glendell Continued Operations Project (the Project) seeks to extend the life of the Glendell mine to approximately 2045, with an overall increase in extraction rate up to 10 million tonnes per annum (Mtpa) from the current approved 4.5 Mtpa.

The Project Study Area includes an additional approximately 1060 hectares of land outside of currently approved mining disturbance areas and is located approximately 16 kilometres (km) northwest of Singleton and 24 km southeast of Muswellbrook in the Upper Hunter Valley (**Figure 1**). The Project is located to the east of Bowmans Creek and the New England Highway.

Umwelt (Australia) Pty Ltd have been engaged by Glencore to manage and prepare the *Environmental Impact Statement* for the Project. To support the assessment of Aboriginal cultural heritage values within the Project Study Area, Glencore is undertaking Aboriginal community consultation as per the Office of Environment and Heritage's *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010*. Accordingly, Glencore is seeking Expressions of Interest from relevant Aboriginal groups and individuals in the Singleton/Muswellbrook area to form a group of Registered Aboriginal Parties (RAPs). The RAPs will assist Glencore to develop an Aboriginal Cultural Heritage Assessment and assist Glencore to understand the cultural values of the Project Study Area.

If your organisation can recommend and provide contact details for any Aboriginal groups or individuals with a cultural interest in the Upper Hunter Valley area (Singleton and Muswellbrook Local Government Areas), we can then enquire whether they wish to be consulted regarding the Project.

We would appreciate it if you could provide any feedback regarding these Aboriginal stakeholder groups or individuals by **COB Monday 14 December 2017** or sooner if possible.

Yours Sincerely,

Brad Snedden Project Approvals Manager

> Private Mail Bag 8, Singleton, NSW 2330 567 Broke Road, Singleton, NSW 2330 T + 61 2 6570 2416 F + 61 2 6570 2520 www.glencore.com





Glendell Continued Operations Project Area

File Name (A4): 4166_004.dgn 20171123 16 +1

24 November 2017

General Manager Muswellbrook Shire Council PO Box 122 MUSWELLBROOK 2333

Dear Sir,

Aboriginal Cultural Heritage Assessment Glendell Continued Operations Project

The Mount Owen Complex (operated by Glencore) includes approved open cut operations in three pit areas, the Bayswater North Pit and North Pit (both approved under the Mount Owen Continued Operations Consent) and the Barrett Pit, approved under the Glendell Consent. The Glendell Continued Operations Project (the Project) seeks to extend the life of the Glendell mine to approximately 2045, with an overall increase in extraction rate up to 10 million tonnes per annum (Mtpa) from the current approved 4.5 Mtpa.

The Project Study Area includes an additional approximately 1060 hectares of land outside of currently approved mining disturbance areas and is located approximately 16 kilometres (km) northwest of Singleton and 24 km southeast of Muswellbrook in the Upper Hunter Valley (Figure 1). The Project is located to the east of Bowmans Creek and the New England Highway.

Umwelt (Australia) Pty Ltd have been engaged by Glencore to manage and prepare the *Environmental Impact Statement* for the Project. To support the assessment of Aboriginal cultural heritage values within the Project Study Area, Glencore is undertaking Aboriginal community consultation as per the Office of Environment and Heritage's *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010*. Accordingly, Glencore is seeking Expressions of Interest from relevant Aboriginal groups and individuals in the Singleton/Muswellbrook area to form a group of Registered Aboriginal Parties (RAPs). The RAPs will assist Glencore to develop an Aboriginal Cultural Heritage Assessment and assist Glencore to understand the cultural values of the Project Study Area.

If your organisation can recommend and provide contact details for any Aboriginal groups or individuals with a cultural interest in the Upper Hunter Valley area (Singleton and Muswellbrook Local Government Areas), we can then enquire whether they wish to be consulted regarding the Project.

We would appreciate it if you could provide any feedback regarding these Aboriginal stakeholder groups or individuals by **COB Monday 14 December 2017** or sooner if possible.

Yours Sincerely,

Brad Snedden Project Approvals Manager

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24 November 2017

The National Native Title Tribunal GPO Box 9973 SYDNEY 2001

Dear Sir/Madam,

Aboriginal Cultural Heritage Assessment Glendell Continued Operations Project

The Mount Owen Complex (operated by Glencore) includes approved open cut operations in three pit areas, the Bayswater North Pit and North Pit (both approved under the Mount Owen Continued Operations Consent) and the Barrett Pit, approved under the Glendell Consent. The Glendell Continued Operations Project (the Project) seeks to extend the life of the Glendell mine to approximately 2045, with an overall increase in extraction rate up to 10 million tonnes per annum (Mtpa) from the current approved 4.5 Mtpa.

The Project Study Area includes an additional approximately 1060 hectares of land outside of currently approved mining disturbance areas and is located approximately 16 kilometres (km) northwest of Singleton and 24 km southeast of Muswellbrook in the Upper Hunter Valley (**Figure 1**). The Project is located to the east of Bowmans Creek and the New England Highway.

Umwelt (Australia) Pty Ltd have been engaged by Glencore to manage and prepare the *Environmental Impact Statement* for the Project. To support the assessment of Aboriginal cultural heritage values within the Project Study Area, Glencore is undertaking Aboriginal community consultation as per the Office of Environment and Heritage's *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010.* Accordingly, Glencore is seeking Expressions of Interest from relevant Aboriginal groups and individuals in the Singleton/Muswellbrook area to form a group of Registered Aboriginal Parties (RAPs). The RAPs will assist Glencore to develop an Aboriginal Cultural Heritage Assessment and assist Glencore to understand the cultural values of the Project Study Area.

If your organisation can recommend and provide contact details for any Aboriginal groups or individuals with a cultural interest in the Upper Hunter Valley area (Singleton and Muswellbrook Local Government Areas), we can then enquire whether they wish to be consulted regarding the Project.

We would appreciate it if you could provide any feedback regarding these Aboriginal stakeholder groups or individuals by **COB Monday 14 December 2017** or sooner if possible.

Yours Sincerely,

Brad Snedden Project Approvals Manager

> Private Mail Bag 8, Singleton, NSW 2330 567 Broke Road, Singleton, NSW 2330 T [‡] 61 2 6570 2416 F + 61 2 6570 2520 www.glencore.com



24 November 2017

NTSCORP PO Box 2105 STRAWBERRY HILLS 2012

Dear Sir/Madam,

Aboriginal Cultural Heritage Assessment Glendell Continued Operations Project

The Mount Owen Complex (operated by Glencore) includes approved open cut operations in three pit areas, the Bayswater North Pit and North Pit (both approved under the Mount Owen Continued Operations Consent) and the Barrett Pit, approved under the Glendell Consent. The Glendell Continued Operations Project (the Project) seeks to extend the life of the Glendell mine to approximately 2045, with an overall increase in extraction rate up to 10 million tonnes per annum (Mtpa) from the current approved 4.5 Mtpa.

The Project Study Area includes an additional approximately 1060 hectares of land outside of currently approved mining disturbance areas and is located approximately 16 kilometres (km) northwest of Singleton and 24 km southeast of Muswellbrook in the Upper Hunter Valley (**Figure 1**). The Project is located to the east of Bowmans Creek and the New England Highway.

Umwelt (Australia) Pty Ltd have been engaged by Glencore to manage and prepare the *Environmental Impact Statement* for the Project. To support the assessment of Aboriginal cultural heritage values within the Project Study Area, Glencore is undertaking Aboriginal community consultation as per the Office of Environment and Heritage's *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010.* Accordingly, Glencore is seeking Expressions of Interest from relevant Aboriginal groups and individuals in the Singleton/Muswellbrook area to form a group of Registered Aboriginal Parties (RAPs). The RAPs will assist Glencore to develop an Aboriginal Cultural Heritage Assessment and assist Glencore to understand the cultural values of the Project Study Area.

If your organisation can recommend and provide contact details for any Aboriginal groups or individuals with a cultural interest in the Upper Hunter Valley area (Singleton and Muswellbrook Local Government Areas), we can then enquire whether they wish to be consulted regarding the Project.

We would appreciate it if you could provide any feedback regarding these Aboriginal stakeholder groups or individuals by **COB Monday 14 December 2017** or sooner if possible.

Yours Sincerely,

Brad Snedden Project Approvals Manager

> Private Mail Bag 8, Singleton, NSW 2330 567 Broke Road, Singleton, NSW 2330 T [‡] 61 2 6570 2416 F + 61 2 6570 2520 www.glencore.com



24 November 2017

OEH regional office (Newcastle) 117 Bull Street NEWCASTLE WEST 2302

Dear Sir/Madam,

Aboriginal Cultural Heritage Assessment Glendell Continued Operations Project

The Mount Owen Complex (operated by Glencore) includes approved open cut operations in three pit areas, the Bayswater North Pit and North Pit (both approved under the Mount Owen Continued Operations Consent) and the Barrett Pit, approved under the Glendell Consent. The Glendell Continued Operations Project (the Project) seeks to extend the life of the Glendell mine to approximately 2045, with an overall increase in extraction rate up to 10 million tonnes per annum (Mtpa) from the current approved 4.5 Mtpa.

The Project Study Area includes an additional approximately 1060 hectares of land outside of currently approved mining disturbance areas and is located approximately 16 kilometres (km) northwest of Singleton and 24 km southeast of Muswellbrook in the Upper Hunter Valley (**Figure 1**). The Project is located to the east of Bowmans Creek and the New England Highway.

Umwelt (Australia) Pty Ltd have been engaged by Glencore to manage and prepare the *Environmental Impact Statement* for the Project. To support the assessment of Aboriginal cultural heritage values within the Project Study Area, Glencore is undertaking Aboriginal community consultation as per the Office of Environment and Heritage's *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010.* Accordingly, Glencore is seeking Expressions of Interest from relevant Aboriginal groups and individuals in the Singleton/Muswellbrook area to form a group of Registered Aboriginal Parties (RAPs). The RAPs will assist Glencore to develop an Aboriginal Cultural Heritage Assessment and assist Glencore to understand the cultural values of the Project Study Area.

If your organisation can recommend and provide contact details for any Aboriginal groups or individuals with a cultural interest in the Upper Hunter Valley area (Singleton and Muswellbrook Local Government Areas), we can then enquire whether they wish to be consulted regarding the Project.

We would appreciate it if you could provide any feedback regarding these Aboriginal stakeholder groups or individuals by **COB Monday 14 December 2017** or sooner if possible.

Yours Sincerely,

Brad Snedden Project Approvals Manager

> Private Mail Bag 8, Singleton, NSW 2330 567 Broke Road, Singleton, NSW 2330 T [‡] 61 2 6570 2416 F + 61 2 6570 2520 www.glencore.com



24 November 2017

The Registrar Office of The Registrar, Aboriginal Land Rights Act 1983 PO Box 5068 PARRAMATTA 2124

Dear Nicole,

Aboriginal Cultural Heritage Assessment Glendell Continued Operations Project

The Mount Owen Complex (operated by Glencore) includes approved open cut operations in three pit areas, the Bayswater North Pit and North Pit (both approved under the Mount Owen Continued Operations Consent) and the Barrett Pit, approved under the Glendell Consent. The Glendell Continued Operations Project (the Project) seeks to extend the life of the Glendell mine to approximately 2045, with an overall increase in extraction rate up to 10 million tonnes per annum (Mtpa) from the current approved 4.5 Mtpa.

The Project Study Area includes an additional approximately 1060 hectares of land outside of currently approved mining disturbance areas and is located approximately 16 kilometres (km) northwest of Singleton and 24 km southeast of Muswellbrook in the Upper Hunter Valley (Figure 1). The Project is located to the east of Bowmans Creek and the New England Highway.

Umwelt (Australia) Pty Ltd have been engaged by Glencore to manage and prepare the *Environmental Impact Statement* for the Project. To support the assessment of Aboriginal cultural heritage values within the Project Study Area, Glencore is undertaking Aboriginal community consultation as per the Office of Environment and Heritage's *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010*. Accordingly, Glencore is seeking Expressions of Interest from relevant Aboriginal groups and individuals in the Singleton/Muswellbrook area to form a group of Registered Aboriginal Parties (RAPs). The RAPs will assist Glencore to develop an Aboriginal Cultural Heritage Assessment and assist Glencore to understand the cultural values of the Project Study Area.

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Yours Sincerely,

Brad Snedden Project Approvals Manager

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File Name (A4): 4166_004.dgn 20171123 16 +1

24 November 2017

General Manager Singleton Council PO Box 314 SINGLETON 2330

Dear Sir,

Aboriginal Cultural Heritage Assessment Glendell Continued Operations Project

The Mount Owen Complex (operated by Glencore) includes approved open cut operations in three pit areas, the Bayswater North Pit and North Pit (both approved under the Mount Owen Continued Operations Consent) and the Barrett Pit, approved under the Glendell Consent. The Glendell Continued Operations Project (the Project) seeks to extend the life of the Glendell mine to approximately 2045, with an overall increase in extraction rate up to 10 million tonnes per annum (Mtpa) from the current approved 4.5 Mtpa.

The Project Study Area includes an additional approximately 1060 hectares of land outside of currently approved mining disturbance areas and is located approximately 16 kilometres (km) northwest of Singleton and 24 km southeast of Muswellbrook in the Upper Hunter Valley (Figure 1). The Project is located to the east of Bowmans Creek and the New England Highway.

Umwelt (Australia) Pty Ltd have been engaged by Glencore to manage and prepare the *Environmental Impact Statement* for the Project. To support the assessment of Aboriginal cultural heritage values within the Project Study Area, Glencore is undertaking Aboriginal community consultation as per the Office of Environment and Heritage's *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010*. Accordingly, Glencore is seeking Expressions of Interest from relevant Aboriginal groups and individuals in the Singleton/Muswellbrook area to form a group of Registered Aboriginal Parties (RAPs). The RAPs will assist Glencore to develop an Aboriginal Cultural Heritage Assessment and assist Glencore to understand the cultural values of the Project Study Area.

If your organisation can recommend and provide contact details for any Aboriginal groups or individuals with a cultural interest in the Upper Hunter Valley area (Singleton and Muswellbrook Local Government Areas), we can then enquire whether they wish to be consulted regarding the Project.

We would appreciate it if you could provide any feedback regarding these Aboriginal stakeholder groups or individuals by **COB Monday 14 December 2017** or sooner if possible.

Yours Sincerely,

Brad Snedden Project Approvals Manager

> Private Mail Bag 8, Singleton, NSW 2330 567 Broke Road, Singleton, NSW 2330 T + 61 2 6570 2416 F + 61 2 6570 2520 www.glencore.com



24 November 2017

Noel Downs Wanaruah Local Aboriginal Land Council 19 Maitland Street MUSWELLBROOK 2333

Dear Noel,

Aboriginal Cultural Heritage Assessment Glendell Continued Operations Project

The Mount Owen Complex (operated by Glencore) includes approved open cut operations in three pit areas, the Bayswater North Pit and North Pit (both approved under the Mount Owen Continued Operations Consent) and the Barrett Pit, approved under the Glendell Consent. The Glendell Continued Operations Project (the Project) seeks to extend the life of the Glendell mine to approximately 2045, with an overall increase in extraction rate up to 10 million tonnes per annum (Mtpa) from the current approved 4.5 Mtpa.

The Project Study Area includes an additional approximately 1060 hectares of land outside of currently approved mining disturbance areas and is located approximately 16 kilometres (km) northwest of Singleton and 24 km southeast of Muswellbrook in the Upper Hunter Valley (Figure 1). The Project is located to the east of Bowmans Creek and the New England Highway.

Umwelt (Australia) Pty Ltd have been engaged by Glencore to manage and prepare the *Environmental Impact Statement* for the Project. To support the assessment of Aboriginal cultural heritage values within the Project Study Area, Glencore is undertaking Aboriginal community consultation as per the Office of Environment and Heritage's *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010*. Accordingly, Glencore is seeking Expressions of Interest from relevant Aboriginal groups and individuals in the Singleton/Muswellbrook area to form a group of Registered Aboriginal Parties (RAPs). The RAPs will assist Glencore to develop an Aboriginal Cultural Heritage Assessment and assist Glencore to understand the cultural values of the Project Study Area.

If your organisation can recommend and provide contact details for any Aboriginal groups or individuals with a cultural interest in the Upper Hunter Valley area (Singleton and Muswellbrook Local Government Areas), we can then enquire whether they wish to be consulted regarding the Project.

We would appreciate it if you could provide any feedback regarding these Aboriginal stakeholder groups or individuals by **COB Monday 14 December 2017** or sooner if possible.

Yours Sincerely,

Brad Snedden Project Approvals Manager

> Private Mail Bag 8, Singleton, NSW 2330 567 Broke Road, Singleton, NSW 2330 T + 61 2 6570 2416 F + 61 2 6570 2520 www.glencore.com




27 November 2017

Brad Snedden Glencore Private Mail Bag 8 SINGLETON NSW 2330

Dear Brad

Re: Request - Search for Registered Aboriginal Owners

I refer to your email dated 24 November 2017 regarding an Aboriginal Cultural Heritage Assessment located within the area of Bowmans Creek, NSW.

I have searched the Register of Aboriginal Owners and the project area described does not have Registered Aboriginal Owners pursuant to Division 3 of the Aboriginal Land Rights Act 1983 (ALRA).

I suggest that you contact the Wanaruah Local Aboriginal Land Council on 02 6543 1288. They may be able to assist you in identifying other Aboriginal stakeholders for this project.

Yours sincerely

Jodie Rikiti Administration Officer Office of the Registrar, ALRA

> Address-Level 3, 2 – 10 Wentworth Street, PARRAMATTA NSW 2150 Post. P.O Box 5068, PARRAMATTA NSW 2124 Phone: 02 8633 1266

From:	wanarua@bigpond.net.au
Sent	Monday, 27 November 2017 11:30
To:	Bradly.Snedden@glencore.com.au
Subject:	Re: Aboriginal Cultural Heritage Assessment for the Glendell Continued Operations Project
Attachments:	Registered Aboriginal Parties.xlsx
Follow Up Flag:	Follow up
Flag Status:	Flagged
Cood morning Brod	
Good morning brad,	
Please find attached our	RAP's list.
Regards	

Renee

Renee MacDonald Administration

Wanaruah Local Aboriginal Land Council

PO Box 127 MUSWELLBROOK NSW 2333 Ph: 02 6543 1288

I acknowledge the Traditional Owners of the land I work upon, the Wanaruah People and pay my respects to Elders past, present and future. On 27/11/2017 10:10 AM, <u>Bradly.Snedden@glencore.com.au</u> wrote:

Hi Noel,

It was a pleasure to meet you last week. Further to that meeting please find attached the initial letter seeking contact details for any Aboriginal groups or individuals with a cultural interest in the Upper Hunter Valley area (Singleton and Muswellbrook Local Government Areas), as discussed.

Please don't hesitate to contact me at any stage.

Regards Brad

Brad Snedden Coal Assets Australia, Glencore

M: 04 2846 6820 T: 02 6520 2684 E: Bradly Snedden@glencore.com.au

www.glencore.com

LEGAL DISCLAIMER. The contents of this electronic communication and any attached documents are strictly confidential and they may not be used or disclosed by someone who is not a named recipient.

If you have received this electronic communication in error please notify the sender by replying to this electronic communication inserting the word "misdirected" as the subject and delete this communication from your system.



DOC17/585796-1 ACH Glendell Contuined Operations

> Mr Brad Seddon Coal Assets Australia, Glencore Bradley.Snedden@glencore.com.au

Dear Brad,

Aboriginal Cultural Heritage Assessment - Glendell Continued Operations Project

In response to your request under Section 4.1.2(a) of the Aboriginal cultural heritage consultation requirements for proponents (DECCW 2010), please find attached a list of known Aboriginal parties that have self-nominated for Singleton and Muswellbrook Council Local Government Area (LGA). Please note the following information with respect to Aboriginal consultation for your project.

Aboriginal stakeholder lists maintained by OEH are comprised of self-nominated individuals and organisations

Please note that the attached list is comprised only of self-nominated individuals and Aboriginal organisations who could have an interest in your project. The list is not vetted by OEH. As the list comprises only of self-nominated individuals and Aboriginal organisations, it is not necessarily an exhaustive list of all Aboriginal parties who may hold an interest in the project. Further consultation in accordance with step 4.1.2 of the *Aboriginal cultural heritage consultation requirements for proponents* (DECCW 2010) is required to identify Aboriginal people who may hold either cultural or historical knowledge relevant to determining the significance of Aboriginal objects or places within your proposed project area.

Ensure you document the consultation process

Please ensure all consultation undertaken in accordance with the Aboriginal cultural heritage consultation requirements for proponents (DECCW 2010) is documented within an Aboriginal Cultural Heritage Assessment Report (ACHAR). This must include copies of all correspondence sent to or received from all Registered Aboriginal Parties (RAPs) throughout the entire consultation process. Omission of these records in the final ACHAR may cause delays in the assessment of an Aboriginal Heritage Impact Permit (AHIP) application or a major project Aboriginal cultural heritage assessment, and could require parts of the consultation process to be repeated if the evidence provided to OEH does not demonstrate that the consultation process has been conducted in accordance with our consultation requirements.

Demonstrate that reasonable consultation attempts have been made

Please ensure you provide evidence to demonstrate that reasonable attempts have been made to contact the relevant parties identified through step 4.1.2 of the *Aboriginal cultural heritage consultation*

Locked Bag 1002 Dangar NSW 2309 Level 4, 26 Honeysuckle Drive Newcastle NSW 2300 ABN 30 841 387 271 www.environment.nsw.gov.au requirements for proponents (DECCW 2010). If this evidence is not provided, OEH may deem that the consultation process has not complied with the consultation requirements. Similarly, the proponent is required to record all feedback received from RAPs, along with the proponent's response to the feedback. Where concerns or contentious issues are raised by RAPs during the consultation process, OEH expects that reasonable attempts are made to address and resolve these matters, however OEH acknowledges that in some cases, this may not be achievable. In the case where conflict cannot be resolved, it is the responsibility of the proponent to record these differences and provide the necessary information in their ACHAR with their AHIP application or major project ACHAR.

Consultation should not be confused with employment

As outlined in Section 3.4 of the Aboriginal cultural heritage consultation requirements for proponents (DECCW 2010), the consultation process involves getting the views of, and information from, Aboriginal people and reporting on these. It is not to be confused with other field assessment processes involved in preparing a proposal and an application. OEH does not have any role with respect to commercial engagement. Where RAPs are engaged commercially to provide field services as part of an assessment process, that is a matter for the proponent to manage as they see fit. However, if a proponent is proposing to undertake consultation processes or elicit cultural information from RAPs during the course of conducting a field survey, OEH considers this to form part of the consultation process, and expects that all RAPs would be afforded the opportunity to be involved in the process.

Contacting our office

To ensure we can respond to enquiries promptly, please direct future correspondence to our central mailbox: rog.hcc@environment.nsw.gov.au.

Should you require any further information, please do not hesitate to contact us.

Yours sincerely

STEVEN COX Senior Team Leader Planning Hunter Central Coast Branch Regional Operations Division



Attachment A

Hunter Central Coast Branch - Aboriginal Stakeholder Register for Singleton City Council LGA Please note that this list is valid at the time of sending only, and should not be used for subsequent projects.

Organisation	First name	Surname	Address 1	City	State	Post code	Landline	Mobile	Email
Aboriginal Native Title Elders Consultants	John and Margare t	Matthews	4 Calgaroo Avenue	MUSWELLBROOK	NSW	2333			
AGA Services	Ashley, Gregory & Adam	Sampson	22 Ibis Parade	WOODBERRY	NSW	2322	Donna Sampson 0403 765 019	Ashley Sampson 0401 958 051	aga.services@hotmail.com
Aliera French Trading	Aliera	French	23B Gommera St	BLACKSMITHS	NSW	2281	11 2 - 1	0421 299 963	Allera.french.trading@hotmail.com
Awabakal Traditional Owners Aboriginal Corporation	Kerrie	Brauer	PO Box 122	RUTHERFORD	NSW	2320		0412 866 357	Kerrie@awabakal.com.au
Cacatua Culture Consultants	Donna & George	Sampson	22 Ibis Parade	WOODBERRY	NSW	2322		0434 877 015	cacatuaAservice@tpg.com.au
Crimson-Rosie	Jeffery	Matthews	6 Eucalypt Avenue	MUSWELLBROOK	NSW	2333	02 6543 4791		

Page 4

Organisation	First	Surname	Address 1	City	State	Post	Landline	Mobile	Email
Culturally Aware	Tracey	Skene	7 Crawford Place	MILFIELD	NSW	2325		0474 106 537	traceyamorrung-pa.com.au
D F T V Enterprises	Derrick	Vale Snr	5 Mountbatte n Close	RUTHERFORD	NSW	2320		0438 812 197	deckavale@hotmail.com
Deslee Talbott Consultants	Deslee	Matthews	Unit 2 / 19 South Street	GUNNEDAH	NSW	2380		0431 205 336	m-desley@hotmall.com
Divine Diggers Aboriginal Cultural Consultants	Deidre	Perkins	6 Ashleigh Street	HEDDON GRETA	NSW	2321	02 4937 4573		dedemaree3@hotmail.com
Gidawaa Walang & Barkuma Neighbourhood Centre Inc.	Ann Hickey	Debbie Dacey- Sullivan	76 Lang Street	KURRI KURRI	NSW	2327	02 4937 1094		gidawaa.walang@hotmail.com
Guringai Tribal Link Aboriginal Corporation	Tracey	Howie	PO Box 4061	WYONGAH	NSW	2259	02 4396 8743		tracey@guringa).com.aii
Hunter Traditional Owner	Paulette	Ryan	165 Susan Street	SCONE	NSW	2337		0431 109 001	hto:paulette@gmail.com
Hunter Valley Aboriginal Corporation	Rhonda	Griffiths	182 Bridge St	MUSWELLBROOK	NSW	2333	02 6543 1180		h973809@bigpond.net.au
Hunters & Collectors	Tania	Matthews	U211 Walowa St	NARRABRI	NSW	2390		0409 193 612	Tamatthews10@hotmail.com
Jarban & Mugrebea	Les	Atkinson	11 Nelson Street	CESSNOCK	NSW	2325		0466 316 069	Les.atkinson@hotmail.com
Jumbunna Traffic Management Group Pty Ltd	Norm	Archibald	17 Flobern Ave	WAUCHOPE	NSW	2325		0413 718 149	jtmanagement@live.com.au

Page 5

Organisation	First	Surname	Address 1	City	State	Post code	Landline	Mobile	Email
Kauma Pondee Inc.	Jill	Green	Unit 6/1 Central Street	LAMBTON	NSW	2305		0434 210 190	kaumapondee@live.com,au
Kawul Cultural Services	Vicky	Slater	33 Gardner Circuit	SINGLETON	NSW	2330		0421 077 521	Vicki.slater@hotmail.com
Kawul Pty Ltd trading as Wonn1 Sites	Arthur	Fletcher	619 Main Road	GLENDALE	NSW	2285	02 4954 7751	02 4954 7751	Wonn1sites@gmail.com
Lower Hunter Aboriginal Incorporated	David	Ahoy	5 Killara Drive	CARDIFF SOUTH	NSW	2285		0421 329 520	lowerhunterai@gmail.com
Lower Hunter Wonnarua Cultural Services	Lea- Anne Ball and Uncle Tommy Miller		51 Bowden Street	HEDDON GRETA	NSW	2321	02 4937 2694	02 4937 2694	tn,miller@southemphone.com.au
Lower Wonnaruah Tribal Consultancy Pty Ltd	Barry	Anderson	156 The Inlet Road	BULGA	NSW	2330	02 6574 5303		
Murra Bidgee Mullangari Aboriginal Corporation	Ryan Johnson	& Darleen Johnson- Carroll	PO Box 246	SEVEN HILLS	NSW	2147		0497 983 332	mutrabidgeemullangan@yaboo.com.a u
Myland Cultural & Heritage Group	Warren	Schillings	30 Taurus Street	ELERMORE VALE	NSW	2287	-	0431 392 554	warren@yarnteen.com.au

Page 6

Organisation	First name	Surname	Address 1	City	State	Post code	Landline	Mobile	Email
Roger Matthews Consultancy	Roger	Matthews	15 Parkinson Avenue	MUSWELLBROOK	NSW	2333		0455 671 288	-
Ungooroo Aboriginal Corporation	Alan	Paget	PO Box 3095	SINGLETON	NSW	2330	02 6571 5111		admin@ungoorco.com au
Wallagan Cultural Services	Maree	Waugh	PO Box 40	CESSNOCK	NSW	2325		0439 813 078	Mareewaugh30@hotmail.com
Wattaka Wonnarua CC Service	Des	Hickey	4 Kennedy Street	SINGLETON	NSW	2330		0432 977 178	deshickey@bjgpond.com
Widescope Indigenous Group	Steven	Hickey	73 Russell Street	EMU PLAINS	NSW	2750		0425 232 056 or 0425 230 693	Widescope group@live.com
Wonnarua Culture Heritage	Gordon	Griffiths	19 O'Donnell Crescent	METFORD	NSW	2323	02 4934 6437	0401 028 807	
Wonnarua Elders Council	Richard	Edwards	PO Box 844	CESSNOCK	NSW	2325			
Wonnarua Nation Aboriginal Corporation	Laurie	Perry	254 John St	SINGLETON	NSW	2330	tt.	0412 593 020	l.perry@optusnet.com.au
Yarrawalk (A division of Tocomwall Pty Ltd), Tocomwall	Scott	Franks	PO Box 76	CARRINGBAH	NSW	1495		0404 171 544	scott@tocomwall.com.au

Organisation	First name	Surname	Address 1	City	State	Post code	Landline	Mobile	Email
Pty Ltd on behalf of Scott Franks and Anor on behalf of the Plains Clans of the Wonnaru People NSD1680/2013									
Yinarr Cultural Services	Kathleen	Steward Kinchela	Lot 5 Westwood Estate	MERRIWA	NSW	2329	17.1	0475 436 589	vinarculturalservices@bigpond.com dontminemeay@gmail.com
	Carol	Ridgeway -Bissett	33 Ullora Road	NELSONS BAY	NSW	2315	02 4984 3113	02 4984 3113	
	Steve	Talbott	73 Kiah Road	GILLIESTON HEIGHTS	N5W	2321		0429 662 911	gomeroi.namoi@outlook.com
Didge Ngunawal Clan	Paul Boyd	& Lilly Carroll	7 Siskin St	QUAKERS HILL	NSW	2763		0426 823 944	didgengunawalclan@yahoo.com.au

From:	Enquiries@nntt.gov.au
Sent	Tuesday, 28 November 2017 14:30
To:	Bradly.Snedden@glencore.com.au
Subject:	RE: SR3428 Aboriginal Cultural Heritage Assessment for the Glendell Continued
Attachments:	20171128_SR3428_NSW_Muswellbrook_Shire_Council_LGA_Overlap_Report.xlsx; 20171128_SR3428_NSW_Singleton_Shire_Council_LGA_Overlap_Report.xlsx;
Follow Up Flag:	Follow up
Flag Status:	Flagged

UNCLASSIFIED

Native title search – NSW - Singleton Shire Council and Muswellbrook Shire Council LGA Your ref: - Our ref: SR3428

Dear Brad Snedden,

Thank you for your search request received on 27 November 2017 in relation to the above area, please find your results attached.

Please note: Where the area identified to be searched is indistinct, generalised, or is for a freehold parcel, the results provided may relate to the Local Government Area (LGA) or Local Aboriginal Land Council (ALC).

Search Results

The results provided are based on the information you supplied and are derived from a search of the following Tribunal databases:

- Schedule of Native Title Determination Applications
- Register of Native Title Claims
- Native Title Determinations
- Register of Indigenous Land Use Agreements
- Notified Indigenous Land Use Agreements

For more information about the Tribunal's registers or to search the registers yourself and obtain copies of relevant register extracts, please visit our <u>website</u>.

Please note: There may be a delay between a native title determination application being lodged in the Federal Court and its transfer to the Tribunal. As a result, some native title determination applications recently filed with the Federal Court may not appear on the Tribunal's databases.

The search results are based on analysis against external boundaries of applications only. Native title applications commonly contain exclusions clauses which remove areas from within the external boundary. To determine

whether the areas described are in fact subject to claim, you need to refer to the "Area covered by claim" section of the relevant Register Extract or Schedule Extract and any maps attached.

Search results and the existence of native title

Please note that the enclosed information from the Register of Native Title Claims and/or the Schedule of Applications is **not** confirmation of the existence of native title in this area. This cannot be confirmed until the Federal Court makes a determination that native title does or does not exist in relation to the area. Such determinations are registered on the National Native Title Register.

The Tribunal accepts no liability for reliance placed on enclosed information

The enclosed information has been provided in good faith. Use of this information is at your sole risk. The National Native Title Tribunal makes no representation, either express or implied, as to the accuracy or suitability of the information enclosed for any particular purpose and accepts no liability for use of the information or reliance placed on it.

If you have any further queries, please do not hesitate to contact us on the free call number 1800 640 501.

Regards,

Enquiries

Public enquiry hours are 8.30am to 4.30pm National Native Title Tribunal | Perth Facsimile (08) 9425 1193 | Email enquiries@nntt.gov.au Freecall 1800 640 501 | www.nntt.gov.au Shared Country Shared Future Celebrating 25 Years of Native Title Recognition www.nativetitle25.gov.au

From: <u>Bradly.Snedden@glencore.com.au</u> [mailto:<u>Bradly.Snedden@glencore.com.au</u>] Sent: Monday, 27 November 2017 7:27 AM To: Enquiries <<u>Enquiries@nntt.gov.au</u>> Subject: SR3428 Aboriginal Cultural Heritage Assessment for the Glendell Continued Operations Project

To whom it may concern,

With reference to Glencore's newly proposed Glendell Continued Operations Project, which seeks to extend the life of the existing Glendell mine to approximately 2045, please find attached the initial letter seeking contact details for any Aboriginal groups or individuals with a cultural interest in the Upper Hunter Valley area (Singleton and Muswellbrook Local Government Areas).

Please don't hesitate to contact me at any stage.

Regards Brad

Brad Snedden Coal Assets Australia, Glencore

M; 04 2846 6820 T: 02 6520 2684 E: <u>Bradly,Snedden@glencore.com.au</u>

www.glencore.com

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GLENCORE

04 June 2018

Ryan Carroll Johnson & Darleen Johnson Carroll Murra Bidgee Mullangari Aboriginal Corporation PO Box 246 Seven Hills NSW 2147

Glendell Continued Operations Project Aboriginal Cultural Heritage Values - Methodology

Dear Ryan and Darleen,

Thank you for your involvement as a Registered Aboriginal Party regarding consultation for the Aboriginal Cultural Heritage Assessment (ACHA) for Glencore's Glendell Continued Operations Project (Project). The Project has completed the initial archaeological field work survey component to contribute scientific values to the ACHA and will shortly commence the collation of Aboriginal cultural heritage values as a component of the ACHA, as outlined in our previous letter dated 21 February 2018.

Methodology

The collation and reporting of cultural heritage values will be undertaken by Dr Shaun Canning from ACHM Pty Ltd and the methodology will consist of a series of cultural values workshops focussed on the project area. Key processes to be undertaken at the workshops include the following:

- Review of background cultural heritage information including the cultural heritage information collected and reported previously for the adjacent Mount Owen Continued Operations (MOCO) project ACHA in 2014 - also completed by Dr Shaun Canning.
- Review the outcomes of the initial archaeological field work survey completed in April 2018 by OzArk and RAPs.
- Opportunities to provide historical and cultural values associated with the Project through cultural values workshops and further site visits if required.
- Discussion of potential impacts and the recommended mitigation measures to reduce or manage unavoidable impacts.
- Consideration of other on-site management measures for cultural features that are not to be impacted by the Project.
- Recommended measures to address intergenerational equity in the event that the Project receives approval to proceed.

Workshops will be available for members of the WNAC, the WLALC and all other RAPs. Field visits will also be available if required by RAPs who may not have visited site recently. Following the workshops, draft Cultural Values reports will be circulated to RAPs for 28 days for comment, and final reports will be included as appendices in support of the Aboriginal Cultural Heritage Assessment for Project EIS. The final reports will also be provided to participating RAPs.

In addition, the Registered Native Title Claimants (PCWP) will be providing their advice on Aboriginal cultural heritage values for the Project Area.

Private Mail Bag 8, Singleton, NSW 2330 567 Broke Road, Singleton, NSW 2330 T + 61 2 6570 2416 F + 61 2 6570 2520 www.glencore.com Glencore Coal Assets Australia Pty Limited ACN 163 821 298

GLENCORE

This work will be undertaken in accordance with the Office of Environment and Heritage's (OEH) "Aboriginal Cultural Heritage Consultation Requirements for Proponents" (DECCW 2010), and with regard to the OEH guideline "Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW" (OEH 2011). Arrangements will also be made for confidential or sensitive information to be recorded separately in accordance with guidelines, if requested.

If you wish to comment on the ACHA methodology, your comments must be received by 6 July 2018 via the following:

- By post: PO Box 320, Singleton NSW 2330 or
- via email: Bradly.Snedden@glencore.com.au.

We will be in contact with you again with further details about the cultural values workshops.

If you have any questions, please contact me via the details below.

Regards,

Bradly Snedden Approvals Manager Glendell Continued Operations Project 02 6520 2684

Page 2 of 2



21 February 2018



Glendell Continued Operations Project Aboriginal Cultural Heritage Assessment - Survey Methodology

Dear

Thank you for your registration as a Registered Aboriginal Party regarding consultation for the Aboriginal Cultural Heritage Assessment for Glencore's Glendell Continued Operations Project (Project). The Project seeks to extend the life of the Glendell Mine located between Muswellbrook and Singleton in the Upper Hunter Valley, NSW.

Please refer to the attached Methodology prepared by OzArk Environmental & Heritage Management Pty Limited (OzArk) for further details of the Project Area. It is anticipated that the survey will be conducted in late March to April 2018 and will inform the scientific values component of the Aboriginal Cultural Heritage Assessment Report to be prepared for the Project. An opportunity to provide cultural heritage values will also be facilitated through upcoming Values Workshops to be held in 2018.

In accordance with the Office of Environment and Heritage's Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010, your comments regarding the Methodology must be received by 19 March 2018 via post: PO Box 320, Singleton NSW 2330 or via email: Bradly.Snedden@glencore.com.au.

I will be in contact with you again in March 2018 with further details associated with the survey program, participation and induction requirements along with information associated with upcoming cultural values workshops.

As a separate matter, the Social Impact Assessment and community engagement team from Umwelt (Australia) Pty Limited is currently undertaking the Social Impact Assessment for the Project. As a community member and Project stakeholder you will shortly be contacted by a member of the Social Impact Assessment team, inviting you to a meeting where you can ask questions and share your thoughts on social issues and opportunities associated with the proposed Project. You can contribute your ideas and thoughts in a face-to-face meeting, by phone or by email depending on your preference. For more information, or to schedule a meeting with the Social Impact Assessment team, please contact Kate Davies at Umwelt on 0488 229 179 or send her an email at kadavies@umwelt.com.au.

If you would like to arrange for a site visit to assist in your review of the Methodology or if you have any questions, please contact me via the details below.

Regards,

Bradly Snedden Approval Manager Glendell Continued Operations Project 02 6520 2684

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Environmental and Heritage Management P/L

ABORIGINAL CULTURAL HERITAGE SURVEY METHODOLOGY

GLENDELL CONTINUED OPERATIONS PROJECT Singleton LGA February 2018

Prepared by

OzArk Environmental & Heritage Management Pty Ltd for Umwelt Australia Pty Limited on behalf of Glendell Tenements Pty Ltd

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DOCUMENT CONTROLS

Proponent	Glendell Tenements	Pty Limited				
Client	Umwelt (Australia) F	ty Limited				
Project No / Purchase Order No						
Document Description	Aboriginal Cultural H Operations Project	leritage Survey Metho	odology, Glendell Continued			
	Name	Signed	Date			
Clients Reviewing Officer						
Clients Representative Mar	haging this Document	OzArk Person(s) M	anaging this Document			
		Ben Churcher				
Location		OzArk Job No.				
Document Status V2.1 DR	AFT	Date 13 February 2	018			
Draft V1.1 Author to Editor (Series V1_ = OzArk interr	OzArk 1 ^{at} Internal nal edits)	V1.0 SR author 30/01/18 V1.1 BC edit 1/2/18				
Draft V2.0 Report Draft for (Series V2 _ = OzArk and 0	release to client Client edits)	V2.0 BC incorporates client comments 10/2/18 V 2.1 BC amends figures 13/2/18				
FINAL V3once latest vers by client	sion of draft approved					
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Enquiries should be addressed to OzArk Environmental & Heritage Management Pty Ltd.

Aboriginal Cultural Heritage Survey Methodology: Glendell Continued Operations Project.

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Acknowledgement

OzArk acknowledge the Traditional Owners of the area on which this assessment will take place and pay respect to their beliefs, cultural heritage and continuing connection with the land. We also acknowledge and pay respect to the post-contact experiences of Aboriginal people with attachment to the area and to the elders, past and present, as the next generation of role models and vessels for memories, traditions, culture and hopes of local Aboriginal people.

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1 INTRODUCTION

OzArk Environmental & Heritage Management Pty Limited (OzArk) has been engaged by Umwelt Australia Pty Limited (Umwelt) (the Client) on behalf of Glendell Tenements Pty Limited (Glendell) (the Proponent) to prepare a survey methodology for the Glendell Continued Operations Project (the Project). This methodology is in accordance with Stage 3 of the *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (ACHCRs).

1.1 PROJECT OVERVIEW

The Mount Owen Complex (MOC), which includes the Project Area, is located within the Hunter Coalfields in the upper Hunter Valley of New South Wales (NSW), approximately 20 kilometres (km) northwest of Singleton, 24 km southeast of Muswellbrook. The MOC is situated in the Singleton Local Government Area (LGA) (Figure 1-1).

The MOC includes approved open cut operations in three pit areas, the Bayswater North Pit and North Pit (both approved under the Mount Owen Continued Operations Project consent [SSD-5850]) and the Barrett Pit, approved under the Glendell Mine consent (DA 80/952). The MOC Coal Handling and Preparation Plant (CHPP) washes coal from all three pit areas. The water management system for the MOC is integrated, as well as being linked to the broader Glencore Greater Ravensworth Area Water and Tailings Scheme (GRAWTS). The MOC is approved to process up to 17 million tonnes per annum (Mtpa) run of mine (ROM) coal through the CHPP with production at each of the three pits approved as follows:

- Mount Owen (North Pit) up to 10 Mtpa;
- Ravensworth East (Bayswater North Pit) up to 4 Mtpa; and
- Glendell (Barrett Pit) up to 4.5 Mtpa.

The Project seeks to extend the life of Glendell Mine to 2043, with an increase in extraction rate over the life of the Project up to 10 Mtpa from the current approved 4.5 Mtpa.

Key aspects of the Project include the continuation of the Barrett Pit to the north, the realignment of Hebden Road, the diversion of Yorks Creek and relocation of Ravensworth Homestead (Figure 1-2). The major Project components are summarised in Table 1-1.

Aboriginal Cultural Heritage Survey Methodology: Glendell Continued Operations Project

Project Component	Description		
Extraction limit	Overall increase in extraction rate from current approved 4.5 Mtpa up to 10 Mtpa. It is noted that this will ramp up over the life of the Project as mining operations progress further to the north and as operations at Mount Owen ramp down in accordance with current approvals.		
Project life	Extension of the life of Glendell Mine to 2043 – this presents an extension of 19 years based on the current approved mine life.		
Additional ROM extracted	Approximately 145 Mt.		
Mining areas	Continuation of open cut mining to the north of the existing Glendell Mine.		
Mining method	Open cut using excavator and truck.		
Interactions with other mining operations	Continued integration with MOC in relation to coal handling and transport, water and tailings management, and surface infrastructure.		
Key mine infrastructure	New mine infrastructure area (MIA) to be established or use of existing Liddell MIA. Construction of a heavy vehicle access road to the new MIA or the Liddell MIA.		
Infrastructure relocations	Relocation of part of Hebden Road Relocation of sections of transmission lines and other utilities as required for mine progression.		
Coal handling and processing (CHPP)	Use of existing MOC CHPP infrastructure in the current location. No change to approved CHPP throughput of up to 17 Mtpa ROM coal. Size and location of ROM and product stockpile areas will remain unchanged. Given that the current Mount Owen Continued Operations Project consent authorises the use of the CHPP and associated infrastructure to 2031 (2037 subject to MOD 2 currently under assessment) this Project will need to consider and seek approval for ongoing use of this infrastructure through to 2043.		
Coal Transport	No increase in train movements of up to 1636 trains per year.		
Equipment fleet	Use of existing and additional mining fleet to reflect increase in production and length of mine extension.		
Water management System (WMS)	Extension of existing MOC WMS to Project Area and continued integration with regional water management scheme (GRAWTS).		
Overburden, coarse reject and tailings management	Emplacement of overburden in-pit with areas up to 200 metres to provide variability in the final landform. Out-of-pit emplacement to assist with incorporation of natural landform design elements in final landform. Tailings emplacement within Ravensworth East (West Pit) and regional tailings management scheme (GRAWTS).		
Creek Diversions	Diversion of part of Yorks Creek Swamp Creek catchment diverted to Bettys Creek in final landform.		
Final void	No additional void in final landform although change in size and location of final void. Final void located to the north of approved Barrett Pit void.		
Rehabilitation and final landform	Final landform to be in line with current design standards (e.g. incorporation of natural landform design elements) and regulator expectations for similar recent projects such as the Mount Owen Continued Operations Project and the United Wambo Project.		

Table 1-1: Summary of Key Project Components

Aboriginal Cultural Heritage Survey Methodology: Glendell Continued Operations Project

Project Component Description		
Workforce	Operational workforce expected to increase as production rate increases but will remain within the current approved employment levels associated with MOC. Some short term increases in workforce associated with key infrastructure construction periods.	
Operating hours	No change, 24 hours, 7 days per week.	
Mine access	From the realigned Hebden Road.	
Built heritage	Dismantling and relocation of Ravensworth Homestead to enable continued min progression.	

Aboriginal Cultural Heritage Survey Methodology: Glendell Continued Operations Project

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Figure 1-1. Location of the Project Area.





Figure 1-2. Key Project features.

1.2 PROJECT AREA

All proposed impacts related to construction and operation of the Project will be confined to the Project Area shown on Figure 1-3. The Project Area comprises approximately 2929 hectares (ha) the majority of which is already cleared or is approved for disturbance as part of existing approvals. A large proportion of the Project Area within MOC has been subject to salvage programs.

The topography of the Project Area is characterised by a number of low ridges with spurs and low to moderate gradient slopes. Lower topographic areas are associated with Bowmans, Swamp, Yorks and Bettys Creeks (Figure 1-3Error! Reference source not found.). The creek lines generally flow from the north to the south. Portions of Swamp, Yorks and Bettys Creek have been diverted and/or lost within the Project Area as a result approved mining activities. The Project Area also contains a number of unnamed tributaries associated with the previously listed creek lines which flow between the spurs. In the portions of the Project Area that are outside of approved mining areas, the topography is generally flat ranging between around 60 meters (m) above sea level to small rises that are around 140 m above sea level.

The Project Area has been subject to agricultural land uses, including intensive grazing and pasture improvement, as well as mine related activities. All woodland in the Project Area is regrowth and mature trees are very rare. Figure 1-4 shows the Project Area superimposed on an aerial photo dating from 1958. This shows the almost complete nature of the clearing across the Project Area and large areas of visible sheet wash erosion. Woodland regrowth tends to be thick stands of Casuarina along creek lines and open Eucalyptus woodland on slopes. Other extensive areas within the Project Area have been previously cleared and are still open grasslands currently used for cattle grazing.

Aboriginal Cultural Heritage Survey Methodology: Glendell Continued Operations Project



Figure 1-3: Aerial showing the Project Area and major drainage systems.





Aboriginal Cultural Heritage Survey Methodology: Glendell Continued Operations Project

2 ARCHAEOLOGICAL CONTEXT

2.1 INTRODUCTION

The Project Area is located in an area where the archaeological values are largely known due to the high amount of previous assessment either within the Project Area or in immediately adjacent landforms.

This survey methodology will limit itself to those studies that are directly applicable to the Project Area although the predictive model for site location will consider the broader archaeological context of the district.

2.2 ANTIQUITY OF ABORIGINAL OCCUPATION

The Aboriginal occupation of Australia begins prior to 40,000 BP (years before present) and possibly earlier than 50,000 BP. Dates exceeding 20,000 years occur in almost all parts of Australia resulting in the expectation that most areas should have a Pleistocene (>12,000 BP) occupational signature. However, such dates remain relatively rare due to a range of factors, both behavioural and post-depositional. These factors include a possible low density of occupation in the Pleistocene period, poor preservation of archaeological materials (particularly dateable organic materials) and significant coastline change over the past 18,000 years.

In 1986, Koettig undertook an archaeological survey approximately 6 km southeast of the Project Area between Glennies Creek and Singleton (cited in Umwelt 2003). Following that survey, Koettig carried out several excavations at six locations along Glennies Creek. Koettig considered artefacts found in Site SGCD 16 (about one metre deep in Unit B of on an old alluvial terrace) were 'markedly different' to artefacts recovered from the artefacts in Unit A. Her conclusion was formed on the basis of the raw material used, large number of cores, the large percentage of cortex remaining on artefacts and larger sizes of artefacts. Artefacts from Unit B were from volcanic rocks while those in Unit A were predominantly mudstone and silcrete. Later, a date of >20,200 BP was obtained from a hearth associated with the artefacts placing the site well into the Pleistocene.

2.3 PREVIOUS ASSESSMENTS WITHIN OR NEAR THE PROJECT AREA

There have been numerous archaeological investigations in the local area and a number within the Project Area itself. The results of these investigations provide an archaeological context for the current assessment and were used in the preparation of a predictive model of Aboriginal site location (Section 3). This section refers to archaeological investigations that were entirely or partially within the Project Area and Section 2.4 reviews the salvage programs that have taken place at the MOC.

Aboriginal Cultural Heritage Survey Methodology: Glendell Continued Operations Project

2.3.1 Glendell Mining Lease Area (Brayshaw 1982)

The first survey to interact with the Project Area was by Helen Brayshaw in 1982 (Brayshaw 1982). Brayshaw's survey area included areas within the southern portions of the Project Area including the southern 6 km of Bettys Creek and 5 km of Bowmans Creek. As a result of this assessment, three open sites and two isolated artefacts were recorded. The three open sites (artefact scatters) were recorded as follows:

- Site A: Artefact Scatter. 30 m west of Bettys Creek, principally on the southern bank of a tributary. 43 artefacts were recorded, occurring at an average density of 1/17 square metres (m²). Raw materials present included indurated mudstone 75%, siltstone 2.5%, quartz 2.5% and silcrete 20%;
- Site B. Artefact scatter. On the western bank of Bettys Creek, about 300 m north of the main northern railway. Four flakes were found here at an average density of 1/30 m²; and
- Site C. Artefact scatter. East of a tributary of Bettys Creek about 200 m north of the confluence. Five artefacts recorded, occurring at an average density of 1/24 m².

2.3.2 A Preliminary Assessment of Aboriginal Relics on the area of Foybrook Power Station Project (Dyall 1982)

To the northwest of the Project Area, along the northern reaches of Bowmans Creek, Len Dyall (Dyall 1982) recorded 18 artefact scatters and two grinding groove sites. The artefact scatters were small with the exception of one that contained over 150 artefacts. One grinding groove site was suggestive of a seed processing location rather than for axe grinding. Both grinding groove sites are outside of the Project Area.

2.3.3 Archaeological Survey of Pikes Gully Colliery Area, Liddell, NSW (Haglund 1982)

In the same area of Bowmans Creek and to the northwest of the Project Area, Laila Hagland (Hagland 1982) recorded two artefact scatters:

- Site 1: Aboriginal stone artefacts were noted in a number of exposures within, and along, the edge of a river terrace west of Bowmans Creek. It was noted that the artefacts recorded varied in type, size range and density between the exposures. Small thin flakes and small, well-made artefacts such as bondi points were noted only close to the southern end. Artefact density appeared greater in this part. These observations may reflect real distribution trends, but may also result from the smaller and more shallow areas of exposure further north; and
- Site 2: Aboriginal stone artefacts were noted in two exposures along the northeast bank of Bowmans Creek, northwest of its junction with Stringybark Creek, and within a minor erosion gully on the slope above.

2.3.4 Environmental Impact Statement Mount Owen Coal Project Hebden - New South Wales (Resource Planning 1991)

In 1991 Resource Planning undertook a large assessment for the Mount Owen Coal Project that was focussed on Swamp and Yorks Creeks, located immediately north of the Project Area (Resource Planning 1991). This study included 25 km of drainage line (including left and right banks) along Swamp Creek and Yorks Creek. Traverses were also made across side slopes and along ridge lines. The survey area totalled 370 ha. 98 Aboriginal archaeological sites, ranging from isolated artefacts to dense concentrations of more than 100 pieces of flaked stone. were mapped and recorded. Table 2-1 presents the artefact densities recorded by Resource Planning and this shows clearly that Swamp Creek displays a lower artefact density when compared to Yorks Creek. In the case of Swamp Creek over 75% of sites were isolated finds or very low density artefact scatters while along Yorks Creek 54% of sites recorded over 50 artefacts at each site (a moderate artefact density). Resource Planning noted that the sites in the Swamp Creek catchment are regarded as an excellent representative assemblage of occupational evidence in the small tributary valleys of the Hunter River (Resource Planning 1991: 5). This report recommends, based on the survey evidence "that part of the Yorks Creek drainage line would be set aside as an archaeological conservation zone" (Resource Planning 1991 5): a recommendation that was followed as the northern reaches of Yorks Creek are now within a permanent Voluntary Conservation Area (VCA). The Yorks Creek VCA is located outside the Project Area.

Artefact Numbers	Swamp Creek (%)	Yorks Creek (%)
Isolated Artefact	27.6	9
<10 Flakes	50.0	18
10-20	14.5	18
20-50	6.6	27
50-100	1.3	18
>100		9

Table 2-1: Artefact densities at sites recorded by Resource Planning 1991.

2.3.5 Proposed Mt Owen Extension. Archaeological survey of Bettys Creek (Resource Planning 1993)

In 1993 Matthew Barber, archaeologist with Resource Planning, surveyed areas along Bettys Creek: locations that are now within the current Mount Owen disturbance area to the northeast of the Project Area (Resource Planning 1993). The western boundary of Barber's survey area was defined by the drainage divide between Bettys Creek and Swamp Creek (now no longer extant but can be seen in historic aerial photographs (**Figure 1-4**). The southern boundary was formed by the proposed lease extension boundary. The proposed extension resulted in the disturbance of an additional 260 ha of land, including approximately 100 ha of the then Ravensworth State Forest.

The survey recorded 39 archaeological sites, of which 34 were recorded in detail. It was found that the majority of sites were situated close to the drainage lines and that their location represented a verifiable distribution and was not a bias of survey coverage. It was, however, noted that erosion plays a vital role in the identification of sites. This is because, the report argued, the majority of sites are actually subsurface in origin.

All of the sites recorded were open artefact scatters although their content varied from one artefact to several hundred artefacts. The artefact types appear in the main to be the product of backed blade manufacture (Resource Planning 1993: 4). There were some sites, in the report's opinion, which had a high potential for further archaeological investigations due to their potential to contain subsurface deposits and the quantity of artefacts present. A number of artefacts revealed retouch, the majority of which were classed as part of the backed blade industry. As with other sites in the Swamp Creek area, and other parts of the Hunter Valley, the dominant raw material was indurated mudstone/tuff followed by silcrete.

2.3.6 Aboriginal Archaeological Assessment - Glendell Open Cut Mine (Umwelt 2004)

Umwelt conducted an Aboriginal Archaeological Assessment for the Glendell Open Cut Mine survey area involving survey during September, October and December 2001, as well as geomorphic investigations during May 2002.

The Glendell survey area incorporated sections of Bowmans Creek, Swamp Creek and Bettys Creek and included the southern portion of the Project Area. As part of the archaeological brief, a desk-top study and an in-field reconnaissance were undertaken with the aim of identifying areas within the Glendell survey area that contained Aboriginal resources. The resources sought for identification within the Glendell survey area included fresh water supplies, food and medicine plants, faunal prey species, stone suitable for implement manufacture, areas suitable for camping, areas that provided an extensive outlook, areas with major and minor creek confluences that had often been found to have Aboriginal camp sites and the terrain units that may have acted as pathways between resource locations.

The information compiled was then used to assist in the preparation of a predictive model related to the location and nature of sites within the then Glendell survey area. In addition, past land-use practices and geomorphic studies were used to determine areas where artefactual material may remain in a relatively undisturbed context. Geomorphic studies were also used to investigate a buried soil profile within the shared Bowmans Creek/Swamp Creek floodplain and to determine the likelihood of this soil profile containing artefactual material from the late Pleistocene to early Holocene periods.

As a result of the research it was concluded that the entire Glendell survey area would have supplied adequate resources for small groups of hunter-gatherers living a mobile lifestyle. Bowmans Creek was highlighted as an area that should have formed the focus of camping activities of longer duration, possibly by larger numbers of people, due to an increased abundance and reliability of the resource base.

Other areas, such as the lower western slopes adjacent to Bettys Creek were assessed as having attracted groups of people for short-term visits to harvest abundant seasonal foods. Bowmans Creek was therefore cited as likely to have the largest sites in terms of spatial extent and numbers of artefacts.

Such sites were predicted as likely to be found on the lower slopes, terraces and floodplains along Bowmans Creek, spreading further across the Bowmans Creek/Swamp Creek floodplain. Bettys Creek and Swamp Creek were listed as likely to have evidence of more sporadic and short-term use as overnight camping locations.

A pattern of site distribution was evident from the previously recorded sites in the locale with the majority of sites located along the watercourses (58%). More of these were associated with ephemeral tributaries (30%) than major creek lines and their associated floodplains and terraces (30%). A little more than half (54%) of the sites were within 30 m of the closest watercourse and 66% within 100 m. In relation to the slopes, sites were more commonly located on the foot slopes/lower slopes (18.5%), than the crest/upper slopes (16.6%) and mid slopes (8%).

A total of 37 previously unrecorded sites were located during the 2001 fieldwork survey of the Glendell survey area. The sites consisted of 30 artefact scatters, including one small quarry site with an associated artefact scatter, one scatter in an area with a buried soil profile and seven isolated finds. The Bowmans Creek 5 quarry site was recorded as having an associated artefact scatter as the majority of the artefacts in the site were manufactured from mudstone and silcrete rather than the quartz and quartzite materials available at the site.

The artefact scatter in the area with the buried soil profile (Bowmans Creek/Swamp Creek Trench) was located on the shared floodplain between Bowmans Creek and Swamp Creek. In this area a trench approximately 300 m in length was constructed during the 1980s to divert Swamp Creek into Bowmans Creek. At the time of the 2001 survey the trench was not connected to the creeks and it currently remains unconnected. The artefact scatter eroding from the A-Horizon of the floodplain was observed to be approximately one metre above the buried soil profile. This profile was later determined through geomorphic investigation to be of early Pleistocene to Tertiary age and did not contain any artefactual material (Mitchell 2002).

Artefact analysis of the salvage assemblage recorded:

• Flakes and broken flakes dominated the assemblage (78%), followed by flaked pieces (15%) and cores (3%). Within the flake category, 4% were retouched and half of the retouched flakes were backed. Heat shatter accounted for 3% of the artefacts;

- The mudstone and silcrete flakes were of similar size. Volcanic flakes were generally larger and heavier than flakes composed of other raw materials;
- Volcanic flakes had a significantly higher percentage of cortex than silcrete or mudstone, and mudstone artefacts had a higher percentage of cortex than silcrete;
- Silcrete artefacts had a higher overall rate of retouch than mudstone artefacts (8.2% and 6.3% respectively), and silcrete retouched artefacts were more likely to be backed than retouched mudstone artefacts; and
- A number of artefacts relating to post-European occupation of the area were also recovered, including fragments of glass and pottery. The location of this material closely correlated with concentrations of Aboriginal stone artefacts. Additionally, at least one Aboriginal artefact manufactured from glass was salvaged, suggesting that the area was used by Aboriginal people in the post-contact period.

2.3.7 Environmental Assessment for Modification of Glendell Mine Operations (Umwelt 2007)

In 2007 an Environmental Assessment was undertaken to modify the Glendell Mine Development Consent (DA 80/952) to enable the integration of Glendell Mine operations with the approved MOC operations and the implementation of a revised mine plan.

The assessment noted that a range of surveys of the Glendell Mine site had been undertaken to identify areas and sites of significance in relation to Aboriginal archaeology. Appendix 10 of the Environmental Assessment lists a number of sites that had been previously identified at the Glendell Mine site and have been salvaged in accordance with a permit from the then Department of Environment and Conservation. The assessment stated that the remaining sites within the Glendell Mine site will be protected and managed in accordance with an Aboriginal Heritage Management Plan developed for the site.

2.3.8 Aboriginal Archaeological Values Assessment: Mount Owen Continued Operations (OzArk 2013)

The assessment area for the Mount Owen Continued Operations (MOCO) Project disturbance area covered approximately 500 ha with portions of the assessment area encompassing part of the southern portion of the Project Area.

Australian Cultural Heritage Management Pty Limited (ACHM) were engaged by Mount Owen to undertake Aboriginal community consultation for the MOCO Project and to author the Aboriginal Cultural Heritage Assessment Report (ACHAR) to which OzArk 2014 contributed (ACHM 2013). The ACHM report appeared as Appendix 13a (Parts 1 and 2) of the MOCO Project *Environmental Impact Statement* (EIS) (Umwelt 2015). ACHM 2013 contains the cultural, aesthetic and historic values of the area, while OzArk 2014 contains an examination of the scientific values of the area.

2.3.8.1 Cultural values

ACHM 2013: 114 summarises the cultural values of the area in which the Project Area is located. What follows is an edited excerpt of the MOCO Project Statement of Significance (ACHM 2013: Section 5:10):

It is noted that the numerous Aboriginal stakeholders who participated in this cultural values assessment process hold values which relate to the wider Hunter Valley region generally, and less directly to the MOCO area specifically. However, one of the Knowledge Holder groups holds very strong values over the MOCO area. Other than the one group expressing strong connection to the MOCO area, there was very little other information presented in the disclosed material or values workshops which relates specifically to the MOCO area.

A common theme in many Aboriginal cultural heritage assessments is the proprietary interest members of the relevant Aboriginal communities hold in regard to the wider cultural landscape including archaeological sites or places within any given area. The project is no exception in this regard. Within the context of the current assessment, there are strong on-going connections to places created and used by ancestors alongside demonstrably strong interests in the manner in which those places are managed or harmed as a result of this project. These sentiments are not unique, and must certainly be considered in the overall assessment of the significance of the places in question. The connection to these places is noted as often being relatively unspecific and generally do not appear to relate to any surviving traditional knowledge or customary cultural practices, apart from one of the Knowledge Holder groups who express a strong connection to on-going cultural knowledge and customary lore in this location.

The cultural values expressed by the participants in this assessment have been consistent in voicing an over-arching concern for the wider landscape and criticism of the negative impact of mining on that landscape. Consistent in the material disclosed is a sense of 'outrage' and grief at the treatment of Aboriginal people since First Settlement (dispossession and genocide are mentioned repeatedly) through to more contemporary experiences (i.e. the Stolen Generation).

ACHM 2013: Section 5:10 concludes:

There is little doubt that the wider cultural landscape surrounding (and encompassing) the MOCO area is of high cultural and historical significance to Wonnarua people. The historical associations with early settlement, conflict, dispossession and survival are important, and the nature of the area as a surviving cultural landscape of significance to numerous members of the Wonnarua people

makes this an area of regional and national significance. The regional archaeological record is also of high regional significance. Overall, the cultural significance of the wider region is considered to be high, and requires considerable additional research to fully understand.

2.3.8.2 Scientific values

The archaeological survey for the MOCO Project took place over two weeks from 26 November 2012 to 7 December 2012. The archaeological test excavation program for the MOCO Project took place over one week from 11 March 2013 to 15 March 2013. In 2014, the proposed disturbance area for the MOCO Project was expanded slightly necessitating a further one day of survey that took place on 29 April 2014. The results of these investigations are detailed in OzArk 2014 and contained in Appendix 13b of the MOCO Project EIS (Umwelt 2015).

<u>Results</u>

Large portions of the MOCO Project (223 ha) had been subject to previous Aboriginal Heritage Impact Permits (AHIPs) with extensive areas having already undergone archaeological assessment and salvage. Within the disturbance area, 18 sites had already been salvaged by manual excavation and more expansive additional areas have been subject to grader scrapes to salvage subsurface artefacts. Over the years, both from within the disturbance area and from adjacent landforms, over 11,000 artefacts had already been recovered as a result of these programs.

As a result of the scientific values assessment for the MOCO Project, 39 Aboriginal sites were recorded; consisting of:

- 11 artefact scatters (37-3-1189 to 37-3-1199);
- 25 isolated finds (37-3-1170 to 37-3-1188 and 37-3-1212 to 37-3-1216); and
- Three extensions to previously recorded sites (Extension to site 37-3-0649, Extension to site 37-3-0611 and Extension to site 37-3-0600).

In addition, the disturbance area contained three previously recorded sites, 37-3-0611, 37-3-0985 (low density artefact scatters) and 37-3-0527 (isolated artefact). Thus, 42 sites were known to exist within or close to the disturbance area.

At two locations within the disturbance area, test excavations were carried out under the NSW Office of the Environment and Heritage (OEH) *Code of Practice for the Archaeological Investigation of Aboriginal Objects in NSW.* At one location (37-3-1191), no artefacts were recorded during the test excavations, while at the second location (37-3-1192), 114 artefacts were recorded, with over 80% coming from one discrete concentration. As a result, it was determined that 37-3-1191 is a displaced site with no associated archaeological deposits, while

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37-3-1192 is a low density artefact scatter along the banks of the 'eastern drainage' line with one known concentration of artefacts.

Three sites recorded during the survey, 37-3-1194, 37-3-1197 and 37-3-1198, remain partially extant in the Project Area.

Conclusion

Those archaeological sites in the disturbance area investigated revealed relatively sparse artefact concentrations in shallow and disturbed contexts. Archaeologically, all of the places located and/or identified conform to the Australian Small Tool Tradition¹, and most likely date to no more than the last 2,000 to 3,000 years.

The majority of the disturbance area had been subjected to varying degrees of land clearing and mining since first settlement, destroying the primary context of much of the physical cultural material present, and irretrievably altering the landscape itself.

Given the nature and extent of the archaeological sites identified, there was little additional knowledge which could be added to the archaeological record from any further investigation of this material. There is little probability for the presence of undisturbed and deeply stratified archaeological sites within the disturbance area.

In general, the archaeological sites in the MOCO disturbance area offered:

- Limited research potential in regard to regional and/or localised subsistence and resource procurement activities;
- Limited research potential to address questions on stone tool technologies in the region;
- Limited potential for radiometric dating methods to be applied to the sites;
- Limited research potential to address questions about the timing of the first occupation of this region of the Hunter Valley;
- Limited research potential to address questions about the timing of the Aboriginal settlement history of the Hunter Valley; and
- Limited potential to reveal further unique spatiotemporal patterning which would add to the archaeological record.

2.3.9 Mount Owen Modification 2 (OzArk 2017e)

OzArk was engaged by Umwelt, on behalf of Mt Owen Pty Limited to complete an Aboriginal Cultural Heritage Assessment Report for the Mount Owen Continued Operations Modification 2.

¹ The Australian Small Tool Tradition (also sometimes referred to as 'Bondaian') is a term applied to the Holocene period Aboriginal tool kit; distinguishing it from the earlier Australian Core Tool and Scraper Tradition generally dated to the Pleistocene period.

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The proposed modification disturbance area consisted of two portions: a smaller northern portion on both sides of, and south of, an existing diversion of Bettys Creek (Area A; approximately 9 ha); and a larger portion to the southeast of the current North Pit (Area B; approximately 37 ha). Both areas are to the east of the Project Area.

The fieldwork component of the assessment was undertaken by an OzArk archaeologist and representatives of Registered Aboriginal Parties (RAPs) and Wonnarua Knowledge Holder Groups on 31 August 2017.

No Aboriginal sites were recorded during the assessment. Further, no landform within the proposed disturbance area was seen as having potential to contain further, subsurface archaeological deposits due to the moderate level of disturbance across the proposed disturbance area and the generally thin soils.

MOCO IF-3 (37-3-1198) was the only valid previously-recorded site within the proposed disturbance area. This site was revisited during the site inspection, however, despite good areas of exposure, the artefact was unable to be located. One previously recorded site 37-3-0687 (MC-7) is located outside but close to the proposed disturbance area. This site may be harmed by future erosion stabilisation works along Main Creek and management recommendations regarding this site are made in OzArk 2017e.

2.3.10 Alluvium and Biophysical Strategic Agricultural Land Verification and Mapping (OzArk 2017b, c & d)

In mid to late 2017 and early 2018, OzArk completed five archaeological due diligence assessments of over 100 soil test pit and groundwater monitoring bore locations surrounding Bowmans, Swamp and Yorks Creek for alluvium and Biophysical Strategic Agricultural Land verification and mapping assessments within the Project Area (OzArk 2017b, c & d). Over the five assessments, two new Aboriginal sites (Bowmans Creek 6 and Yorks Creek 19) were recorded and the extent of one previously recorded artefact scatter was updated (#37-3-0748; York Creek 5).

Bowmans Creek 6 was located on a lower slope landform adjacent to a tributary of Bowmans Creek. A total of 12 artefacts were identified, consisting largely of unmodified flakes, with one end scraper and core also recorded. Yorks Creek 19 consists of two flakes recorded on an upper terrace landform near the confluence of Bowmans and Yorks Creeks. In addition to this, one complete flake was recorded along a grazing track in close proximity to #37-3-0748. Given its location on the same upper terrace landform, the artefact was assessed as being an extension to site #37-3-0748. An additional seven artefacts were recorded eroding from the edge of the upper terrace. Site #37-3-0748 was also initially recorded as having potential archaeological deposit (PAD), although it was considered likely to be disturbed by cultivation.
Recorded materials across the three sites were consistent with the predominate materials of the region being mudstone and silcrete, with a volcanic flake also recorded at Yorks Creek 19.

2.3.11 Mt Owen Complex Aboriginal cultural heritage due diligence site inspection results - EL6594, EL8184, ML1629 and ML1415 (EMM 2017)

EMM Consulting Pty Limited (EMM) was engaged to prepare an Aboriginal cultural heritage due diligence assessment for the proposed exploration program across the Project Area. As part of this exploration program, a total of 20 drill holes were proposed.

A field survey of proposed drill locations was undertaken by EMM on 23 May 2017 and no artefacts were identified within the areas of proposed exploration disturbance. In addition, the proposed locations are considered to have low archaeological potential. No additional measures have therefore been recommended in relation to heritage for the proposed drilling program.

2.4 PREVIOUS SALVAGE PROGRAMS WITHIN OR NEAR THE PROJECT AREA

2.4.1 Ravensworth East Archaeological Investigation (ERM 2002)

In 2002 ERM conducted archaeological excavations and salvage grader scrapes over areas of the Ravensworth East Mine under Permit SZ323. These investigates were located in the northeastern portion of the Project Area, in areas along the former course of Swamp Creek (ERM 2002) (Figure 2-1). Table 2-2 lists the six sites salvaged within the Project Area under the 2002 ERM program.

AHIMS#	Site name
37-3-0399	Ravensworth 10
37-3-0398	Ravensworth 09
37-3-0400	Ravensworth 11
37-3-0401	Ravensworth 12
37-3-0402	Ravensworth 13
37-3-0403	Ravensworth 14

Table 2-2. Sites salvaged within the Project Area under Permit SZ323.

The combined geomorphological investigations undertaken by ERM highlighted the Swamp Creek valley as the key area likely to yield archaeological evidence of Aboriginal occupation within the ERM study area. However, these studies also showed that although buried land surfaces were apparent within the valley, evidence of Pleistocene Aboriginal occupation was unlikely to be recovered. Archaeological sampling of soil from these land surfaces failed to yield any archaeological material, confirming this view. In light of this, no further pursuit of Pleistocene archaeological deposits was undertaken within the scope of the excavation program.

The initial archaeological component of ERM's investigation, which included grader scrapes spread over three different landscapes across the valley, at varying distances from water sources, yielded little archaeological evidence. Of the three grader scrapes, three artefacts were recovered over a total area of 560 m².

A low rise adjacent to the swampy meadow channel west of Swamp Creek in the vicinity of surface sites RE 12–14, revealed substantial archaeological material with several artefact concentrations located approximately 40 m to 60 m away from the channel. Test pit excavation yielded an artefact spread up-slope of the channel from approximately 10 m from the current channel edge, extending across the rise in all directions. A total of 87 artefacts were recovered from the 11 test pits. Over a combined excavated area of 11 m², this represents an artefact density of 7.9 artefacts/m². The largest artefact concentration (44 pieces or 50.57% of the total assemblage) was excavated from Test Pit 4 located on the peak of the rise. Without the Test Pit 4 artefact concentration, artefact density would have been substantially lower, at 4.3 artefacts/m², as the majority of test pits contained five artefacts or less. 82.75% of the assemblage was mudstone and 17.25% was silcrete.

Open excavation of the site complex RE 12–14 recovered a concentrated artefact scatter across the peak of the rise within the very shallow A-Horizon soil. Open excavation on this rise was proposed by Margrit Koettig (then at the NSW Department of Environment and Climate Change) to define the apparent spread of artefacts from TP4, and to further establish the nature of this subsurface deposit, specifically to investigate whether it contained hearths and identifiable activity areas. The open area excavation of 86 m² (including TP4) was conducted in July–August 2001 by ERM. 1,168 artefacts were excavated in the open excavation and the investigations revealed a continuation of artefacts over the low rise, rather than what was originally recorded as three individual surface sites. Within this scatter, several distinct areas of artefact concentration were recorded, all with quantities of associated charcoal and burnt earth. The assemblage comprised backed artefacts and associated manufacturing debitage, mostly of mudstone.

Seven raw materials were represented in the open excavation. Mudstone was the dominant raw material observed, accounting for almost 80% of the total artefact numbers. This mirrored the initial trend set in testing phase. Silcrete was the next most common material and comprised nearly 20% of the assemblage. The remainder of the artefacts (less than 2%) was produced from six other raw material types.

Five artefact types were identified in the assemblage. The majority of artefacts were whole flakes accounting for more than 50% of the assemblage with broken flakes (almost 30%) and flaked pieces (approximately 15%) making up much of the remaining assemblage numbers. All modified artefacts, consisting of cores and retouched flakes, made up just under 2% of the assemblage.

2.4.2 Glendell Project Area (Umwelt 2013)

Salvage of the Glendell project area was undertaken under National Parks and Wildlife Services (NPWS) section 90 Consent #2267 and formed Part 4 of the salvage program for the Bettys Creek valley (Figure 2-1). This archaeological salvage within the Glendell project area was conducted by Umwelt and the Aboriginal community between November 2005 and February 2006. Table 2-3 lists those sites within the Project Area that were salvaged under Consent #2267.

AHIMS	site name	Salvage methodology		
37-3-0599	Bettys Creek 9	Surface Collection with Subsurface Investigation (manual excavation)		
37-3-0601	Bettys Creek 11	Surface Collection with Subsurface Investigation (grader scrapes)		
37-3-0602	Bettys Creek 12	Surface Collection with Subsurface Investigation (grader scrapes)		
37-3-0604	Bettys Creek 14	Surface Collection with Subsurface Investigation (grader scrapes)		
37-3-0605	Bettys Creek 15	Surface Collection with Subsurface Investigation (grader scrapes)		
37-3-0606	Bettys Creek 16	Surface Collection with Subsurface Investigation (grader scrapes)		
37-3-0607	Bettys Creek 17	Surface Collection with Subsurface Investigation (grader scrapes)		
37-3-0608	Bettys Creek 18	Surface Collection with Subsurface Investigation (grader scrapes)		
37-3-0609	Bettys Creek 19	Surface Collection		
37-3-0610	Bettys Creek 20	Surface Collection		
37-3-0618	Swamp Creek 1	Surface Collection		
37-3-0619	Swamp Creek 2	Surface Collection		
37-3-0620	Swamp Creek 3	Surface Collection with Subsurface Investigation (grader scrapes)		
37-3-0621	Swamp Creek 4	Surface Collection with Subsurface Investigation (grader scrapes)		
37-3-0622	Swamp Creek 5	Surface Collection		
37-3-0623	Swamp Creek 6	Surface Collection		
37-3-0624	Swamp Creek 7	Surface Collection		
37-3-0026	Glennies Creek Site B / Betlys Creek - B	Surface Collection with Subsurface Investigation (grader scrapes)		
37-3-0625	Swamp Creek 8	Surface Collection		
37-3-0027	Glennies Creek Site C / Bettys Creek - C	Surface Collection with Subsurface Investigation (grader scrapes)		
37-3-0626	Swamp Creek 12	Surface Collection		
37-3-0592	Bettys Creek 1	Surface Collection with Subsurface Investigation (grader scrapes)		
37-3-0627	Swamp Creek 13	Surface Collection with Subsurface Investigation (grader scrapes)		
37-3-0593	Beltys Creek 3	Surface Collection with Subsurface Investigation (grader scrapes)		
37-3-0773	Swamp Ck 10	Surface Collection with Subsurface Investigation (grader scrapes)		
37-3-0594	Bettys Creek 4	Surface Collection with Subsurface Investigation (grader scrapes)		
37-3-0595	Bettys Creek 5	Surface Collection with Subsurface Investigation (grader scrapes)		
37-3-0596	Bettys Creek 6	Surface Collection with Subsurface Investigation (grader scrapes)		
37-3-0597	Bettys Creek 7	Surface Collection with Subsurface Investigation (grader scrapes)		
37-3-0598	Bettys Creek 8	Surface Collection with Subsurface Investigation (grader scrapes)		

Table 2-3. Sites within the Project Area salvaged under Consent #2267.

A total of 2,713 artefacts were recovered from the Glendell project area salvage including 824 (30.6%) from the surface collection, 274 (10.1%) from Excavation 1 (Bettys Creek 10), 19

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(0.7%) from Excavation 2 (Bettys Creek 9), 1,414 (52.1%) from Excavation 3 (Bettys Creek 2) and 177 (6.5%) from the grader scrapes. A total of 2,604 (96%) of the artefacts were recovered from the Bettys Creek catchment, 52 (1.9%) from the Bowmans Creek catchment and 57 (2.1%) from the Swamp Creek catchment.

Observations made from the surface collection assemblage are as follows:

- The highest number of artefacts were collected from Bettys Creek 14 (26.7% of the surface collection assemblage), followed by Bettys Creek 10 (19.5% of the assemblage);
- 60.6% of the artefacts were collected from lower slopes and floodplains associated with creek lines (56.7% from Bettys Creek; 3.3% from Swamp Creek and 0.7% from Bowmans Creek);
- Sites on low but elevated spurs in tributary confluences comprised 22.2% of the assemblage; ridge crests (7.5%); sites on lower slopes on tributary channels more than 150 m from the main creek channel (7.5%); mid slope sites (1.3%) and upper slopes (0.6%);
- The dominant artefact type was broken flakes (45%); followed by flakes (26.7%); flaked pieces (10.9%); retouched flakes (10%), cores (3.7%), heat shatter (3.4%) and grindstones (0.4%);
- A total of 31 cores were recovered from the surface collection. Of these, 21 were recovered from the Bettys Creek sites (17 from areas with tributary confluences with Bettys Creek); and
- Mudstone was dominant within the assemblage making up 58.5% of the artefacts, followed by silcrete (31.9%) with the remaining raw materials making up 9.6% of the total assemblage.

Excavation was targeted at Bettys Creek 2, Bettys Creek 9 and Bettys Creek 10 indicated the following:

- Bettys Creek 10 and Bettys Creek 2 retained a level of spatial integrity reflected by knapping events and raw material distribution patterns;
- Bettys Creek 9 contained artefacts in a secondary context;
- All three locations contained backed flakes;
- A ground oven identified at Bettys Creek 2 had an absolute date of 2188+/-39 BP;
- It was possible to obtain one radiocarbon date of 3077±40 BP (calibrated-Wk-20912) from Square K Spit 3 of Excavation 3 within the Mount Owen Extension Area. The date was relative in nature as it belonged to a large piece of burnt wood that was associated with artefacts both above and below it. Thus the artefacts above it must be dated to later than 3077±40 BP and those below it to earlier;
- Broken flakes (45.7%) dominated the artefact assemblage, followed by flakes (38.7%);

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- Bettys Creek 10 and Bettys Creek 2 were dominated by mudstone while Bettys Creek 9 was dominated by silcrete. Overall, mudstone was dominate (55.7%) over silcrete (32.3%);
- A small knapping event was evident at Bettys Creek 10, with greater amounts of knapping noted at Bettys Creek 2; and
- Core to flake ratios for Bettys Creek 10 were 1:28.7 and for Bettys Creek 2 were 1:27.4 suggesting knapping on site.

As a result of the Umwelt investigations outlined above, today's archaeological landscape, particularly along Bettys Creek, but also along Swamp Creek and Bowmans Creek in the vicinity of the Project Area, has been extensively studied.

2.4.3 Archaeological Salvage. Liddell Coal Operations Development Modification 5 (OzArk 2015)

OzArk was engaged by Liddell Coal Operations (LCO) to undertake the salvage of 15 Aboriginal archaeological sites for Development Modification 5 of DA 305-11-01 and was approved under Aboriginal Heritage Impact Permit (AHIP) #C0000623 (Figure 2-1). The salvage of the sites was undertaken on 28 January 2015 and 24 to 25 February 2015.

Artefacts were retrieved from seven of the 15 sites. A total of 46 artefacts were salvaged across all sites. The majority of the 46 artefacts recovered from the salvage were flakes (73.9%). Other artefact types included cores, flaked pieces, debitage, blades and a core fragment. Almost all artefacts were made from mudstone (56.5%) and silcrete (39.1%). Quartz and basalt artefacts were also present. Most artefacts were at a tertiary (65.2%) stage of reduction, with the rest secondary (34.8%). There were no artefacts at the primary stage of reduction.

The artefacts that were salvaged closely correspond to the regional context. The low proportion of formal tools (just one in 46) and the high percentage of flakes and debitage (76%) in the salvaged assemblage are typical of the region, but this is probably true in most sites across Australia. Mudstone has been recorded to be the most common raw material in the region, which was the case for the salvaged artefacts, and the other materials salvaged are also common.

Details of the two sites in this program that are within the Project Area are listed in Table 2-4.

AHIMS #	Site name	Artefacts salvaged	Notes
37-3-0419	Rav 24 East	12	This site was salvaged by surface collection and grader-scrape salvage. The ground surface visibility (GSV) of 15% is based on pre-grader-scrape visibility. The grader-scrapes added an additional 20% GSV.
37-3-1152	LID 36	1	Rakes were used to remove wood chips from the ground and improve GSV.

Table 2-4. Details of sites within the Project Area salvaged under AHIP C0000623.

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2.4.4 Mount Owen Continued Operations Project Salvage Program (OzArk 2017)

In early 2017 the MOCO salvage program took place under the authority of the 2016 Mount Owen Complex *Aboriginal Cultural Heritage Management Plan* (ACHMP) (XMO SD PLN 0060). This program was completed in the approved disturbance areas associated with the MOCO Project (SSD-5850).

This program included the collection of surface artefacts at 26 sites resulting in 163 artefacts being recorded (Figure 2-1). Included in the tally of 26 sites, were two sites where limited archaeological excavation took place resulting in a further 187 artefacts being recorded. An additional area on the east bank of Bowmans Creek proposed for impact by the new Hebden Road bridge was also subject to archaeological investigation by manual excavation but the area proved to be highly disturbed and no artefacts were recorded.

In addition, there were three sites that were unable to be salvaged, one as it was on land not owned by Mount Owen and two due to the fact that the area of the sites had previously been unintentionally impacted by mining activities². These unintentional impacts were self-reported to the OEH who issued an official caution to Mount Owen on 17 March 2016. Sites salvaged within the Project Area under SSD-5850 are listed in **Table 2-5**.

Site ID	Site Name	Site Type	Number of Artefacts Salvaged	Salvage methodology
37-3-0611	Extension to Bettys Creek 21	Artefact Scatter	4	Surface collection only
37-3-1174	MOCO IF-5	Isolated Find	1	Surface collection only
37-3-1195	MOCO OS-7	Artefact Scatter	0	Surface collection only
37-3-1199	MOCO OS-11	Artefact Scatter	7	Surface collection only
37-3-1211	MOCO IF-18	Isolated Find	0	Surface collection only
	Bowmans Creek East Bank (Hebden Road)	PAD	0	Manual excavation.

Table 2-5. Sites salvaged within the Project Area under SSD-5850.

Of all the sites investigated in the 2017 salvage program, 37-3-1192 recorded the highest artefact density with 71 surface artefacts (43.5% of all surface artefacts recorded during the salvage program) and 186 artefacts recorded in the excavation component of the program (constituting almost all of the artefacts recorded in the excavation component of the program). 37-3-1192 was located on an unnamed watercourse (termed the 'eastern drainage') approximately 2.5 km east of the Project Area. 37-3-1192 was located in area heavily affected by erosion and the investigation showed that while one concentration of artefacts remained *in situ*, the majority of the site had been displaced by the erosion.

² In addition, MOCO OS-3 was unintentionally partially impacted by mining activities and the remainder of this site was salvaged during the salvage program.

Other sites that recorded more than 10 artefacts during the salvage program were 37-3-1191, 37-3-1197 and 37-3-1198. 37-3-1197 and 37-3-1198 remain partially extant within the Project Area. All other sites recorded very low artefact numbers supporting the conclusion reached in OzArk 2014 that the remaining archaeological values at MOC consist of low density, often displaced, artefact scatters.

The recording of these sites affords with the general picture emerging that sites located away from permanent water are likely to have a low artefact density and low site complexity.

Figure 2-1. Location of sites previously salvaged in the Project Area.



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2.5 ARCHAEOLOGICAL CONTEXT: CONCLUSION

The extensive and long running archaeological investigations within and in close proximity to the Project Area indicate that:

- Stone artefact sites (isolated finds and artefact scatters) are the most commonly recorded site types in the area and that other site types, such as culturally modified trees, are very rare or non-existent;
- At the current state of knowledge, only stone artefact sites will be impacted by the Project. Other site types such as grinding grooves or the Bowmans Creek engraving site (Bowmans Ck 16, 37-3-0772) are located outside of the Project Area. In addition, the Yorks Creek VCA is located outside of the Project Area;
- Artefacts tend to associated only with the A-Horizon soil layers indicating a date in the Holocene period (i.e. 10,000 BP to the present);
- The predominant raw materials used for stone artefact manufacture are locally sourced mudstone and silcrete;
- Excavations generally reveal a low artefact density but some spatial patterning has been observed: principally concentrations of artefacts interpreted as 'knapping areas'. Other archaeological features such as hearths are rare;
- Sites tend to be associated with waterways and a discernible pattern has been observed whereby larger sites are associated with larger waterways offering permanent water supplies; and
- While all waterways have been equally studied, Yorks and Bettys Creeks appear to have attracted past Aboriginal occupation more often than Swamp Creek. Bowmans Creek would have been a major focus of past occupation but much of the evidence of this occupation has been removed by major channel migrations or intensive historical land use disturbances such as cultivation.

3 PREDICTIVE MODEL

3.1 BACKGROUND

Across Australia, numerous archaeological studies in widely varying environmental zones and contexts have demonstrated a high correlation between the permanence of a water source and the permanence and/or complexity of Aboriginal occupation. Site location is also affected by the availability of and/or accessibility to a range of other natural resources including: plant and animal foods; stone and ochre resources and rock shelters; as well as by their general proximity to other sites/places of cultural/mythological significance. Consequently sites tend to be found along permanent and ephemeral water sources, along access or trade routes or in areas that have good flora/fauna resources and appropriate shelter.

In formulating a predictive model for Aboriginal archaeological site location within any landscape it is also necessary to consider post-depositional influences on Aboriginal material culture. In all but the best preservation conditions very little of the organic material culture remains of ancestral Aboriginal communities survives to the present. Generally it is the more durable materials such as stone artefacts, stone hearths, shell, and some bones that remain preserved in the current landscape. Even these however may not be found in their original depositional context since these may be subject to either (a) the effects of wind and water erosion/transport: both over short and long time scales or (b) the historical impacts associated with the introduction of European farming practices including: grazing and cropping; land degradation associated with exotic pests such as goats and rabbits and the installation of farm related infrastructure including water-storage, utilities, roads, fences, stockyards and residential quarters. Scarred trees may survive for up to several hundred years but rarely beyond.

3.2 SETTLEMENT STRATEGIES

The large number of archaeological studies undertaken within, and in the vicinity of the Project Area provides information to obtain a sound understanding of the nature and distribution of archaeological sites within the area. Although there is some conjecture about the relationship between stream order, site numbers and densities, the general pattern is that the majority of sites are present within 30 m of watercourses (Dean-Jones 1992: 26–27; AMBS 1997: 29). Although sites are present in locations at a greater distance from water, these sites are limited in terms of both number and size, constituting a lower density scatter than is found along the creek lines (Dean-Jones 1992: 24; ERM 1999: 22–23). The majority of sites are small, with larger sites typically found in association with permanent watercourses. Reduced visibility has been proffered as an explanation for the higher number of sites and artefacts present along the more heavily eroded and less vegetated minor watercourses as compared to major creeks (Umwelt 2004: 7.7; ERM 1999: 84).

3.3 PAST LAND USE

Crucial for the preservation of archaeological deposits is the history of past land use in a particular area. In particular, the European history of the Hunter Valley lowlands, where the Project Area is located, is a stark example of historic land mismanagement leading to wide-spread erosion as the dispersible soils were exposed to rain. On Figure 1-4, for example, the wide-spread sheet wash erosion is noticeable; particularly on the slopes that once existed in the south of the Project Area. While this portion of the Project Area contained more-sloping landforms compared to other areas, it remains indicative of the soil loss that has occurred across the Project Area.

Bowmans, Swamp, Yorks and Bettys Creek have deeply incised channels that are most likely the result of European land-use practices (especially vegetation clearance and overgrazing) in the area and previous studies of the soil profiles exposed in the banks of Swamp, Yorks and Bettys Creeks indicate that these creeks formerly had shallow channels with a chain of ponds morphology (Umwelt 2004).

The drainage depressions and second and third order drainage lines within the Project Area have all been subject to varying degrees of gully erosion. In some areas, erosion has formed gullies up to two metres deep. These destabilised areas have generally also been affected by sheet erosion. Consequently, there has been extensive downslope and downstream movement of topsoil (A-Horizon) and any archaeological deposits it may have contained. With such widespread soil movement it is also important to remember that accumulations of artefacts that may be termed a 'site' today may have, in fact, been washed into that location during the historic period and bear no relationship to past Aboriginal occupation patterns in the area.

Cultivation has impacted the floodplains and terraces of the creek lines and much of the lower slope landforms within the Project Area (see Figure 1-4). Cultivation acts to redistribute artefacts both horizontally and vertically within the soil profile and ultimately destroys the integrity of artefact assemblages within the top 50 centimetres of the soil profile.

More recently, approved coal mining activities, has been the major source of impact within the landscape. Coal mining activities have resulted in the loss of a large portion of Swamp Creek, Bettys Creek and surrounding landforms.

3.4 PREVIOUSLY RECORDED SITES

Due to the history of archaeological investigation in the vicinity of the Project Area, there have been a number of sites recorded either within the Project Area, or in close proximity. 62 sites remain extant within the Project Area (Figure 3-1).

As discussed in Section 2 and below in Section 3.4, the results of previous investigations would suggest that:

- The most common site type will be stone artefact sites; either low density artefact scatters or isolated finds;
- Culturally modified trees will be extremely rare due to the level of historical clearing and the fact that they are a regionally rare site type;
- Grinding grooves will be unlikely to occur in the Project Area as the major creek lines have been subject to previous assessment and it would be expected that these site types would have already been recorded; and
- Other site types such as burials or stone arrangements will be very rare due to the longterm agricultural disturbances that have occurred in the Project Area.

3.5 LANDFORM MODELLING

In the portions of the Project Area that are outside of approved mining areas, the topography is generally flat ranging between around 60 m above sea level to small rises that are around 140 m above sea level. As such, while there are minor variations in the topography of the Project Area, these are not pronounced enough to be mapped in a way that is meaningful for the archaeological understanding of the Project Area.

Formerly, however, in areas that have been largely mined, the topography of the Project Area was comprised of a number of low, generally north-south trending ridges (elevation from 10 to 140 m) with east-west trending spurs and long slopes with a low to moderate gradient. Numerous drainage depressions flowed between each spur, forming first, second and third order ephemeral tributaries of Bowmans, Swamp, Yorks and Bettys Creeks (Figure 1-3).

Swamp, Yorks and Bettys Creeks are all tributaries of Bowmans Creek, which would have been the most reliable water source within the Project Area. The main channels of Swamp, Yorks and Bettys Creek and any associated swamps and billabongs would have provided semi-permanent water sources (Umwelt 2004). The tributary systems of these lower order streams (e.g. first and second order streams) would have only provided an ephemeral water source.

There are many minor creek confluences within the Project Area, however, the only major creek confluence in the Project Area is the confluence of Yorks and Bowmans Creek with the major confluences of both Swamp and Bettys Creek with Bowmans Creek in very close proximity, but to the south of the Project Area. All creeks within the Project Area have some floodplain development, however, only Bowmans Creek has a well-defined terrace sequence. Up to three terrace surfaces are associated with Bowmans Creek within the Project Area.

As such there are a variety of topographic features within the Project Area that would have encouraged past Aboriginal occupation; namely:

• The ridges and spurs would have provided good views along the creek valleys and would have been used as vantage points. However, as the Project Area is now largely

devoid of crests, this landform feature will not influence the distribution or occurrence of archaeological sites in the Project Area.

• The landforms adjacent to Bowmans, Swamp, Yorks and Bettys Creeks have the capability of providing elevated landforms adjacent to water: landforms recognised in the area as having archaeological sensitivity. There is increased archaeological sensitivity at the confluence of Bowmans and Yorks Creeks.



Figure 3-1: Location of valid AHIMS sites within the Project Area.

Aboriginal Cultural Heritage Survey Methodology: Glendell Continued Operations Project.

3.6 PREDICTIVE MODEL FOR THE PROJECT AREA

- <u>Isolated finds</u> may be indicative of: random loss or deliberate discard of a single artefact, the remnant of a now dispersed and disturbed artefact scatter, or an otherwise obscured or sub-surface artefact scatter. They may occur anywhere within the landscape but are more likely to occur in topographies where open artefact scatters typically occur.
 - As isolated finds can occur anywhere, particularly within disturbed contexts, it is predicted that this site type could be recorded within the Project Area. It is noted in Section 2.3 that isolated finds are commonly recorded in the vicinity of the Project Area.
- Open artefact scatters are here defined as two or more artefacts, not located within a rock shelter, and located no more than 50 m away from any other constituent artefact. This site type may occur almost anywhere that Aboriginal people have travelled and may be associated with hunting and gathering activities, short or long term camps, and the manufacture and maintenance of stone tools. Artefact scatters typically consist of surface scatters or sub-surface distributions of flaked stone discarded during the manufacture of tools, but may also include other artefactual rock types such as hearth and anvil stones. Less commonly, artefact scatters may include archaeological stratigraphic features such as hearths and artefact concentrations which relate to activity areas. Artefact density can vary considerably between and across individual sites. Small ground exposures revealing low density scatters may be indicative of background scatter rather than a spatially or temporally distinct artefact assemblage. These sites are classed as 'open', that is, occurring on the land surface unprotected by rock overhangs, and are sometimes referred to as 'open camp sites'.

Artefact scatters are most likely to occur on level or low gradient contexts, along the crests of ridgelines and spurs, and elevated areas fringing watercourses or wetlands. Larger sites may be expected in association with permanent water sources.

Topographies which afford effective through-access across, and relative to, the surrounding landscape, such as the open basal valley slopes and the valleys of creeks, will tend to contain more and larger sites, mostly camp sites evidenced by open artefact scatters.

This site type is likely to be located within landforms of a gentle gradient associated with the main channels of Bowmans, Swamp, Yorks and Bettys Creeks as these are likely to have been attractive camping areas. Smaller sites containing low density and low complexity assemblages are predicted near semi-permanent watercourses (Swamp, Yorks and Bettys Creeks), while the more permanent nature of Bowmans Creek suggests that this creek may have been the focus of more intensive (longer duration) camping which would have produced larger sites with higher density and more complex assemblages. Moderate to steeply sloping landforms are unlikely to have been utilised with lower gradient ridges and spurs being more attractive for camping. The lack of water in these elevated landforms would suggest, however, that camping would have been short-term and that sites would be smaller and contain low complexity assemblages. The high degree of impact from past agricultural practices along the floodplains i.e. cultivation, in the Project Area will probably mean that surface scatters and archaeological deposits are likely to have

become displaced. It would be expected that most sites located would date to the late Holocene (i.e. less than 4,000 years old), the age attributed to the A-Horizon artefact bearing deposits. Although Pleistocene sites contained within B-Horizon sediments may also occur, there have been only one or two instances of Pleistocene deposits being identified in the district and this must be considered a rare eventuality. It is noted that the Project Area already has a number of artefact scatters recorded by investigations over the years. This suggests that many of the larger sites have probably been previously recorded and that the Project Area will probably not record many more large sites.

- Aboriginal scarred trees contain evidence of the removal of bark (and sometimes wood) in the past by Aboriginal people, in the form of a scar. Bark was removed from trees for a wide range of reasons. It was a raw material used in the manufacture of various tools, vessels and commodities such as string, water containers, roofing for shelters, shields and canoes. Bark was also removed as a consequence of gathering food, such as collecting wood boring grubs or creating footholds to climb a tree for possum hunting or bark removal. Due to the multiplicity of uses and the continuous process of occlusion (or healing) following removal, it is difficult to accurately determine the intended purpose for any particular example of bark removal. Scarred trees may occur anywhere old growth trees survive. The identification of scars as Aboriginal cultural heritage items can be problematical because some forms of natural trauma and European bark extraction create similar scars. Many remaining scarred trees probably date to the historic period when bark was removed by Aboriginal people for both their own purposes and for roofing on early European houses. Consequently the distinction between European and Aboriginal scarred trees may not be clear.
 - Due to the near-total clearance of trees from within the Project Area (see Figure 1-4), this site type is not predicted to occur. It is also noted that this site type is very rare at a regional level due to historical tree clearance.
- Quarry sites and stone procurement sites typically consist of exposures of stone
 material where evidence for human collection, extraction and/or preliminary
 processing has survived. Typically these involve the extraction of siliceous or fine
 grained igneous and meta-sedimentary rock types for the manufacture of artefacts.
 The presence of quarry/extraction sites is dependent on the availability of suitable
 rock formations.
 - This site type could be recorded within the Project Area should suitable rock outcroppings be available. One quarry site, Bowmans Creek 5, is located within the Project Area to the north of Swamp Creek (see Section 2.3.7).
- <u>Burials</u> are generally found in soft sediments such as aeolian sand, alluvial silts and rock shelter deposits. In valley floor and plains contexts, burials may occur in locally elevated topographies rather than poorly drained sedimentary contexts. Burials are also known to have occurred on rocky hilltops in some limited areas. Burials are generally only visible where there has been some disturbance of sub-surface sediments or where some erosional process has exposed them.

 Although it is possible that this site type could be found within the Project Area in the alluvial landforms, it is considered a rare site type especially given the disturbance that has occurred within the Project Area.

An examination of the landforms within the Project Area (Section 3.5) indicate that the northern portions of the Project Area is in a degrading environment where soils have been moved from the slopes towards the creek systems where aggrading landforms are evident. This would have the effect of displacing or impacting archaeological deposits had they existed in the north of the Project Area. Landforms adjacent to Bowmans Creek, in particular, are in an aggrading environment. This may mean that archaeological deposits may have become buried, or mixed with artefacts that have washed down from adjoining slopes.

3.7 RESEARCH QUESTIONS

A number of research questions can meaningfully be applied to the investigation of the Project Area. These research questions include:

- What resources were available to the Aboriginal people using the Project Area (food, stone and water)?
- How do the artefact assemblages from the sites along the slopes and ridge crests in the Project Area differ from sites that are located along Bowmans, Swamp, Bettys and Yorks Creeks?
- What tasks were Aboriginal people undertaking at the sites?
- Did the Aboriginal people use the Project Area at any particular time of the year?
- Are there hearths in the area?
- If there are hearths, do they contain remains (animal/plant) that may indicate what people were cooking/eating?
- Are there burials in the area?
- Is there evidence to suggest that Aboriginal people were using the area earlier than the mid to late Holocene?
- Can dates be obtained for the Aboriginal use of the area?
- What resources were transported to the area and where?

The survey methodology set out in Section 4 will be framed to help answer these questions; should sites of sufficient significance be encountered within the Project Area. However, based on the results of previous assessments and past disturbances, it not expected that the Project Area will contain sites of sufficient significance to help answer those research questions that require a robust data set.

Aboriginal Cultural Heritage Survey Methodology: Glendell Continued Operations Project.

4 SURVEY METHODOLOGY

4.1 ASSESSMENT APPROACH

The Aboriginal cultural heritage assessment of the Project Area will follow the *Code of Practice for the Investigation of Aboriginal Objects in New South Wales* (Code of Practice; DECCW 2010). The field inspection will follow the *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in New South Wales* (OEH 2011).

4.2 BACKGROUND

The following archaeological methodology is based on the understanding that portions of the Project Area have been previously surveyed and, in some areas, salvaged as a result of past archaeological assessments and works related to mining approvals. There is, therefore, significant knowledge for much of the Project Area regarding the likelihood of further unidentified Aboriginal objects or sites. In addition, data from previous reports, site cards and permits can be used to interpret the landscape if ground surface visibility is poor to ensure that the archaeological characteristics of the Project Area are understood.

In addition, sizeable portions of the Project Area have been heavily modified by approved mining activities.

All survey will be undertaken with the assistance of RAP/Wonnarua Knowledge Holder representatives. Apart from their valuable experience in recognising and recording archaeological sites, the RAP/ Wonnarua Knowledge Holder representatives will be able to acquaint themselves with the Project Area in order to inform their cultural value assessment of the Project Area. Any cultural values relating to the Project Area will be captured by the OzArk archaeologist (if such information is provided during the survey) and included in the ACHAR to be prepared as part of the EIS for the Project.

4.2.1 Survey methodology

Standard archaeological field survey and recording methods will be employed in this assessment (Burke & Smith 2004).

It should be noted that the aim of any archaeological survey is not to locate each and every artefact in a landscape but to undertake investigations so that the archaeological potential and archaeological characteristics of all landforms within a Project Area are known. Therefore the aims of the survey will be to:

• Reinspect the location of all 62 previously recorded sites that remain within the landscape within the Project Area so that their current condition and scientific heritage values can be assessed;

- Conduct pedestrian transects across targeted landforms in the Project Area so that their archaeological potential can be determined;
- Evaluate whether the predictive model set out in Section 3.6 is valid;
- Determine if the research questions set out in Section 3.7 can be answered;
- Determine if any portions of the Project Area require test excavation in order to understand the archaeological potential at a particular location;
- Undertake sufficient assessment in order to satisfy Sections 2.2, 2.4 (as it pertains to scientific values), 2.5, 2.6, and 2.7 in the *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in New South Wales* (OEH 2011);
- Collecting sufficient data so that the results can be presented in an ACHAR as set out in Section 3 in the *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in New South Wales* (OEH 2011); and
- Undertaking survey and record keeping to satisfy Requirements 1–13 of the Code of Practice.

It is envisioned that fieldwork for the survey would be completed in three weeks with two teams of surveyors consisting of two archaeologists and up to four RAP/Wonnarua Knowledge Holder representatives working concurrently for two weeks, and one team in the third week.

4.2.2 Survey zones

For the purposes of the archaeological survey, the Project Area has been divided into three zones of survey where differing levels of assessment will take place. These zones are set out in Sections 4.2.2.1 to 4.2.2.3.

Figure 4-1 shows a map displaying the various areas of survey priority ranging from areas so heavily modified that they do not require survey, areas of limited survey priority, and areas that warrant full survey. The proposed survey methodology in each area is as follows.

4.2.2.1 Area of high survey priority: 1,000 ha

This assessment area includes approximately 1,000 ha that is classified as 'high survey priority' on Figure 4-1. This constitutes approximately 34 per cent of the Project Area. In this area the major Project components such as the Barrett Pit continuation, the Hebden Road realignment, a potential new MIA, the heavy vehicle access road to the new MIA or Liddell MIA, and the diversion of Yorks Creek will be located (Section 1.1). Although a significant part of the high survey priority area has been subject to survey (over 10 years ago), much of this area is outside of land that has been systematically surveyed in the recent past.

This area includes approximately 2.5 km of Bowmans Creek, 3.5 km of Yorks Creek and 3.9 km of Swamp Creek; all drainage systems with known Aboriginal cultural heritage values. Although culturally modified trees will not be recorded (Section 3.6), this survey area includes the

riparian corridors of Bowmans, Yorks and Swamp Creek areas as disturbance is predicted to be lower in these areas.

Field survey will, wherever possible, be conducted in transects of 100 m intervals (with up to six surveyors spaced 10 m apart). If field conditions do not allow straight transects some areas may be investigated more opportunistically where exposures and/or vegetation allow. Areas of higher archaeological potential such as the banks of waterways such as Bowmans, Yorks, Swamp and Bettys Creeks will be fully inspected by pedestrian transects along both banks. This will ensure that this survey zone is systematically assessed.

If areas have significant levels of ground cover and pedestrian survey is considered by the archaeologist and RAP/Wonnarua Knowledge Holder representatives to yield no results, then assessment will be made, based in part on knowledge gained from past archaeological research in the area, of the potential of the area to have Aboriginal artefacts present.

4.2.2.2 Area of low survey priority: 208 ha

This area contains generally flat landforms surrounding Bettys Creek (Figure 4-1). This area constitutes approximately 7 per cent of the Project Area.

This area has been extensively surveyed in the recent past, including more recently for the MOCO Project. As this area has been extensively surveyed, the archaeological characteristics of this area are largely known. In addition, the Project does not propose to disturb extensive areas within this portion of the Project Area. The only planned disturbance in this area is in the northern portion of the low survey priority area and is to enable the final landform to drain into Bettys Creek (Figure 1-2).

This area will not be inspected by formal transects but will focus on areas of exposure where archaeological material may be visible. Further definition of the Project Design may also narrow the survey area within this area.

Survey in this area will use the experience of the archaeologist and RAP/Wonnarua Knowledge Holder representatives to target areas that they feel will yield the best information. Survey will also be concentrated in the area where the final landform drainage is planned.

4.2.2.3 Area of modified landforms: 1,607 ha

This area has been highly modified by approved mining activities and includes open cut pits, waste emplacements, dams, buildings and other surface infrastructure (**Figure 4-1**). This constitutes approximately 55 per cent of the Project Area.

Due to the highly modified nature of these landforms, they are extremely unlikely to contain archaeological sites and no survey will take place in this area.

Aboriginal Cultural Heritage Survey Methodology: Glendell Continued Operations Project.

4.2.2.4 Approved disturbance areas: 110 ha

Small portions of land within the Project Area (approximately 110 ha or 4 per cent of the Project Area) are not included in any of the three zones described above as they are in areas where approval to disturb has been consented but the disturbance has not yet occurred (Figure 4-1). These approvals are either part of the Glendell Mine consent (DA 80/952) or the MOCO Project consent (SSD-5850). As these areas have been previously assessed and approval to disturb has already been consented, these areas will not be subject to survey.

4.2.3 Test excavation

It is possible that the survey may identify landforms where test excavation under the Code of Practice (Requirements 14–17) is required. Should such landforms be identified during the survey, the test excavation methodology will be prepared as a separate document that will be circulated to all RAPs for review and comment.



Figure 4-1: Aerial showing areas of survey priority.

Aboriginal Cultural Heritage Survey Methodology. Glendell Continued Operations Project.

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16 March 2018



Dear

Re: Glendell Continued Operations Project Aboriginal cultural heritage values assessment – ongoing consultation and fieldwork details

Introduction

Thank you again for registering your expression of interest to be consulted in relation to the Aboriginal archaeological values impact assessment for the Glendell Continued Operations Project (the Project).

Later in the year we will be commencing the Aboriginal cultural heritage values assessment with a series of cultural values workshops that will provide opportunity for your input. This assessment provides greater insight into values, opportunity to discuss potential management measures and greater involvement in consultation. This will include an opportunity to visit the area and be presented with a summary of the fieldwork.

Ongoing consultation will continue for the duration of the Project and the offer to all Registered Aboriginal Parties (RAPs) or knowledge holders remains if you would like to visit the Project Area or provide information associated with Aboriginal objects or places of cultural value at any stage to please contact Glendell representatives to arrange a visit.

In regards to fieldwork, we would like to confirm that the Aboriginal Archaeological Assessment - field survey component is now scheduled to occur between: $9^{th} - 13^{th}$ April 2018, $16^{th} - 20^{th}$ April 2018 and 30^{th} April – 4^{th} May 2018.

This provides an opportunity to participate in the field survey component of the assessment.

It is noted that in accordance with Section 3.4 of the Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010, consultation should not be confused with employment. In this regard, a rostered fieldwork schedule will be developed for the field assessment and participants will be reimbursed for their time. If you would like to participate in the field survey component please complete the attached Registration of Engagement and further information.

> Private Mail Bag 8, Singleton, NSW 2330 567 Broke Road, Singleton, NSW 2330 T + 61 2 6570 2416 F + 61 2 6570 2520 www.glencore.com

Glencore Coal Assets Australia Pty Limited ACN 163 821 298

Fieldwork Details

The following information is provided for those RAPs who would like to participate in the fieldwork activities. Depending on the final number of participants, a rostered fieldwork schedule will be developed. Your service provider will contact you to confirm your allocated days.

General

Work Period	9 th – 13 th April 2018
	16 th – 20 th April 2018
	30 th – 4 th May 2018
Work Hours	8am to 4pm
Meeting Location	Ravensworth East Offices (transport to survey site will be provided)
Access to Site	All fieldwork participants are required to complete an Archaeological Investigation - Temporary/Short Term Induction at the commencement of their first shift
	All fieldwork participants are required to sign on and off daily at the Ravensworth East Offices

Safety Requirements

All fieldwork participants must ensure they have the following personal protective equipment and personal items:

- Hi-Vis long sleeved shirt and trousers
- Protective eyewear/sunglasses
- Boots with ankle support
- Hard hat with wide brim attachment
- Gloves
- Sunscreen
- Rain jacket
- Drinking water (additional drinking water will be available)
- Lunch and morning/afternoon tea (esky will be available for storage)

Site restrictions and Expectations

Mount Owen Complex is a Glencore managed site and all fieldwork participants should note:

- Smoking is not permitted anywhere on site or within the Glendell Continued Operations Project Area
- Mount Owen Complex is a zero alcohol site and all employees and contractors are required to complete a BAC prior to entry
- Mobile phones or other electronic devices are not permitted onsite during the survey. They will be permitted for use during the morning tea/lunch/afternoon tea breaks only.

Way forward

Page 2 of 4

In order to confirm your participation in the fieldwork, please complete the attached Registration of Engagement form provided at the end of this letter. The completed Registration of Engagement should be provided to Bradly Snedden at the details below by **29 March 2018**. Please then contact your preferred Service Provider to arrange involvement in the upcoming fieldwork.

If you have any questions, please contact me via the details provide below.

Yours sincerely,

Bradly Snedden Project Approvals Manager Glendell Continued Operations Project

02 6520 2684 Bradly.snedden@glencore.com.au

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Glendell Continued Operations Project

Aboriginal Cultural Heritage Assessment

Registration of Engagement

DETAILS

Full Name:		
Address:		
Phone Number:		
Mobile Number:		
Email Address		
Name of Organisation:		

I wish to participate in the archaeological field survey associated with Glencore's Glendell Continued Operations Project.

	Sign Initials
I am generally fit for outdoor fieldwork activities and have no medical illness or injury that would prevent my involvement	
I have read and understood the requirements to participate in the field assessment	
I agree to be engaged in cultural heritage assessment and survey through the following supplier:	
Hunter Valley Aboriginal Corporation (HVAC)	
Wonnarua Nation Aboriginal Corporation (WNAC)	
Tocomwall Pty Ltd (PCWP)	

I certify that the information provided on this form is true and correct.

Print Name: _____

Signature:_____Date: ____

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11.3.8 Archaeological Survey Participants

	Week 1			Week 2				Week 3				
	09/04/2018	10/ <u>04</u> /2018	11/04/2018	12/04/2018	13/04/2018	16/04/2018	17/04/2018	18/04/2018	19/04/2018	20/04/2018	30/04/2018	01/05/2018
WNAC	Maree Waugh	Georgina Berry	Tracey Skene	Georgina Berry	Georgina Berry	Maree Waugh	Georgina Berry	Georgina Berry	Maree Waugh	Tracey Skene	Tracey Skene	Tracey Skene
Tocumwal	Johnny Phillips	Johnny Phillips	Johnny Phillips	Johnny Phillips	Johnny Phillips	Johnny Phillips	Johnny Phillips	Johnny Phillips	Johnny Phillips	Johnny Phillips	Johnny Phillips	Johnny Phillips
	Mary Franks	Mary Franks	Mary Franks	Mary Franks	Mary Franks	Scott Franks	Scott Franks	Scott Franks			Mary Franks	
HVAC	John Matthews	John Matthews	John Matthews	Allen Paget	Allen Paget	George Sampson	George Sampson	George Sampson	Dave Horton	Cliff Johnson		George Sampson
	Darrell Matthews	Darrell Matthews	Darrell Matthews	Zaccariah Lakier	Zaccariah Lakier	Ashley Sampson	Gregory Sampson	Gregory Sampson	Darcy Dole	Allen Paget	Shaun Carroll	Gregory Sampson
	Colleen Stair	Colleen Stair	Colleen Stair	Paulette Ryan	Paulette Ryan	Paulette Ryan	Darcy Dole	Dave Horton	Zaccariah Lakier	Darcy Dole		
	Rhonda Ward	Rhonda Ward	Allen Paget	Katrina Cavanaugh	Katrina Cavanaugh	Chad Cowan	Chad Cowan	Zaccariah Lakier	Paulette Ryan	Rhonda Ward		
	Cliff Johnson	Cliff Johnson	Rhonda Ward	Cliff Johnson	Cliff Johnson	Shaun Carroll	Shaun Carroll	Katrina Cavanaugh	Katrina Cavanaugh	Kyle Johnson		

11.3.9 Archaeological Survey 28 Day Review Feedback from RAPs

Group/Organisation	Abbreviation	Contact Person	Agree with Methodology	Methodology Comment
Culturally Aware		Tracey Skene	Yes	No Concerns
Lower Hunter Aboriginal Incorporated	LHAI	David Ahoy	Yes	No Concerns
Kevin Duncan		Kevin Duncan	No	Objects to all mining
JLC Cultural Services		Jenny Chambers	Yes	No Concerns



25 July 2018

Laurie Perry PO Box 3066 Singleton Delivery Centre NSW 2330

Glendell Continued Operations Project Aboriginal Cultural Heritage Values Workshops

Dear Laurie,

Thank you for your involvement as a Registered Aboriginal Party (RAP) regarding consultation for the Aboriginal Cultural Heritage Assessment (ACHA) for Glencore's Glendell Continued Operations Project (Project). The initial archaeological field work survey component has been completed in collaboration with OzArk archaeologists and the RAPs for the Project. In addition to OzArk's assessment, the ACHA Report is also now being prepared by Shaun Canning from Australian Cultural Heritage Management (ACHM). **Figure 1** below outlines how the ACHA Report integrates with the overall Aboriginal cultural assessment being completed for the Project.

A significant component which provides important contribution into the ACHA Report is the undertaking of Cultural Values Workshops particularly associated with capturing the values associated with the Project Area. These Workshops have now been scheduled and this letter provides you with further information in this regard.



Figure 1 Integrated Aboriginal Cultural Heritage Assessment Approach

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Glencore Coal Assets Australia Pty Limited ACN 163 821 298

Cultural Values Workshops

Cultural Values Workshops have now been scheduled for the Project. Separate workshops will be conducted to enable knowledge holders and members of the Aboriginal community the opportunity to participate in a smaller, more personalised, forum. Please see the details below providing information as to the arrangements for your workshop.

Indicative Itinerary

Cultural Values Workshop Date – Thursday 2nd August 2018

11:50pm-12pm	Meet at Ravensworth East Offices for log-on and site induction
12pm	Leaving vehicles at Ravensworth East, we will boards a bus that will take everyone to Glendell Mine.
12:15pm – 12:45pm	Survey results overview (Ben Churcher – OzArk)
12:45pm – 2:30pm	Site tour of the Project Area, in bus provided
2:30pm – 4:00pm	Workshop and discussions (afternoon tea available) at Glendell Mine Training Room.
4:00pm	Return to Ravensworth East Mine and Log-off site (required)

Participation Reimbursement

We appreciate your attendance and acknowledge the time required to participate. Accordingly, you will be reimbursed for your attendance based on a half days work plus travel expenses. Invoicing will be facilitated by your previously nominated supplier.

General Information

The following provides additional information for participants who would like to attend the Cultural Values Workshop.

Meeting Location	Ravensworth East offices, Hebden Road
Access to Site	All participants are required to complete an induction
	All participants are required to sign on and off at the Damstra terminal at
	Ravensworth East Mine

Site restrictions and Expectations

Mount Owen Complex is a Glencore managed site and all participants should note:

- Smoking is not permitted anywhere on site or within the Project Area
- Mount Owen Complex is a zero alcohol site and all employees, contractors and visitors are required to complete a blood alcohol content (BAC) test on arrival
- Mobile phones or other electronic devices are not permitted onsite during the site tour. They will be permitted for use during the breaks only
- Hi Vis clothing and enclosed footwear is required for the site visit

Private Mail Bag 8, Singleton, NSW 2330 567 Broke Road, Singleton, NSW 2330 T + 61 2 6570 2416 F + 61 2 6570 2520 www.glencore.com

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Attendance Registration

To confirm your attendance at the Cultural Values Workshop please **RSVP by Monday 30 July 2018** via the following:

- By post: PO Box 320, Singleton NSW 2330, or
- via email: Bradly.Snedden@glencore.com.au

If you have any questions, please contact me via the details below.

Kind regards,

Bradly Snedden Approvals Manager Glendell Continued Operations Project (02) 6520 2684

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11.3.11 Cultural Values Workshop One – WLALC Attendees and Minutes

Glendell Continued Operations Project Meeting record and action list

Cultural Values Workshop - WLALC

Meeting Date: 31" July 2018 (AM)	Location: Glendell Training Room
Attendees	
Colleen Stair (CS) - Crimson Rosie	John Matthews (JM) - UHHC
Rhonda Griffiths (RG) - HVAC	Shaun Canning (SC) - ACHM
Margaret Matthews (MM) - ANTC	Ben Churcher (BC) - OzArk
David Horton (DH) – Gomeri C/C	Bradly Snedden (BS) - Glencore
George Sampson (GeS) – Cacatua	Ben Kemp (BK) - Glencore
Greg Sampson (GrS) – AGA	Bridie McWhirter (BMc) - Umwelt

Ite	m	Action	When required
•	BC provided an overview of the archaeology assessment and the field survey completed in April and May 2018, the test excavation methodology and explained the plan ahead for the test excavation program. BC added that the Glendell Continued Operations Project site is very different in comparison to the Mangoola site, for example Mangoola has no interaction with creeks.		
7	Site four completed to familiarise the RAPs with the landform and visit potential sites in the upcoming test excavation program		
•	SC gave an overview of what the ACHAR will cover and outlined it will include cultural heritage and archaeology.		
	SC raised the importance of aboriginal interaction with the Ravensworth Homeslead SC stated importance of finding contact sites which will be a focus for OZArk and Casey and Lowe, however evidence of contact is difficult to find SC traised the importance of the connection with the Macarthurs. RG added that her family have a connection to the Macarthurs and will get in contact with her sister to find out more information for the next workshop.	5.1	
•	SIC added that after the test pitting results 28 day notification period, another workshop will be held to discuss values		
•1	SC raised the topic of massacres in the area: The topic is current as Lyndell Ryan has done work out of Newcastle Uni on massacres in the area Question over massacres on site which were existing questions from MOCO approval process No closer to understanding massacre inside yia on single place can be identified that they occurred and no specific information has been found. SC added that unless something comes out of this project, the results will remain the same as MOCO,		
1	SC raised the need to come up with recommendations to be included ACHAR SC added that high level recommendations which apply across the region or company are not achievable for the project, but need to be more locally focussed and realistic for the project to achieve. SC added that he will bring together all recommendation together from the three groups into the ACHAR		

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Glendell Continued Operations Project Meeting record and action list

Cultural Values Workshop - WLALC

Ke	tem .		When required
Ï	SC suggested that there may be scholarship opportunities similar to what was included in MOCO. Opportunity to make the scholarship wider than environmental science or archaeology, which was the MOCO contenor. on RG added that scholarships are something we should be looking at.	-	-
• •	SC raised that not everyone wants to go to university or is ready to go and that there is potential to bridge the gap between school and university and support other programs such as talle courses, high school program or apprenticeships. RC added that there is a need for something in the high schools for boys as there is existing girls programs for example the girls academy at Muswellbrook High School		
•	SC raised the idea of offsets and their difficulty in being of use or value to the abonginal community as they are typically fragmented of land with notimited access allowed. RG added that for the offsets to be useful, they need to be one decent percel of land instead of a number of small fragments of land		
•	SC stated that Glencore don't have an appetite for inventing programs but would rather invest and support existing programs RG mentioned that she would investigate what local existing programs need funding. RG added that there is a need to go into high schools as that is where our future is		
•	RG raised the issue of the keeping place and suggested that there is separation of groups SC added that the diversity of groups being multinational companies, multiple shires and multiple aboriginal groups who would have to agree to come to a decision w RG added that there is culture and heritage that we are missing out on because we can't come together to salvage for future generations.	1.0	
è	RG raised issues with the Umbrella Agreement and its fairness. SC suggested that the group consult with Tim Wells in this regard as it cannot be solved in this forum and is not a part of this discussion.		

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11.3.12 Cultural Values Workshop One – Unaligned RAP Attendees and Minutes

Glendell Continued Operations Project Meeting record and action list

Cultural Values Workshop – Unaligned RAPs

Meeting Date: 1" August 2018 (AM)	Location: Glendell Training Room
Attendees	
Jenny Lee Chambers (JC) - JLCCS	Shaun Canning (SC) - ACHM
Allen Paget (AP) - Ungooroo	Ben Churcher (BC) - OzArk
Duane Sharpley (DS) - Muragadi	Bradly Snedden (BS) - Glencore
Jordan Ponting (JP) - Murrabidgee	Ben Kemp (BK) - Glencore
Bridie McWhirter (BMc) - Umwelt	

Ite	m	Action	When required
•	BC provided an overview of the archaeology assessment and the field survey completed in April and May 2018, the test excavation methodology and explained the plan ahead for the test excavation program.		
•	Site tour completed to familiarise the RAPs with the landform and visit potential sites in the upcoming test excavation program		
÷	SC gave an overview of what the ACHAR will cover and outlined it will include cultural heritage and archaeology.		
•	SC reised the need to come up with recommendations to be included ACHAR SC added that high level recommendations which apply across the region or company are not achievable for the project, but need to be more locally focussed and realistic for the project to achieve. SC added that he will bring together all recommendation together from the three groups into the ACHAR	·	
-	SC suggested that MOCO almed high for many recommendations which may not have been achievable and there is a need to bridge the gap from high school to university as not all will want to go to university. SC added that there is podential for programs in aeither ages, for example Clontarf. SC mentioned that Glencore would prefer to invest in existing programs to gain instant traction and there is better value out of existing programs SC suggested that there should be a focus on three key themes for recommendations - employment opportunities, business opportunities and education.		
	AP raised the guestion that if another group or RAP wanted to start up a business, do you have to let them. SC suggested it is a case by case basis and it is dependent on the individual. SC added that there is a need to bridge the gap between running a business and having the ability to do it and therefore, creating opportunities for traving to bridge this gap is important		
•	SC suggested Glencore's appetite is to ensure programs around resources skills are optimised, through supporting education and upskilling instead of handing out jobs or businesses etc. SC added that its likely Glencore would prefer pay for education through courses and training so that they can gain the right skills and then potentially gain jobs from training, AP provided the example of Ungocroo Medical centre in Singleton.		
•	SC raised the issue of offsets The Hildcrest property was raised as an example where no one from aboriginal communities have had involvement in SC added that the aim is to avoid these situations		

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Glendell Continued Operations Project Meeting record and action list

Cultural Values Workshop – Unaligned RAPs

llem	Action	When required
 SC added that after the test pitting period, another workshop will be held to discuss values SC suggested that everyone go away and consider recommendations BS suggested that the previous MOCO recommendations be put up during next workshop 		

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11.3.13 Cultural Values Workshop One – Hickey Family Attendees and Minutes

Glendell Continued Operations Project Meeting record and action list

Cultural Values Workshop - Hickeys

Meeting Date: 1" July 2018 (PM)	Location: Ravensworth East Offices
Attendees	
Luke Hickey (LH) - HVOS	Shaun Canning (SC) - ACHM
Mick Stair (MS) - HTO	Ben Churcher (BC) - OzArk
Ben Kemp (BK) - Glencore	Bradly Snedden (BS) - Glencore
Bridie McWhirter (BMc) - Umwelt	

Item		Action	When required
•	BC provided an overview of the archaeology assessment and the field survey completed in April and May 2018, the test excavation methodology and explained the plan ahead for the test excavation program. • LH questioned whether the scarred tree within the Project Area is alive or dead	BC to confirm whether scarred tree is alive	TBC
•	LH raised that the text excavation methodology is not clear enough and suggested that transects should occur at 5m intervals instead of 10m. LH added that if the intervals occur at every 5m then no significant sites are missed. BC added that he will investigate if there areas appropriate for 5m intervals.	BC to investigate whether 5m intervals are appropriate for test pitting	31/8/2018
•	Site four completed to familiarise the RAPs with the landform and visit potential sites in the upcoming test excavation program		
÷	SC gave an overview of what the ACHAR will cover and outlined it will include cultural heritage and archaeology		
÷	LH raised that their aim is for self-employment and indigenous wellbeing		
•	LH raised that there is not enough land on the valley floor. It is rare and endangered and so is the water source. LH added that the issue is the mining is coming and going and leaving it as is. LH raised the Hillorest property as an example.		
-	LH raised the concern of previous projects and not getting what they were promised in previous times. SC stated that we need to come up with a strategy to focus on recommendations which are achievable for the project. LH stated that funding for the mens group is needed. LH added that they don't want the money, they want the opportunities.		
•	SC added that after the test pitting period, another workshop will be held to discuss values SC suggested that everyone consider recommendations for the next workshop		

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11.3.14 Cultural Values Workshop One – WNAC Attendees and Minutes

Glendell Continued Operations Project Meeting record and action list

Cultural Values Workshop – WNAC

Meeting Date: 2"" August 2018	Location: Glendell Training Room
Attendees	
James Wilson-Miller (JWM) - WNAC-WEC	Laurie Perty (LP) - WWAC
Arthur Fletcher (AF) - WNAC	Georgina Berry (GB) - WNAC
Richard Edwards - WNAC-WEC	Maree Waugh (MW) - WNAC
Sandra Miller (SM)- WNAC	Rhoda Perry (RP) - WNAC-WEC
Rae Reed (RR) - WNAC	Shaun Canning (SC) - ACHM
Kerry Phillips (KP) - WNAC	Ben Churcher (BC) - OzArk
Paul W Hinton - WNAC	Ben Kemp (BK) - Glencore
Garry Phillips-Reilly (GPR) - WNAC	Bridie McWhirter (BMc) - Umwelt

Ite	m	Action	When required
	BC provided an overview of the archaeology assessment and the field survey completed in April and May 2015, the test excavation methodology and splained the plan whead for the test excavation program. • AF stated that they want to be involved in the creek diversion from the beginning. BS suggested there could be a working bee for involvement		
•	Site tour completed to familiarise the RAPs with the landform and visit potential sites in the upcoming. lest excavation program		
•	SC gave an overview of what the ACHAR will cover and outlined it will include cultural heritage and archaeology	1.00	
	SC raised the idea of offset areas and questioned whether they work from a cultural point of view due to their difficulty in being of use or value to the aboriginal community as they are typically fragmented of land with nonlimited access allowed. Af raised that the community should have input from the beginning in regard to offset areas. SC stated that this could be a recommendation in the ACHAR LP stated that cultural offsets do work as he has had experience with them working with Glencore previously.	h	
	LP stated that they are trying to stay in the community culturally.		
•	SC added that after the test pitting period, another workshop will be held to discuss values and suggested that everyone consider recommendations for the next workshop. LP raised issues over funding to get together to talk about recommendations due to the widespread locations of members.		
•	LP raised issues regarding the Umbrella Agreement. SC suggested LP talk to Tim Walls for this matter as it is not the right forum and cannot be solved as part of this workshop.		

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3 September 2018



Re: Glendell Continued Operations Project – Invitation to Cultural Values Workshop #2

Introduction & Project Update

Thank you again for your ongoing involvement in relation to the Aboriginal Archaeological Values Impact Assessment for the Glendell Continued Operations Project (the Project).

As you are aware, the Aboriginal Cultural Heritage Field Survey was completed between 9 April and 1 May 2018. A test excavation program is also scheduled to take place from 3 to 21 September 2018.

Both assessments have been prepared in collaboration with OzArk Archaeologists and Registered Aboriginal Parties (RAPs) for the Project. In this regard, a draft *Aboriginal Archaeological Impact Assessment* (AAIA) report is currently being prepared by OzArk and a copy will be mailed out to you for review and comment in the coming months.

Cultural Values Workshop Session 2

In addition to the field surveys completed to date, the first of the Cultural Values Workshop sessions were held during July and August 2018 with assistance from Dr Shaun Canning from Australian Cultural Heritage Management (ACHM).

A further Cultural Values Workshop, to be held over two days, is now proposed to enable additional opportunity to participate in roundtable discussions regarding cultural knowledge or values you may wish to provide. Following recent feedback, and given that the Mangoola Coal Continued Operations Project is completing a similar assessment, this workshop will be jointly run with members of the Mangoola Coal Continued Operations Project Team to ensure clarification is provided across both projects.

Please see the details below regarding the arrangements for the Cultural Values Workshop.

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Meeting Date, Location and Details

Workshop Date:	Tuesday 18 and Wednesday 19 September 2018	
Location: Room	Charbonnier Hunter Convention Centre – Lower Chameleon	
	44 Maitland Road, Singleton	
Time:	8:30 am to 4:00 pm	
Service:	Lunch and morning/afternoon tea will be provided (<i>please indicate</i> any special dietary requirements)	

Participation Reimbursement

We appreciate your attendance and acknowledge the time required to participate. Accordingly, you will be reimbursed by your previously nominated supplier (WNAC) for your attendance based on a full days work (\$550) plus travel expenses (\$50), totalling \$600 for each day attended.

Attendance Registration

To confirm your attendance at the Workshop, please RSVP by 10 September 2018 to:

Contact: Catherine Fenton (Approvals Officer) Email: catherine.fenton@glencore.com.au Phone: (02) 6520 2686 Post: PO Box 320, Singleton NSW 2330

Way Forward

If you would like to participate in the Cultural Values Workshop please provide your RSVP by 10 September 2018. We will then contact your previously nominated supplier to confirm your attendance and to permit invoicing.

If you have any questions, please feel free to contact me via the details provided below. I look forward to seeing you at the workshop.

Kind Regards,

Bradly Snedden Approvals Manager - Glendell Continued Operations Project (02) 6520 2684

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Cultural Values	What can projects do to make up for the loss of country?	
Cultural Values	Are the next attingent share in the project area important to you?	
cultural values	Are the post-settlement places in the project area important to your	
Reconciliation	What do you think projects should consider to assist the reconciliation process?	
Cumulative Impact	Can you tell us what you think the cumulative impacts of this project might be?	
Cultural Heritage Protection	Is the protection of cultural heritage places important to you?	YES
		NO 🗆
		Why?
Cultural Heritage Protection	How could cultural heritage places be mitigated if protection is not an option?	
Intergenerational Equity	What types of programs do you think are important to Wonnarua people to create intergenerational equity opportunities?	Education
Intergenerational Equity	What types of programs do you think are important to Wonnarua people to create intergenerational equity opportunities?	Education Equity Capacity Building
Intergenerational Equity	What types of programs do you think are important to Wonnarua people to create intergenerational equity opportunities?	Education Equity Capacity Building Training Capacity Building Capacity Capacit
Intergenerational Equity	What types of programs do you think are important to Wonnarua people to create intergenerational equity opportunities?	Education Equity Capacity Building Training Site Conservation Works Business Opportunities
Intergenerational Equity	What types of programs do you think are important to Wonnarua people to create intergenerational equity opportunities?	Education Equity Capacity Building Training Site Conservation Works Business Opportunities Offsets
Intergenerational Equity	What types of programs do you think are important to Wonnarua people to create intergenerational equity opportunities? What specific education programs would you like to see?	Education Equity Capacity Building Training Site Conservation Works Business Opportunities Offsets All of the Above
Intergenerational Equity	What types of programs do you think are important to Wonnarua people to create intergenerational equity opportunities? What specific education programs would you like to see?	Education Equity Capacity Building Training Site Conservation Works Business Opportunities Offsets All of the Above
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	What specific business opportunities would you like to see?		
	How do you think equity can be created during the project(s)?		
Other Matters	What other matters do you think should be addressed by this process as part of the Giendell or Mangoola Projects?		
NAME:	Aboriginal Cultural Values W	Torkshops DATE:	
NAME: The purpose of 11 Heritage Assessm	Aboriginal Cultural Values W is form is for you to write down any values or recommendations that you nit Report for the project. The form is divided into several themes and topics	Torkshops DATE: Would like to see considered for incorporation in the A	boriginal Cult
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11.3.17 Cultural Values Workshop Two – Attendees

Glendell Continued Operations Project and Mangoola Coal Continued Operations Project Meeting record and action list

Cultural Values Workshop # 2

	Wonnarua Nation Aboriginal Corporation	(WNAC)
Meeting Date: 18 th September 2018 (Day 1)		
Attendees		
James Wilson-Miller (JWM) - WNAC-WEC	Laurie Perry (LP) - WNAC	Alice Hinton Bateup (AHB) - WWAC
Arthur Fletcher (AF) – WNAC Elder Chair	Georgina Berry (GB) - WNAC	Lee P Perry (LPP) - WNAC
Richard Edwards – WNAC-WEC	Maree Waugh (MW) - WNAC	Tom Miller - WNAC Elder
Sandra Miller (SM)- WNAC	Rhoda Perry (RP) - WNAC-WEC	Tracey Skene (TS) - WNAC
Kerry Phillips (KP) - WNAC	Lee Hinton (LH) - Chair WNAC	Kevin Hinton (KH) - WNAC elder
Paul W Hinton – WNAC	Noeline Bell (NB) - WNAC	Patricia Burns (PB) - WNAC
Garry Reilly (GR) - WNAC Director	Maxine Conaty (MC) - WNAC	Jason Martin (JM) - Glencore
Bradly Snedden (BS) - Glencore	Shaun Canning (SC) - ACHM	Lori Dennen-King (LD) - Glencore
Bridie McWhirter (BMc) - Umwelt		

Ito	m	Action	When required
·	JM provided an overview of the Mangoola Project and the outcomes of the archaeological fieldwork completed to date	 Provide ecology reports to WNAC members 	On hold until reports
•	RP raised the extent of stakeholder consultation- suggested that it's a shame anyone can put in their values. RP also questioned whether there would be a time that Glencore can inform OEH that there will only be two groups to consult with. SCz dded that NSW legislation doesn't allow this process and the consultation guidelines are there so that no discrimination occurs against anyone.		complete
•	BS provided an overview of the Glendell Continued Operations Project and the outcomes of the archaeological fieldwork completed to date and a broad overview of the Ravensworth Homestead. BS also noted that the archaeological test pitting process did not find any artefacts at the Homestead.		
•	The significance of Ravensworth Homestead to indigenous people was raised. For example it is located on indigenous land, its proximity to St. Clair and the relationships with the Macarthurs. JVM suggested that it is a sacred site of significance for indigenous men and women. JVM added that it is significant to them even though it's not indigenous heritage. RP added that they knew the people who worked there and lived there.		
•)	BS suggested that if Giencore do not get approval to relocate the Homestead, a possible outcome is to mine around the Homestead. It was added that the Wambo Homesteadd hasn't been moved and mined around and was not a good outcome.		
•	The number of indigenous people in the existing workforce at Mount Owen Complex was questioned. It was added that training, development and employment opportunities for indigenous people is needed.		
•	It was stated that in 1904, people from St Clair Mission worked at the Homestead and therefore there is over 100 years of aboriginal history associated with the Homestead. RP added that they used to go to the surgery in Singleton in the 1940's which shows the connection with the Bowman's		

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Glendell Continued Operations Project and Mangoola Coal Continued Operations Project Meeting record and action list

Cultural Values Workshop # 2

llem.		Action	When required
•	RP stated that we need to tread carefully for future generations as what are we going to be leaving them.		
÷	JM raised that 25 archaeological sites will be harmed as part of the Mangoola Project and added that a portion of the Mangoola site which has high significance of archaeological sites is being fenced off and offset. It was then raised by WNAC members that offset sites should be locked up more permanently and access to the land should be provided.		
•	WNAC members suggested that they would like to read the ecology report for both Mangoola and Glendell Continued Operations Project. BS and JM stated that the ecology reports are not complete but could be provided when complete. MC added that they want to know the plant species which are on the land as plants have cultural values and knowledge about uses and medicinal uses.		
•	LP reised the need for offsets for cultural values and land for growing bush plants and tucker. LP added that they need to own their own land to grow the plants on.		
•	SC raised the idea of scholarships and their implementation through the Mount Owen Continued Operations Project which provided three archaeological scholarships SC added that the scholarships need to be broadened and not just available for archaeology.		
•	LH suggested that health programs are needed in the community. The access for elderly is also an issue with an aging population. For example mobility scooters and sleep apnoea machines.		
	LH raised education as an issue in the indigenous community such as keeping up to date with technology. For example, some of the older generation do not know how to research on the internet or send emails and elders need to be taught compassionately.		
•	LH guestioned the level of aborginal employment in the Giencore workforce and suggested that WNAC would like to see an increase. LH added the importance of school based fraineeships and school based apprenticeships as some individuals may not want to go to University, but through a school based program they could achieve a qualification before they leave school. LH suggested that school based traineeships should be a corporate based initiative with specific targets for each region:		
•	LH stated that there is an existing program called 'Career Trisckers' which is a non-profit organisation which creates intern opportunities for indigenous university students. LH added that training is needed to allow for better transition and creating opportunities for employment after training.		
	LH suggested funding and support for indigenous sportspeople at the grassroots level. RP added that support is needed in sport as there are a lot of young indigenous sportspeople e.g. touch footballers.		
•	It was raised that there needs to be an indigenous careers path because there is a facilitation step missing between training, education and employment		
1	It was raised that there are three different mines (United. Mangoola. Glendell) with three different scope of works. LP stated that the WNAC objectives are aligned with their membership base and use. LP added that WNAC focuses on their membership base not at a local level as some members hip out of area.		-

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Glendell Continued Operations Project and Mangoola Coal Continued Operations Project Meeting record and action list

Cultural Values Workshop #2

	Wonnarua Nation Aboriginal Corporation	(WNAC)
Meeting Date: 19 th September 2018 (Day 2)		
Attendees		
James Wilson-Miller (JWM) - WNAC-WEC	Laurie Perry (LP) - WNAC	Alice Hinton Bateup (AHB) - WWAC
Arthur Fletcher (AF) – WNAC Elder Chair	Georgina Berry (GB) - WNAC	Lee P Perry (LPP) - WNAC
Richard Edwards – WNAC-WEC	Maree Waugh (MW) - WNAC	Tom Miller - WNAC Elder
Sandra Miller (SM)- WNAC	Rhoda Perry (RP) - WNAC-WEC	Tracey Skene (TS) - WNAC
Kerry Phillips (KP) - WNAC	Lee Hinton (LH) - Chair WNAC	Kevin Hinton (KH) – WNAC elder
Paul W Hinton - WNAC	Noeline Bell (NB) - WNAC	Patricia Burns (PB) - WNAC
Garry Reilly (GR) - WNAC Director	Maxine Conaty (MC) - WNAC	Jason Martin (JM) - Glencore
Bradly Snedden (BS) - Glencore	Shaun Canning (SC) - ACHM	Lori Dennen-King (LD) - Glencore
Bridie McWhirter (BMc) - Umwelt		

Ite	Item				When required
8	SC initiated discussion of the Ravensworth Homestead and asked WNAC members to provide any thoughts or values they hold towards the Homestead	-			
•	RP stated that a number of descendants worked on the farm and that they do have a connection to it. LP added that everyone is trying to save it but where will it go. LP added that it needs to be moved onto land that is never going to be mined and that the cultural significance needs to be maintained. BS stated that it will move onto land where no mineable resource lies under. JWM added that indigenous cultural heritage to the Homestead needs to be maintained as it is part of their story.				
•	It was suggested that once the Homestead is relocated, that the house could be used as a museum, a keeping place, training centre.				
÷	WNAC members agreed that the preservation of the nomestead is important - would rather it be moved than be destroyed by leaving it in situ for destruction by dust and vibration.				
•	WNAC members agreed that the preservation of the homestead is important - would rather it be moved than be destroyed by leaving it in situ for destruction by dust and vibration.				

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Glendell Continued Operations Project and Mangoola Coal Continued Operations Project Meeting record and action list

Cultural Values Workshop #2

Item	Action	When required
LH provided a presentation on the strategic direction of WNAC and potential opportunities for funding from Glencore to assist in WNAC's direction. WNAC are planning on completing a membership census to determine what skills, education completed, employment situations, medical conditions exist within WNAC which will outline where the gaps are and then can determine the strategic direction to take. LH stated that the education fund agreement that WNAC which will outline where the gaps are and then can determine the strategic direction to take. LH stated that the education fund agreement that WNAC which will one ldet technology and access to one quipment, replacement of outlated services, illetacy and numeracy programs. The health fund agreement that WNAC currently have with Centennial expires in 2020. WNAC are seeking Glencore to take over the heagteement to provide support and funding to eldet technology and access to a quipment. replacement to provide support and funding to eccess to high tech live saving equipment (e.g. sleep spnces, dabetes), coordination of intergenerational workshops. Employment options for individuals predominately less than 25 years which would then allow training for employment opportunities. Small business development program including cert IV in business management, start-up capital grant including a business coach/mentor. This will allow the individual to develop a business plan and gain the knowledge and understanding whether the business will be value. Small business development optical lister-up businesses. Sporting fund – WNAC currently mas an agreement with Centernial knows too is con using storing bundses. Sporting fund – WNAC currently mas an agreement with Centernial hocus ses on national and intermational sporting funding. Supporting fund – WNAC currently mas an agreement with Centernial hocus ses on national and intermational sporting funding. Supporting fund – WNAC currently mas an agreem		

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Glendell Continued Operations Project Meeting record and action list

Cultural Values Workshop #2

Unaligned RAPs – Glendell Continued Operations Project			
Meeting Date: 21 st September 2018	Location: Singleton Diggers Club		
Attendees			
John Matthews (JM) - UHHC	Jenny Chambers (JC) - JLCCS		
Margaret Matthews (MM) - ANTC	Rhonda Ward (RW) - UCCS		
Collen Stair (CS) - Crimson Rosie	Aliera French (AF) – Aliera French Tradi Shaun Canning (SC) - ACHM		
David Horton (DH) - Gomery C/C			
George Sampson (GeS) - Cacatua	Noel Downs (ND) - Wanaruah LALC		
Greg Sampson (GrS) - AGA Services	Catherine Fenton (CF) - Glencore		
Rhonda Griffiths (RG) - HVAC	Bridie McWhirter (BMc) - Umwelt		

Ite	m in the second s	Act	lion	When required
•	SC introduced the Project and gave a brief overview of the purpose of the workshop and suggested that the focus be on cultural values associated with Ravensworth Homestead as that is the main difference between the Glendell Continued Operations Project and the Mangoola Project in terms of cultural heritage. Broader values from the group were previously captured in meeting held Monday 17/9	·	Send copy of community information sheet to attendees	5/10/18
•	ND stated that the Wanaruah Local Aboriginal Land Council placed a submission in for the Ravensworth Homestead to be relocated to Sedgefield			
•	RG stated that her great grandmother was brought up at Camden Park and that could be a contact as it was through Macarthur's daughter (Mary). RG added that it cannot be confirmed as she has not been told any stories but suggests its likely through the connection with Camden Park			
•	Agreed that the Ravensworth Homestead would be better to go somewhere that it can be used, rather than left to detenorate. However there is no known direct lines of connection back to the homestead			
•	AF asked what would be done differently if there was known aborginal connection of the Homesteed, SC stated that it adds to the complexity of the place and increases significances. SC added that it changes how it will be documented more than anything else.			
•	ND added that the archaeological area surrounding the Homestead is significant and the buildings represent what happened to aboriginal people			
•	RG stated that if the Homestead is relocated, it needs to be meintelined as there is no point otherwise as you are not conserving it. RG added that it would be nice to see it restored.			
÷	Issue of community access was raised - Hentage assets get locked up and become inaccessible			
÷	CF mentioned that a community information sheet on the Revensworth Homestead was previously issued but can be supplied to anyone who would like a copy			
•	ND referenced and read an excerpt from a book called 'Dawn in the Valley' by W. Allan Wood which contains references to the area	_		

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11.3.18 Workshop Two Questionnaire Responses

Topic/Theme	Question	Respondent 1	Respondent 2	Respondent 3	Respondent 4	Respondent 5	Respondent 6	Respondent 7	Respondent 8	Respondent 9	Respondent 10	Respondent 11	Respondent 13	Respondent 14	Respondent 15	Respondent 16	Respondent 17	Respondent 18	Respondent 19	Respondent 20	Respondent 21	Respondent 22
Cultural Values 1	Do you or your family have any specific cultural knowledge or values that you would like to share regarding the GCOP Additional Project Area (e.g. cultural values, historic values, scientific and/or aesthetic values)?	My family's connection to this land goes back many generations. The land is the lifeblood of all of us and flows through us.	Yes.	We do have cultural knowledge and connections to this area. Our families lived and worked on this land.	As part of my role as an Aboriginal site worker, to me cultural values are high, same with the historic values.		Only what my Mother and Grandmother and my other Uncle.	Cultural, scientific.	Cultural, i.e. Gringai/Wonnaru a, settler history in general. These aspects are important in disseminating knowledge to 'mines' for future mining developments.	As you should know land is very important as we believe we belong to the land. Changes to the land is changes to our culture. My great great grandmother walked the land free.	Family ancestral members roamed around this area which includes Sarah Madoo and her children and grandchildren.	The LALC hold cultural knowledge for this area. Place names. Some information about the family clan group. Whose country it was. This group was moved from the area in the 1850s to (the crossing) before being dispersed to Breza and St Clair in 1860s.		All good.			Eatens Family. Mainly song line.	Extended family knowledge passed down from elders. The edge of song line.	Extended family knowledge passed down from elders.	Have walked the land and have family associated with the land.	Yes, family have connection to the land, by working, cultural connections.	
Cultural Values 2	If you answered no, to the question above, do you know anyone who does hold knowledge or values over the protected area?		Jimi Miller.				Yes. My Elders of Wonnarua Nation, of the knowledge that they hold, re: Wonnarua People, that have been passed down by my Grandmother and other close relatives.	Yes, I do. Victor Penny, Laurie Perry James Miller.	There are many cultural knowledge holders whose knowledge of history, heritage and cultural value vary. Please be aware of these concerns.	Most of our Wonnarua people/families and some have more knowledge, e.g. Jimmy can speak our language in its true form, others know of sites.	Yes. Family members.	The Wedgetail Eagle was the clan totem. Milyane/Wanthal a.					(Respondent ticked this box)	(Respondent ticked this box)	Yes.			
Cultural Values 3	Are you satisfied that the archaeological assessment undertaken for the project is comprehensive and fit for purpose?	If I knew to what extent the assessment was completed, I could comment better. But I must ask how deep the assessment was done.	Yes.	I am dissatisfied with some archaeologist s on some project.	Mostly, but more cultural values should be understood, heard and respected. Hopefully this should happen as soon as possible.	Yes.	Of no concern to me, as a lot of our artefacts have been moved - relocated to other areas due to soil erosion and changing weather patterns, storms producing floods that have moved some.	No. because there is new technology that exists today which can verify in depth if artefacts are there?	As long as Indigenous interpretations are included, I see no problem.	Depends on who the archaeologist is working for.	Not really, still a feeling of loss.	Would like to see a lot more work done researching local historical records to fill in gaps and/or confirm existing knowledge.		Free land.		Yes survey wise but not the test pitting.	(Respondent ticked this box)	Yes, it is comprehensive	Yes.	Would like to have more impact and a say in where the excavation pits are dug.	No on scientific level, yes but on a cultural level it should have had a separate cultural report this would have saved us doing this questionnaire, allowed. Traditional owners to have more input from beginning of assessment allowing us to choose the archaeologist.	
Cultural Values 4	What are the most important parts of the landscape to Aboriginal people?	For me the Hunter River, Redonberry Hill and St. Clair hold significant importance.		Being able to walk over, around, the land is a very important part of our real connection to land and our families.	All the landscape including flora and fauna, mother earth and water.	All country in important.	All found in the Hunter Valley is important to me it is part of my Aboriginal Identity.	The land itself, rehabilitatio n restored back to its original landscape.	Redbourneberry Hill, Hunter River, St Clair, and Glennies Creek.	The whole its our land and its going to be torn up for money not for the betterment of Wonnarua families.	Water ways, sites of significance land/water ways.	All of it. Mostly those where people hunter gathered, slept, educated and entertained. Water ways and habitat for staples, e.g. possum, eels, water rush, grasses.				Waterways.	Shelters.	Shelter used for weather	Rivers, creeks, shelters.	The whole land itself! Everything. It all tells a story of our people.	The whole landscape is important to us it holds spiritual and cultural connections. It leaves behind our ancestors' artefacts that therefore show connection of them being on the landscape. It plays hand in hand with the associated cultural landscape that overall tell the story of the landscape.	
Cultural Values 5	What recommendations in relation to migration should Glencore consider in relation to the potential impacts of the Project?	To ensure future generations can appreciate the natural environments and their connection to it.			Resources of all descriptions and 24-hour access. Help for elders and families.	Mining activities destroy country. Nothing can be done - country is destroyed.	None.	All of the above.	Mitigating truthfully with local designated Indigenous community by investigating program whereby positive outcomes will benefit all concerned. Training in most areas of employment, education, training and identified Indigenous positions.	Reimbursement to the Wonnarua families WNAC members and it should not be a spit in the bucket	Loss/homestead re. our family ancestry.	Cultural protection areas need to be formalized. Wybong and Big flat Creek. 100- 200m either side for sight at that owned by GCOP.	Nil.			Funds made available for cultural education of the immediate community of the impact the project causes.	Management control.	That shelters protected, by blasting. Salvage of all artefacts.	All artefacts to be salvages in the impact area.	To listen to us more and not treat us like idiots.	If the landscape is in harm's way and all precautions have been exhausted and that there is no way of protecting it then mitigation method of having compulsory input by from beginning being part of decision making. By taking more voluntary steps	Repatriatio n to within project areas.

Mitigation I II f t t t	Mitigation H	Cultural Heritage Protection B	Cultural I Heritage o Protection A A	Cumulativ e Impact	Cultural V Values 6	
What types of programs do you think are important to Wonnarua people	How could cultural heritage places be mitigated if protection is not an option?	What protection options are necessary, if any?	Is the protection of cultural heritage places important to you?	Can you tell us what you think the cumulative impacts of this project might be?	Are post- settlement/Europea n heritage places important to you? If so, how?	
Education. Equity. Capacity building.			Yes. To ensure that our future generations have access to and understand their heritage.		Yes, they created the built environment we live in today, it signifies our modern history and deserves to be respected.	
Education. Capacity building. Training. Site						
Education. Equity. Capacity building.	If protection and safe guards are not in place.	Safeguarding our artefact material. Look at a keeping place. Look at lease of landowners to protect the artefacts.	Yes. Keeping our C/H - Histories, storyline, and songs.	Destruction of our land mass. But there is still cultural values associated with this land.	Yes, most definitely. Because of family connections, family environment and a workplace.	
forever. Education. Equity. Capacity building.	On a pro rata of 2:1 of land area, the places should be nominated and identified by the people as highly significant places to be protected and mitigated	Are our voices truly being heard in a respectful way from governments including local, state, government?	Yes. For our future generations and us. To be as healthy and our value to the community.	Positive: Potentially training and employment in many fields, looking after elders. Targeted employment for Aboriginals and their families. Negative: Environmenta l and health concerns.	Yes they are and always because its part of us and I acknowledge time has changed and we have to accept and adopt.	
Education. Equity. Capacity building.	A facility under the guidance of the Wonnarua elders, to preserve and display cultural artefacts uncovered.	Once mining destroys it is gone.	Yes. Spiritual identity.	Loss of country. Loss of wildlife. Loss of connection to country.	White settlement is only of value where Koori participation in involved.	
Education. Training. Business opportunities.	Consultation with the Mine's People, to try and achieve the best outcome for my people.	The area of land known as 'Redbourneberr y Hill/Reserve' situated just on the outskirts of Singleton.	Yes. All cultural heritage to do with Wonnarua Nation on Wonnarua Land is important to me.	Just the long term affects that result in the health of Wonnarua People especially affecting our elders that are still living on this land.	Anything to do with European takeover of Wonaarua Land situated in the Hunter Valley is not important to me.	
Education. Capacity works. Training.	Out the window.	I can't do too much about it?	Yes.	Loss of identity.	No, not really.	
Education. Equity. Capacity building. Training. Site conservation	Relocation of post contact heritage structures must be considered at all costs.	A surety of mines, that ongoing projects are protected by ongoing strategies which benefits local community more, if mining interest are wound down!!	Yes. There are sites which are shared sites. Glennies, Bowman's Creeks, St Clair, a relocated Bowman's Cottage.	All positive outcomes of this project should benefit all associated with it. Patterns of reciprocity should at all times be adhered to on equal terms.	Yes! Many post contact, culture clash buildings do have special significance with certain Indigenous groups, not all, i.e. Bowman's Cottage, St Clair Mission, church, school, etc.	
Education. Equity. Capacity building. Training. Site	We should go to the OEH, DPE local council, State and Commonwealth government ministers.	Fenced off. Moved to WNAC land e.g. St Clair.	Yes. We need them to keep our culture alive.	Trying to employ Aboriginal workers. Pay WNAC. Infighting of Wonnarua people and non- Wonnarua people.	No Europeans don't hold our culture to any value, and they should. Only place our ancestors used e.g. Ravensworth Homestead.	
Education. Equity. Capacity buildings. Train in g. Site conservation works. Business operations	Compensate to retain cultural integrity.	Cultural camps for our children, grandchildren and great grandchildren.	Yes. Keep them intact for our future generations.	Loss/flora/fauna/land/rive rs system.	No not really.	
Education. Equity. Capacity building. Training. Site conservation	Investment into Aboriginal community education. The Upper Hunter needs an Aboriginal community controlled cultural education unit.	Cultural burning is effective for hazard reduction as well as rehabilitation. Sustainability of water ways and habitat to continue the local cultural resources. 100-200m either side of creeks. Cultural management practices.	Yes. Stupid question.	Further destruction and impact to the cultural landscape.	As it applies to the ongoing history of Aboriginal people. Jimmy Blacksmith lived through this area.	
Education. Equity. Capacity building.			Yes.			
Education. Equity. Capacity buildings.			Yes.			
Education. Equity. Capacity building.			Yes.			
Education. Equity. Capacity building.		Fencing. Educating the GCOP employees about Aboriginal culture and sites, so no harm accidently occurs. Monitoring of sites to ensure ongoing protection. Signs being put up reminding GCOP employees that this specific area is protected and it is not to be disturbed.	Yes. Because it is a part of our cultural history, destroying the cultural heritage sites would be equivalent to burning history textbooks. It would be erasing our cultural history of these sites are destroyed.	Mainly environmental for animals and local communities health wise. Culturally the whole Project has significantly destroyed a large part of the cultural landscape.	Yes of course its still our history even though it can sometimes be painful.	
Education. Equity. Capacity building.	Education. Access sites.	Fence to protect.	Yes. Important.		N/A.	
Education. Equity. Capacity building.	Relocate artefacts to area for education purposes. Education for all.	That all site be protected or freed. Free to be salvaged as management of RAPS.	Yes. We have lost a significant amount over time all places are significant to my people.	Loss of sites for educational purposes. Already low in this case.	None.	
Education. Equity. Capacity building. Training.	Salvage, offset areas.	Fencing.	Yes. All sites are important to Aboriginal people.	Loss of sites.	No.	
Education. Equity. Capacity building.	To record and keep all our cultural information.	To be part of the process from start to finish.	Yes. Because our culture should be respected a lot more than it is now.	Broken spiritual connection, sadness seeing the process happen.	Yes, it has a connection with us.	
Education. Equity. Capacity building.	Having the right to thoroughly retrieve all cultural information from the landscape and document it on a cultural perspective.	Maybe by having a small panel of knowledge holders sitting alongside Glencore on decision making of the land they propose to mine and having the right to have report of what happens to their cultural land.	Yes. It is our culture and connection to the land our grass roots to our ancestor's past.	Our culture is inextricably linked to the environment and that any impact to our cultural sites and landscape is like taking a page out of oral history stories.	Yes, some areas such as homestead hold importance to us as it is connected to our stories of the land, oral history, etc.	relations with communities.

Mitigation III	What specific education programs would you like to see? What specific capacity building programs would you like to see?	Training and employment quotas to assist in social equity and ensuring future generations are adequately skilled to succeed.	School programs. Language programs. Archaeologica I site training. Business - start up.	Need job specific training and qualifications with a demand so that there in always working opportunities . Minimum 12 months employment to get on their feet. As above.	Care and control? Specific signed agreement for fund, management and reporting. Integration Equity: Funding for research to reconnect.	Integration equity.	Care and control? Training for kids.	Care and control? Care and control, before and post of potential mining intergentation equity for perpetuity Realistic policy developments which foster and nurture realistic outcomes.	Care and control? Computers, scholarships outside of mining, arts, sports, small business, exclusion within language, technology, schools.	Care and control? Elder of the nation keeping up with systems technology and training. Cultural camps. Sports at high level. Juvenile justice, working with children programs. Cultural healing.	Care and control? Cultural engagement. (respondent ticked Integration Equity) Cultural education unit to deliver up to Cert. 2 level. Courses to engage community \$2 million over 3-4 years.		Fu up Ab he ce Mi (Ti mi (Ti mm fu fu fu fu fu fu fu fu fu fu fu fu fu	unds to set p an boriginal ealth care enter in luswellbrook. art fund the MS and eplicate in luswellbrook. This is what is nost mportant to le). unds towards towards cegirls cademy rogram at luswellbrook. unds towards CYC programs or young digenous ustralians.	Care and control? Training. (Respondent ticked this box)	Care and control? Access to all artefacts, all sites, important trails.	(Respondent ticked care and control and integration identity).	Care and control? And conservation museum for artefacts.	Care amd control? Conservation and land- horticulture programs, management ecology, GIS program learns mapping. Integrating equity: Working with Indigenous people on cultural camps beyond program and community. Building relationship with community on a business level. Opportunity of John Ventures with community. Working with health, issues, mental health domestic violence, holding or being part of forums on a	
	What specific training programs would you like to see?	Small business management and mentoring. Full time traineeships and apprenticeships . University internships and graduate programs. High school work experience program.	Training in: technology programs, cultural workshop.	Rehab of mine sites - machine operators. Specific to needs of company.	ldentify individual's skills and interest develop work experience, training programs.	Anything to do with our youth in their sporting abilities and job training.	All of the above.	Mining related positions for apprentices and young adults, full funded from mining coffers. Indigenous projects coordinators, for mining interests.	Business. Language. Cultural camps. Scholarships. Arts. Technology. Understanding our fauna as the old people did. Scholarships re: HECS.	Language (Wonnarua/Gringai)	3-5 Aboriginal apprenticeships each year for people who live locally and went to school here.		Mi ap s a tra sp all ag Sk bu pr yo (1: bu yo (1: bu to	lore pprenticeship and aineeships becifically for I Aboriginal ge groups. kill wilding rograms for oung people (5-257) to wild skills that re essential b be	(Respondent ticked this box)	Employment of mentors, assistance in training.	Traineeships. Apprenticeships	School based traineeships and scholarships.	sponsorsnip level. School based traineeships, apprenticeship s, scholarships, language and culture programs, learning apps - culture - land etc.	
	What specific opportunities would you like to see in relation to business development?	Indigenous businesses to be able to utilize a financial committee for the duration of a contract to purchase plant equipment, etc. Diploma/Cert IV Small Business Management to ensure the potential businesses are adequately skilled and competent in all facets of business and are able to manage their business interests.	Set up business in arts shop. Tourism business. Youth programs.	Respect. Training and jobs. Creating opportunities where there is a demand.	The opportunity to undertake courses in business management		Small businesses, take Aboriginal trained youth workers.	Small business enterprises associated with mining concerns, i.e. truck driving, fencing, land regeneration, machine operators, surveying assistants, etc.	WNAC to be greater, re: work/employmen t WNAC to continue to be here longer than the mines. WNAC to continue our culture and language. Giving land to grow plants from Wonnarua Lands.	Development management skills with Wonnarua Nation members. Bail houses for Koori kids, cultural camps for more days.	Support for startups and ongoing mentoring.		en	mpioyea.	Continue in training.	Continue through, training, in contracts for fencing, horticultures.	Fencing contracts, tree planting.	Support and training for our people, and to become self- supportive.	Assistance in helping community set up their business by leasing office space and paying the lease for 12 months until business builds up contracts, etc. Putting the community through business counsel and building their Governance education up, or either putting up a fund for community to tap into to.	
Other Matters	What other matters do you think should		Need correctional	Meeting with WEC with			Educate our youth,	Cross cultural training for mining	The most important is	1. More days together as Wonnarua families.	Treaty/gap closing. Cultural		Ge	etting rid of ne umbrella	Ongoing consultation.	Ongoing meetings with		Training - education.	Sponsorship of community	Repatriat n of

be addressed by this process as part of the Project?		services and assistance. Work rehabilitation employment. Up-skilling for the workforce.	appropriate Glencore management on an agreed timeframe and appointment. The Aboriginal community should be a part of the process from day one, from initial start of the process, dealing with flora and fauna, surveying, etc., for site protection.		educate our elders. Small business managemen t skills, safe houses for youth on being released from internment.	personnel in local history, culture and heritage of affected groups, developed, structured and delivered by local Elders or persons of knowledge. Recognizing the groups who are real Traditional Owners and supporting their interest. Tell governments that only designated owners of country are the ones we will engage with and no other.	renumeration to WNAC and that it is well and truly appropriate in regards to what the mines will make over the year they are operating.	 Art and cultural practice for Wonnarua families. Health and wellbeing for Wonnarua children. Application for language online. Top up WNAC's education and health program to cover more programs. 	landscape protection. Wybong Creek along the length owned by GCOP. 100-200m either side.		agreement. Actions being taken to improve protection of sites.	

Glencore and	Mental	attends high	artefacts,
ongoing	health. Sprt.	cost	access to
consultations.	Cultural	conference	areas
	camps.	that relates to	where
	Cultural	indigenous	artefacts
	healing.	people:	are
	Cultural	AAA	repatriated
	awareness.	conference,	to, length
		conforance	takes
		health and	to access
		wellbeing	mines to
		conference	visit sites
		domestic	
		violence	
		conference,	
		homeless	
		conference,	
		(Naidoc?)	
		Awards, more	
		involvement in	
		(Naidoc?)	
		community	
		events on a	
		sponsorsnip	
		assisting	
		financially in	
		research on	
		Aboriginal	
		issues, youth	
		and elders	
		events,	
		sporting, Elders	
		events in	
		community,	
		nealth forums,	
		mental boolth forums	
		drug and	
		alcohol forums	
		cultural	
		program.	
		working with	
		elders on youth	
		programs	
		for justice	
		services	
		beyond bars	
		program -	
		Elder's	
		learning culture	
		nrograms	
		making	
		Aboriginal	
		memorial	
		walking trails in	
		conjunction	
		with national	
		park and wild	
		life,	
		literacy and	
		numeracy	
		programs, and	
		cultural	
		camps within	
		upper-lower	
		Hunter.	





Environmental and Heritage Management P/L

A view of one of the proposed test excavation locations adjacent to Bowmans Creek in the north of the Project Area.

ARCHAEOLOGICAL TEST EXCAVATION METHODOLOGY

Glendell Continued Operations Project August 2018

> PREPARED BY OZARK ENVIRONMENTAL AND HERITAGE MANAGEMENT PTY LTD FOR UMWELT AUSTRALIA PTY LIMITED ON BEHALF OF MT OWEN PTY LTD

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1 INTRODUCTION

1.1 PREAMBLE

OzArk Environmental & Heritage Management (OzArk) would like to acknowledge the Traditional Owners of the area—the Wonnarua peoples—and pay respect to their cultural heritage, beliefs and continuing relationship with the land.

We pay respect to the Elders, both past and present, for they hold the memories, traditions, culture and hopes of Aboriginal people in the area.

This document sets out the proposed methodology for the test excavation program associated with the Glendell Continued Operations Project (the Project). Test excavation is an archaeological tool designed to help identify archaeological deposits of conservation value and to understand the nature and extent of the subsurface component of sites. The permissible actions undertaken during the test excavation program are governed by Section 3.1 of the *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* (Code of Practice). This clearly establishes that a test excavation program should sample a given area, rather than to completely excavate it, and that the program should be designed to answer specific archaeological questions rather that other, broader questions (see Requirement 17 Section 1.3).

The test excavation methodology for the Project was written by Ben Churcher (Principal Archaeologist, OzArk).

1.2 BACKGROUND TO THE TEST EXCAVATION PROGRAM

The Glendell Mine is an open cut coal mine located at the Mount Owen Complex (MOC), within the Hunter Coalfields in the upper Hunter Valley of New South Wales (NSW). The Project Area is located approximately 20 kilometres (km) northwest of Singleton and 24 km southeast of Muswellbrook.

The Project seeks to extend the life of Glendell Mine to 2044, with an increase in extraction rate over the life of the Project up to 10 million tonnes per annum (Mtpa) from the current approved 4.5 Mtpa. The Project will extend the life of the existing operation providing for ongoing employment opportunities for the existing Glendell workforce (**Figure 1-1**).

Key aspects of the Project include the continuation of the Glendell Pit to the north, the realignment of Hebden Road, the diversion of Yorks Creek and relocation of Ravensworth Homestead.

The Project will impact on areas that have previously been impacted by mining and are approved for mining as well as up to an additional approximately 870 hectares (ha) of land that has not previously been impacted by mining (the Potential Additional Disturbance Area).

Umwelt Australia Pty Ltd (Umwelt) has been engaged by Mt Owen Pty Ltd on behalf of Glendell Tenements Pty Ltd (the proponent) to prepare an Environmental Impact Statement (EIS) for the Project which involves the development of an Aboriginal Archaeology Impact Assessment (AAIA).

As part of the AAIA, OzArk have been engaged to undertake the archaeological assessment of the areas that will be potentially impacted by the Project. The surface archaeological assessment has already been completed over the Potential Additional Disturbance Area during April and May 2018.

As a result of the surface archaeological assessment, 12 locations have been identified that require subsurface test excavation in order to determine the integrity and/or extent of sites recorded during the field assessment.

This document sets out the proposed methodology for the test excavation and follows the Code of Practice under Part 6 *National Parks and Wildlife Act 1974* (NPW Act).

Additionally, test excavations related to historic heritage at the Ravensworth Homestead may also be required. There is potential for Aboriginal artefacts to be encountered in historic test excavations. The methodology for the historic test excavations will have policies relating to the potential of encountering Aboriginal artefacts and this methodology will be circulated separately to the Registered Aboriginal Parties (RAPs) for the Project once prepared.



Figure 1-1: Key Project features.

Glendell Continued Operations Project: Test Excavation Program Methodology

1.3 CODE REQUIREMENTS FOR THE TEST EXCAVATION PROGRAM

The Code of Practice lists a number of requirements pertaining to test excavation. These requirements are enumerated below and further information pertaining to these requirements follow in subsequent sections of this document.

Requirement 14 (Test excavation which is not excluded from the definition of harm):

Sub-surface investigation will not be excluded from harm where they are carried out in the following areas:

- o in or within 50m of an area where burial sites are known or are likely to exist
- o in or within 50m of a declared Aboriginal place
- o in or within 50m of a rock shelter, shell midden or earth mound
- in areas known or suspected to be Aboriginal missions or previous Aboriginal reserves or institutes
- o in areas known or suspected to be conflict or contact sites.
 - The test excavation locations are not located within the vicinity of the items listed under Requirement 14 of the Code.
 - It is noted, however, that the entirety of the test excavation program is taking place in an area where there is the potential for conflict or contact sites due to the program's location within the former Ravensworth Estate and its proximity to the Ravensworth Homestead where early contact (and potentially conflict) between Aboriginal people and settlers may have occurred. While there are no known specific conflict or contact sites within the immediate vicinity of the test excavation areas, should such sites come to light during the test excavation works, all archaeological testing under the Code of Practice will immediately cease at that location.
 - Further, the Secretary's Environmental Assessment Requirements (SEARs) for the Project (SSD 9349; issued 7 June 2018), indicate that test excavation is a required aspect of the Aboriginal cultural heritage assessment:
 - Office of Environment and Heritage (OEH) input into SEARs, Attachment A Point 6 (in part): "The Environmental Impact Assessment (EIS) must identify and describe the Aboriginal cultural heritage values that exist across the whole area that will be affected by the development and document these in the Aboriginal Cultural Heritage Assessment Report (ACHAR). This may include the need for surface survey and test excavation."
- **Requirement 15a** (Consultation): As the proposed archaeological test excavation program is part of the Project, consultation has been ongoing with the RAPs and has been completed to the stage described in subclause 80C (6) of the *National Parks and Wildlife Regulation 2009* (NPW Regulation).

Glendell Continued Operations Project: Test Excavation Program Methodology

- **Requirement 15b** (Test excavation sampling strategy): This document sets out the proposed sampling strategy for the test excavation program.
- Requirement 15c (Notification):
 - o the location of the proposed test excavation and the subject area.

> This document sets out the proposed location of the test excavation program.

- the name and contact details of the legal entity with overall responsibility for the project.
 - Mt Owen Pty Limited, 642 Hebden Road, RAVENSWORTH NSW 2330
- the name and contact details of the person who will be carrying out the test excavations where this is different to the legal entity with overall responsibility for the project.
 - OzArk Environmental & Heritage Management, 145 Wingewarra St, DUBBO NSW 2830
- the proposed date of commencement, and estimated date of completion, of the test excavations.
 - Anticipated Commencement: 03/09/2018
 - Anticipated Completion: 21/09/2018

Weather permitting, the projected period for the excavation is up to 15 days.

- the location of the temporary storage location for any Aboriginal objects uncovered during the test excavations.
 - Aboriginal objects recovered during the excavations will be temporarily housed in a locked container at 21 Agnes Ave, CRESTWOOD, NSW, 2620 (OzArk branch office) for analysis. Following analysis the artefacts will be stored in accordance with the MOC Aboriginal Cultural Heritage Management Plan (MOC ACHMP) until such time as a Care Agreement is reached between an individual or organisation and the Office of Environment and Heritage (OEH). If no analysis is required (i.e. all analysis is completed in the field), the artefacts will be stored in accordance with the MOC ACHMP. Other objects, such as faunal or charcoal samples, may be sent to third party specialists for analysis.
- Requirement 16a (Test Excavation): The test excavation program will adhere to Requirement 16a of the Code as set out in this document (see Section 4.3).
- Requirement 16b (Objects recovered during test excavations): Aboriginal objects recovered during the excavations will be analysed at 21 Agnes Ave, CRESTWOOD, NSW, 2620 (OzArk branch office). When not being analysed, the objects will be temporarily stored in a locked container at 21 Agnes Ave, CRESTWOOD, NSW, 2620. Following analysis the objects will be stored according to the MOC ACHMP. If no analysis is required (i.e. all analysis is completed in the field), the artefacts will be immediately

Glendell Continued Operations Project: Test Excavation Program Methodology

stored according to the MOC ACHMP until such time as a Care Agreement is reached between an individual or organisation and OEH.

- Requirement 17 (When to stop test excavations): the test excavation program will adhere to the requirements set out in the Code: Any test excavation carried out under this requirement will cease when suspected human remains area encountered; or when enough information has been recovered to adequately characterise the objects present with regard to their nature and significance.
 - OzArk shall ensure that this Requirement is adhered to during the test excavation program. This will include ceasing work as soon as human skeletal material is noted and immediately notifying the police. If the skeletal material is determined to be Aboriginal, OEH will be immediately notified.

1.4 ABORIGINAL COMMUNITY CONSULTATION

A draft of this test excavation methodology was issued to all RAPs on 19 July 2018 for a 28 day review period closing on 17 August 2018.

From 31 July to 2 August 2018, during the review period for this document, a series of on-site meetings were held with RAPs to initiate discussions regarding the cultural values of the Potential Additional Disturbance Area. As part of these meetings, Ben Churcher, OzArk Principal Archaeologist, presented a summary of the results of the archaeological survey and introduced the methodology and location of the test excavation program. In addition, these meetings involved RAPs being shown various areas within the Potential Additional Disturbance Area where test excavation was planned to take place.

As a result of these meetings, only one specific comment from Luke Hickey was received regarding the test excavation methodology. This comment revolved around the spacing of the test excavation squares which were proposed to be spaced at 10 metre (m) intervals, while Luke felt this spacing was too wide and proposed a 5 m spacing. During discussion on this issue, it was agreed that small potential archaeological deposits (PADs) would be sampled by excavation squares at 5 m intervals; while larger PADs would be sampled at 10 m intervals so that a broad representation of the landform could be sampled.

As a result of Luke's concerns, Point 3 in Section 4.4 has been added to this document.

At the end of the 28 day review period, three further responses were received from RAPs. These responses are set out below. There was no requirement to amend the test excavation methodology as a result of these responses.

Ryan Johnson (Murra Bidgee Mullangari).

I have read the project information and draft test pitting methodology and endorse the recommendations made.

- > Jesse Carroll Johnson (Muragadi Heritage Indigenous Corporation)
 - I have read the recommendations for the Glendell project and endorse the recommendations made by Ozark, if you require further details please contact.
- > Kevin Duncan

Yaama Bridie, Thank you for the results of the Draft Test Pitting Methodology for the Glendell Project. I as an Aboriginal Traditional Custodian of these areas strongly disapprove of Mining in our Traditional Lands as Mining has done much damage to our natural Environment and Cultural Space. For thousands of years these lands have been important places for our people. In the result of Mining across the Valley into Jerry's Plains the Land itself will never recover and thousands of years of Cultural History wiped forever. My words I know will probably not be recognised in context to my Human Right as an Indigenous person under United Nations Charter of Indigenous Peoples Rights which Australia is Signatory. So even in my protest to protect and preserve Culture that is older than the Pyramids themselves they will ultimately will be destroyed. This is my True expression of who I am as an Aboriginal Person and of my feelings for my Ancestral Home Lands. Sincerely Kevin Duncan Gomeroi, Wonnorua Awaba, Peoples

2 THE POTENTIAL ADDITIONAL DISTURBANCE AREA

Figure 2-1 shows the Project Area and the extent of the Potential Additional Disturbance Area.

The majority of the Potential Additional Disturbance Area has been already cleared and includes flat landforms and associated lower and mid slope landforms associated with Bowmans, Yorks and Swamp Creeks (Figure 2-2). Historically the area has been intensively farmed leading to widespread vegetation loss and soil erosion (Figure 2-3).

The region surrounding the Project Area is an area that holds high cultural value for Wonnarua people and the wider landscape surrounding the Project Area has deep meaning to Wonnarua people.

Many of the Aboriginal community are also deeply concerned about the existence of 'massacre sites' within the former Ravensworth Estate which includes the Potential Additional Disturbance Area. There is very little supporting historic evidence regarding the actual location of any such sites, despite this having been expressed strongly as 'stories' and cultural knowledge held by a knowledge holder for the area. All available evidence, however, indicates that the area is outside, and a number of kilometres from, the Project Area (ACHM 2013: 66–69).

The wider cultural landscape surrounding the Project Area is of high cultural and historical significance to Wonnarua people. The historical associations with early settlement, conflict, dispossession and survival are important, and the area is seen as a significant surviving cultural landscape to numerous members of the Wonnarua people. Overall, the cultural significance of the wider region is considered to be high.

The landscape within the Potential Additional Disturbance Area is highly disturbed and fragmented, resulting in the fact that much of the natural landscape no longer exists as the history of agriculture and coal mining has irreversibly altered the landscape. With the remnant cultural landscape within the Potential Additional Disturbance Area having undergone considerable modification since European settlement, the Potential Additional Disturbance Area potentially has a lower cultural significance than the surrounding region. However, landscape features, such as creek lines, have often been cited as being of cultural importance and the Potential Additional Disturbance Area contains portions of Bowmans, Yorks and Swamp Creeks. These waterways would contribute and enhance the residual cultural landscape of the Potential Additional Disturbance Area.



Figure 2-1. Aerial showing the Project Area and the Potential Additional Disturbance Area.

Glendell Continued Operations Project: Test Excavation Program Methodology



Figure 2-2. The Project Area showing major hydrological features.

Glendell Continued Operations Project: Test Excavation Program Methodology



Figure 2-3. The Potential Additional Disturbance Area overlain on a 1967 aerial image.

Glendell Continued Operations Project: Test Excavation Program Methodology

3 ARCHAEOLOGICAL CONTEXT

3.1 PREVIOUS ARCHAEOLOGICAL STUDIES

The Project Area has been subject to previous Aboriginal archaeological survey and assessment in the recent past resulting in the recording of multiple Aboriginal sites.

Based on current information from the OEH managed Aboriginal Heritage Information Management System (AHIMS) database, there have been a number of sites recorded either within the Potential Additional Disturbance Area, or in close proximity.

During the course of the survey all valid and partially valid sites were revisited and the majority recorded currently visible artefacts. At those sites where there were no visible surface artefacts, possible explanations include:

- The sites have a low artefact density and it is therefore easier to understand that a low number of artefacts could be obscured whereas larger, more-dense artefact sites would retain a surface manifestation
- The high degree of water movement in some areas that has probably removed artefacts from their find location. This reinforces how dynamic any landscape is and how difficult it is to re-locate low density sites after a passage of time.

There have been numerous archaeological investigations in the local area and a number within the Potential Additional Disturbance Area itself. The results of these investigations provide an archaeological context for the assessment and were used in the preparation of a predictive model of Aboriginal site location for the pedestrian survey. These studies were summarised in the Survey Methodology. For the purpose of the test excavation program, only the studies involving subsurface test excavation or salvage are summarised here.



Figure 3-1. Location of previously salvaged sites in the vicinity of the Potential Additional Disturbance Area.

Glendell Continued Operations Project: Test Excavation Program Methodology

3.1.1 Ravensworth East Archaeological Investigation (ERM 2002)

In 2002 ERM conducted archaeological excavations and salvage grader scrapes over areas of the Ravensworth East Mine under Permit SZ323. These investigates were located in the central portion of the Project Area, in areas along the former course of Swamp Creek (ERM 2002). The area where this work took place is now highly modified and outside of the Potential Additional Disturbance Area. **Figure 3-1** lists the six sites salvaged within the Project Area under the 2002 ERM program. The location of these sites is shown on **Figure 3-1**.

AHIMS #	Site name
37-3-0399	Ravensworth 10
37-3-0398	Ravensworth 09
37-3-0400	Ravensworth 11
37-3-0401	Ravensworth 12
37-3-0402	Ravensworth 13
37-3-0403	Ravensworth 14

Table 3-1. Sites salvaged within the Project Area under Permit SZ323.

The combined geomorphological investigations undertaken by ERM highlighted the Swamp Creek valley as the key area likely to yield archaeological evidence of Aboriginal occupation within the ERM study area. However, these studies also showed that although buried land surfaces were apparent within the valley, evidence of Pleistocene Aboriginal occupation was unlikely to be recovered. Archaeological sampling of soil from these land surfaces failed to yield any archaeological material, confirming this view. In light of this, no further pursuit of Pleistocene archaeological deposits was undertaken within the scope of the excavation program.

The initial archaeological component of ERM's investigation, which included grader scrapes spread over three different landscapes across the valley, at varying distances from water sources, yielded little archaeological evidence. Of the three grader scrapes, three artefacts were recovered over a total area of 560 square metres (m²).

A low rise adjacent to the swampy meadow channel west of Swamp Creek in the vicinity of surface sites Ravensworth 12 to 14, revealed substantial archaeological material with several artefact concentrations located approximately 40 metres (m) to 60 m away from the channel. Test pit excavation yielded an artefact spread up-slope of the channel from approximately 10 m from the current channel edge, extending across the rise in all directions. A total of 87 artefacts were recovered from the 11 test pits. Over a combined excavated area of 11 m², this represents an artefact density of 7.9 artefacts/m². The largest artefact concentration (44 pieces or 50.57% of the total assemblage) was excavated from Test Pit 4 located on the peak of the rise. Without the Test Pit 4 artefact concentration, artefact density would have been substantially lower, at 4.3 artefacts/m², as the majority of test pits contained five artefacts or less. 82.75% of the assemblage was mudstone and 17.25% was silcrete.

Open excavation of the site complex Ravensworth 12–14 recovered a concentrated artefact scatter across the peak of the rise within the very shallow A-Horizon soil. Open excavation on this rise was proposed by Margrit Koettig (then at the NSW Department of Environment and Climate Change) to define the apparent spread of artefacts from TP4, and to further establish the nature of this subsurface deposit, specifically to investigate whether it contained hearths and identifiable activity areas. The open area excavation of 86 m² (including TP4) was conducted in July–August 2001 by ERM. 1,168 artefacts were excavated in the open excavation and the investigations revealed a continuation of artefacts over the low rise, rather than what was originally recorded as three individual surface sites. Within this scatter, several distinct areas of artefact concentration were recorded, all with quantities of associated charcoal and burnt earth. The assemblage comprised backed artefacts and associated manufacturing debitage, mostly of mudstone.

Seven raw materials were represented in the open excavation. Mudstone was the dominant raw material observed, accounting for almost 80% of the total artefact numbers. This mirrored the initial trend set in testing phase. Silcrete was the next most common material and comprised nearly 20% of the assemblage. The remainder of the artefacts (less than 2%) was produced from six other raw material types.

Five artefact types were identified in the assemblage. The majority of artefacts were whole flakes accounting for more than 50% of the assemblage with broken flakes (almost 30%) and flaked pieces (approximately 15%) making up much of the remaining assemblage numbers. All modified artefacts, consisting of cores and retouched flakes, made up just under 2% of the assemblage.

3.1.2 Glendell Project Area (Umwelt 2013)

Salvage of the Glendell project area was undertaken under National Parks and Wildlife Services (NPWS) section 90 Consent #2267 and formed Part 4 of the salvage program for the Bettys Creek valley. This archaeological salvage within the Glendell project area was conducted by Umwelt and the Aboriginal community between November 2005 and February 2006. Table 3-2 lists those sites within the Project Area that were salvaged under Consent #2267. The location of these sites is shown on Figure 3-1.

AHIMS	site name	Salvage methodology
37-3-0599	Bettys Creek 9	Surface Collection with Subsurface Investigation (manual excavation)
37-3-0601	Bettys Creek 11	Surface Collection with Subsurface Investigation (grader scrapes)
37-3-0602	Bettys Creek 12	Surface Collection with Subsurface Investigation (grader scrapes)
37-3-0604	Bettys Creek 14	Surface Collection with Subsurface Investigation (grader scrapes)
37-3-0605	Bettys Creek 15	Surface Collection with Subsurface Investigation (grader scrapes)
37-3-0606	Bettys Creek 16	Surface Collection with Subsurface Investigation (grader scrapes)
37-3-0607	Bettys Creek 17	Surface Collection with Subsurface Investigation (grader scrapes)

Table 3-2. Sites within the Project Area salvaged under Consent #2267.

Glendell Continued Operations Project: Test Excavation Program Methodology

AHIMS	site name	Salvage methodology
37-3-0608	Bettys Creek 18	Surface Collection with Subsurface Investigation (grader scrapes)
37-3-0609	Bettys Creek 19	Surface Collection
37-3-0610	Bettys Creek 20	Surface Collection
37-3-0618	Swamp Creek 1	Surface Collection
37-3-0619	Swamp Creek 2	Surface Collection
37-3-0620	Swamp Creek 3	Surface Collection with Subsurface Investigation (grader scrapes)
37-3-0621	Swamp Creek 4	Surface Collection with Subsurface Investigation (grader scrapes)
37-3-0622	Swamp Creek 5	Surface Collection
37-3-0623	Swamp Creek 6	Surface Collection
37-3-0624	Swamp Creek 7	Surface Collection
37-3-0026	Glennies Creek Site B / Bettys Creek - B	Surface Collection with Subsurface Investigation (grader scrapes)
37-3-0625	Swamp Creek 8	Surface Collection
37-3-0027	Glennies Creek Site C / Bettys Creek - C	Surface Collection with Subsurface Investigation (grader scrapes)
37-3-0626	Swamp Creek 12	Surface Collection
37-3-0592	Bettys Creek 1	Surface Collection with Subsurface Investigation (grader scrapes)
37-3-0627	Swamp Creek 13	Surface Collection with Subsurface Investigation (grader scrapes)
37-3-0593	Bettys Creek 3	Surface Collection with Subsurface Investigation (grader scrapes)
37-3-0773	Swamp Ck 10	Surface Collection with Subsurface Investigation (grader scrapes)
37-3-0594	Bettys Creek 4	Surface Collection with Subsurface Investigation (grader scrapes)
37-3-0595	Bettys Creek 5	Surface Collection with Subsurface Investigation (grader scrapes)
37-3-0596	Bettys Creek 6	Surface Collection with Subsurface Investigation (grader scrapes)
37-3-0597	Bettys Creek 7	Surface Collection with Subsurface Investigation (grader scrapes)
37-3-0598	Bettys Creek 8	Surface Collection with Subsurface Investigation (grader scrapes)

A total of 2,713 artefacts were recovered from the Glendell project area salvage including 824 (30.6%) from the surface collection, 274 (10.1%) from Excavation 1 (Bettys Creek 10), 19 (0.7%) from Excavation 2 (Bettys Creek 9), 1,414 (52.1%) from Excavation 3 (Bettys Creek 2) and 177 (6.5%) from the grader scrapes. A total of 2,604 (96%) of the artefacts were recovered from the Bettys Creek catchment, 52 (1.9%) from the Bowmans Creek catchment and 57 (2.1%) from the Swamp Creek catchment.

Observations made from the surface collection assemblage were as follows:

- The highest number of artefacts were collected from Bettys Creek 14 (26.7% of the surface collection assemblage), followed by Bettys Creek 10 (19.5% of the assemblage)
- 60.6% of the artefacts were collected from lower slopes and floodplains associated with creek lines (56.7% from Bettys Creek; 3.3% from Swamp Creek and 0.7% from Bowmans Creek)
- Sites on low but elevated spurs in tributary confluences comprised 22.2% of the assemblage; ridge crests (7.5%); sites on lower slopes on tributary channels more than 150 m from the main creek channel (7.5%); mid slope sites (1.3%) and upper slopes (0.6%)

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- The dominant artefact type was broken flakes (45%); followed by flakes (26.7%); flaked pieces (10.9%); retouched flakes (10%), cores (3.7%), heat shatter (3.4%) and grindstones (0.4%)
- A total of 31 cores were recovered from the surface collection. Of these, 21 were recovered from the Bettys Creek sites (17 from areas with tributary confluences with Bettys Creek)
- Mudstone was dominant within the assemblage making up 58.5% of the artefacts, followed by silcrete (31.9%) with the remaining raw materials making up 9.6% of the total assemblage.

Excavation was targeted at Bettys Creek 2, Bettys Creek 9 and Bettys Creek 10 indicated the following:

- Bettys Creek 10 and Bettys Creek 2 retained a level of spatial integrity reflected by knapping events and raw material distribution patterns
- Bettys Creek 9 contained artefacts in a secondary context
- All three locations contained backed flakes
- A ground oven identified at Bettys Creek 2 had an absolute date of 2188+/-39 BP (years before present)
- It was possible to obtain one radiocarbon date of 3077±40 BP (calibrated-Wk-20912) from Square K Spit 3 of Excavation 3 within the Mount Owen Extension Area. The date was relative in nature as it belonged to a large piece of burnt wood that was associated with artefacts both above and below it. Thus the artefacts above it must be dated to later than 3077±40 BP and those below it to earlier
- Broken flakes (45.7%) dominated the artefact assemblage, followed by flakes (38.7%)
- Bettys Creek 10 and Bettys Creek 2 were dominated by mudstone while Bettys Creek 9 was dominated by silcrete. Overall, mudstone was dominate (55.7%) over silcrete (32.3%)
- A small knapping event was evident at Bettys Creek 10, with greater amounts of knapping noted at Bettys Creek 2
- Core to flake ratios for Bettys Creek 10 were 1:28.7 and for Bettys Creek 2 were 1:27.4 suggesting knapping on site.

As a result of the Umwelt investigations outlined above, today's archaeological landscape, particularly along Bettys Creek, but also along Swamp Creek and Bowmans Creek in the vicinity of the Project Area, has been extensively studied.

3.1.3 Aboriginal Archaeological Values Assessment: Mount Owen Continued Operations (OzArk 2013)

The assessment area for the Mount Owen Continued Operations (MOCO) Project disturbance area covered approximately 500 ha with portions of the assessment area encompassing part of the southern portion of the Potential Additional Disturbance Area.

Australian Cultural Heritage Management Pty Limited (ACHM) were engaged by MOC to undertake Aboriginal community consultation for the MOCO Project and to author the Aboriginal Cultural Heritage Assessment Report (ACHAR) to which OzArk 2014 contributed (ACHM 2013). The ACHM report appeared as Appendix 13a (Parts 1 and 2) of the MOCO Project *Environmental Impact Statement* (EIS) (Umwelt 2015). ACHM 2013 contains the cultural, aesthetic and historic values of the area, while OzArk 2014 contains an examination of the scientific values of the area.

The archaeological survey for the MOCO Project took place over two weeks from 26 November 2012 to 7 December 2012. The archaeological test excavation program for the MOCO Project took place over one week from 11 March 2013 to 15 March 2013. In 2014, the proposed disturbance area for the MOCO Project was expanded slightly necessitating a further one day of survey that took place on 29 April 2014. The results of these investigations are detailed in OzArk 2014 and contained in Appendix 13b of the MOCO Project EIS (Umwelt 2015).

<u>Results</u>

Large portions of the MOCO Project (223 ha) had been subject to previous Aboriginal Heritage Impact Permits (AHIPs) with extensive areas having already undergone archaeological assessment and salvage. Within the MOCO disturbance area, 18 sites had already been salvaged by manual excavation and more expansive additional areas have been subject to grader scrapes to salvage subsurface artefacts. Over the years, both from within the MOCO disturbance area and from adjacent landforms, over 11,000 artefacts had already been recovered as a result of these programs.

As a result of the scientific values assessment for the MOCO Project, 39 Aboriginal sites were recorded; consisting of:

- 11 artefact scatters (37-3-1189 to 37-3-1199)
- 25 isolated finds (37-3-1170 to 37-3-1188 and 37-3-1212 to 37-3-1216)
- Three extensions to previously recorded sites (Extension to site 37-3-0649, Extension to site 37-3-0611 and Extension to site 37-3-0600).

In addition, the MOCO disturbance area contained three previously recorded sites, 37-3-0611, 37-3-0985 (low density artefact scatters) and 37-3-0527 (isolated artefact). Thus, 42 sites were known to exist within or close to the MOCO disturbance area.

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At two locations within the MOCO disturbance area, test excavations were carried out under the OEH Code of Practice. At one location (37-3-1191), no artefacts were recorded during the test excavations, while at the second location (37-3-1192), 114 artefacts were recorded, with over 80% coming from one discrete concentration. As a result, it was determined that 37-3-1191 is a displaced site with no associated archaeological deposits, while 37-3-1192 is a low density artefact scatter along the banks of the 'eastern drainage' line with one known concentration of artefacts.

Two sites recorded during the survey, 37-3-1194 and 37-3-1198, remain partially extant in the Potential Additional Disturbance Area.

Conclusion

Those archaeological sites in the disturbance area investigated revealed relatively sparse artefact concentrations in shallow and disturbed contexts. Archaeologically, all of the places located and/or identified conform to the Australian Small Tool Tradition¹, and most likely date to no more than the last 2,000 to 3,000 years.

The majority of the disturbance area had been subjected to varying degrees of land clearing and mining since first settlement, destroying the primary context of much of the physical cultural material present, and irretrievably altering the landscape itself.

Given the nature and extent of the archaeological sites identified, there was little additional knowledge which could be added to the archaeological record from any further investigation of this material. There is little probability for the presence of undisturbed and deeply stratified archaeological sites within the disturbance area.

In general, the archaeological sites in the MOCO disturbance area offered:

- Limited research potential in regard to regional and/or localised subsistence and resource procurement activities
- · Limited research potential to address questions on stone tool technologies in the region
- · Limited potential for radiometric dating methods to be applied to the sites
- Limited research potential to address questions about the timing of the first occupation of this region of the Hunter Valley
- Limited research potential to address questions about the timing of the Aboriginal settlement history of the Hunter Valley
- Limited potential to reveal further unique spatiotemporal patterning which would add to the archaeological record.

¹ The Australian Small Tool Tradition (also sometimes referred to as 'Bondaian') is a term applied to the Holocene period Aboriginal tool kit; distinguishing it from the earlier Australian Core Tool and Scraper Tradition generally dated to the Pleistocene period.

Glendell Continued Operations Project: Test Excavation Program Methodology

3.1.4 Archaeological Salvage. Liddell Coal Operations Development Modification 5 (OzArk 2015)

OzArk was engaged by Liddell Coal Operations (LCO) to undertake the salvage of 15 Aboriginal archaeological sites for Development Modification 5 of DA 305-11-01 and was approved under AHIP #C0000623. The salvage of the sites was undertaken on 28 January 2015 and 24 to 25 February 2015.

Artefacts were retrieved from seven of the 15 sites. A total of 46 artefacts were salvaged across all sites. The majority of the 46 artefacts recovered from the salvage were flakes (73.9%). Other artefact types included cores, flaked pieces, debitage, blades and a core fragment. Almost all artefacts were made from mudstone (56.5%) and silcrete (39.1%). Quartz and basalt artefacts were also present. Most artefacts were at a tertiary (65.2%) stage of reduction, with the rest secondary (34.8%). There were no artefacts at the primary stage of reduction.

The artefacts that were salvaged closely correspond to the regional context. The low proportion of formal tools (just one in 46) and the high percentage of flakes and debitage (76%) in the salvaged assemblage are typical of the region, but this is probably true in most sites across Australia. Mudstone has been recorded to be the most common raw material in the region, which was the case for the salvaged artefacts, and the other materials salvaged are also common.

Details of the two sites in this program that are near the Potential Additional Disturbance Area are listed in Table 3-3 and shown on Figure 3-1.

Table 3-3. Details of sites within the Proj	ect Area salvaged under AHIP C0000623
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AHIMS #	Site name	Artefacts salvaged	Notes
37-3-0419	Rav 24 East	12	This site was salvaged by surface collection and grader-scrape salvage. The ground surface visibility (GSV) of 15% is based on pre-grader-scrape visibility. The grader-scrapes added an additional 20% GSV.
37-3-1152	LID 36	1	Rakes were used to remove wood chips from the ground and improve GSV.



In early 2017 the MOCO salvage program took place under the authority of the 2016 MOC ACHMP (XMO SD PLN 0060). This program was completed in the approved disturbance areas associated with the MOCO Project (SSD-5850).

This program included the collection of surface artefacts at 26 sites resulting in 163 artefacts being recorded. Included in the tally of 26 sites, were two sites where limited archaeological excavation took place resulting in a further 187 artefacts being recorded. An additional area on the east bank of Bowmans Creek proposed for impact by the new Hebden Road Bridge was also subject to archaeological investigation by manual excavation but the area proved to be highly disturbed and no artefacts were recorded.

Glendell Continued Operations Project: Test Excavation Program Methodology

In addition, there were three sites that were unable to be salvaged, one as it was on land not owned by Mount Owen (37-3-0527) and two due to the fact that the area of the sites had previously been unintentionally impacted by mining activities (37-3-1171 and 37-3-1189)². These unintentional impacts were self-reported to the OEH who issued an official caution to MOC on 17 March 2016. Sites salvaged within the Project Area under SSD-5850 are listed in **Table 3-4** and shown on **Figure 3-1**.

Site ID	Site Name	Site Type	Number of Artefacts Salvaged	Salvage methodology
37-3-0527	37-3-0527 Ashton EWA 17		N/A	Not salvaged (access)
37-3-0611	Bettys Creek 21	Artefact scatter	2	Surface collection and excavation
37-3-1170	MOCO IF-1	Isolated find	0	Surface collection
37-3-1171	MOCO IF-2	Isolated find	N/A	Not salvaged (previously destroyed)
37-3-1174	MOCO IF-5	Isolated find	1	Surface collection
37-3-1176	MOCO IF-7	Isolated find	0	Surface collection
37-3-1177	MOCO IF-8	Isolated find	0	Surface collection
37-3-1178	MOCO IF-9	Isolated find	1	Surface collection
37-3-1179	MOCO IF-10	Isolated find	0	Surface collection
37-3-1180	MOCO IF-11	Isolated find	2	Surface collection
37-3-1181	MOCO IF-12	Isolated find	1	Surface collection
37-3-1182	MOCO IF-13	Isolated find	2	Surface collection
37-3-1183	MOCO IF-14	Isolated find	3	Surface collection
37-3-1184	MOCO IF-15	Isolated find	2	Surface collection
37-3-1189	MOCO OS-1	Artefact scalter	N/A	Not salvaged (previously destroyed)
37-3-1190	MOCO OS-2	Artefact scatter	2	Surface collection
37-3-1191	MOCO-OS-3	Artefact scatter	24	Surface collection
37-3-1192	MOCO OS-4	Artefact scatter	257	Surface collection and excavation
37-3-1193	MOCO OS-5	Artefact scatter	2	Surface collection
37-3-1194	MOCO OS-6	Artefact scatter	5	Surface collection
37-3-1195	MOCO OS-7	Artefact scatter	σ	Surface collection
37-3-1196	MOCO OS-8	Artefact scatter	3	Surface collection
37-3-1197	MOCO OS-9	Artefact scatter	36	Surface collection
37-3-1198	MOCO OS-10	Artefact scatter	10	Surface collection
37-3-1199	MOCO OS-11	Artefact scatter	7	Surface collection
37-3-1211	MOCO IF-18	Isolated find	0	Surface collection
37-3-1212	MOCO IF-21	Isolated find	2	Surface collection
37-3-1213	MOCO IF-22	Isolated find	2	Surface collection

Table 3-4. Sites salvaged within the Project Area under SSD-5850.

 $^{^2}$ In addition, MOCO OS-3 was unintentionally partially impacted by mining activities and the remainder of this site was salvaged during the salvage program.
Site ID	Site Name	Site Type	Number of Artefacts Salvaged	Salvage methodology
	Bowmans Creek East Bank (Hebden Road)	Potential archaeological deposit (PAD)	0	Manual excavation.

Of all the sites investigated in the 2017 salvage program, 37-3-1192 (MOCO OS-4 located on an unnamed watercourse termed the 'eastern drainage') recorded the highest artefact density with 71 surface artefacts (43.5% of all surface artefacts recorded during the salvage program) and 186 artefacts recorded in the test excavation component of the program (constituting almost all of the artefacts recorded in the test excavation component of the program). 37-3-1192 was located in area heavily affected by erosion and the investigation showed that while one concentration of artefacts remained *in situ*, the majority of the site had been displaced by the erosion.

Other sites that recorded more than 10 artefacts during the salvage program were 37-3-1191, 37-3-1197 and 37-3-1198. 37-3-1194 and 37-3-1198 remain partially extant within the Potential Additional Disturbance Area. All other sites recorded very low artefact numbers supporting the conclusion reached in OzArk 2014 that the remaining archaeological values at MOC consist of low density, often displaced, artefact scatters.

The recording of these sites affords with the general picture emerging that sites located away from permanent water are likely to have a low artefact density and low site complexity.

4 PROPOSED METHODS

4.1 PURPOSE OF THE TEST EXCAVATION PROGRAM

The purpose of the test excavation program is to understand more completely the nature of the sub-surface material within the Potential Additional Disturbance Area. Data obtained from the test excavation program will inform the mitigation and management options in the forthcoming AAIA.

The aims are therefore to:

- 1. Establish the extent and nature the of sub-surface archaeological deposits at a site or landform with archaeological potential
- 2. Use the data gained from the test excavation program to better evaluate the archaeological significance and potential of the Potential Additional Disturbance Area
- 3. Develop, in consultation with the RAPs, an informed management strategy for the site to assist in mitigating the proposed impacts.

As a result, locations initially considered for the test excavation program are limited to:

- Areas identified during the pedestrian survey as having archaeological potential
- Landforms which are relatively intact (i.e. not within disturbed contexts)
- Previously recorded sites which were potential archaeological deposits (PADs) or had PADs associated with them.

Excavations undertaken as per the Code do not require an AHIP under the NPW Act.

4.2 BACKGROUND TO THE TEST EXCAVATION PROGRAM

The test excavation program follows an extensive program of surface survey that focused on the Potential Additional Disturbance Area rather than the Project Area as a whole. The Aboriginal heritage surface survey was undertaken by two teams on 9 to 20 April 2018, and by one team on 30 April to1 May 2018 with each team consisting of two archaeologists and up to four RAPs. The assessment consisted of full pedestrian assessment of the Potential Additional Disturbance Area.

The results of the Aboriginal heritage assessment will be contained in the forthcoming AAIA that will provide full details of all sites recorded. As an overview, the pedestrian survey recorded 59 additional sites consisting of:

- 33 artefact scatters
- 24 isolated finds
- One PAD
- One scarred tree.

15 of these sites are outside of the Potential Additional Disturbance Area, however, some are closely adjacent to the boundary of the Potential Additional Disturbance Area and will require further management.

In addition, there are 43 previously recorded sites within or partially within the Potential Additional Disturbance Area. Of these, one site can no longer be reasonably located in the landscape. As such there are 42 known Aboriginal sites that have been previously recorded in the Potential Additional Disturbance Area.

Figure 4-1 illustrates the locations of all sites within proximity to the Potential Additional Disturbance Area and Figure 4-2 shows the site types recorded during the survey.

When previously and recently recorded sites are considered, there are 86 sites within the Potential Additional Disturbance Area. Three additional sites are technically outside of the Potential Additional Disturbance Area but are so closely adjacent that they should be treated as if they are inside of the Potential Additional Disturbance Area. However, one of these sites can no longer be reasonably located in the landscape and so there are an additional two known sites that may be harmed by the Project, As such, should the Project be approved in its current form, 88 known sites will be harmed.

The survey identified 12 areas where test excavation would provide a clearer picture of the subsurface archaeological potential. These areas, and the reasons why they have been selected are outlined in **Table 4-1**. The location of these 12 areas are shown on **Figure 4-3**.

There a number of previously recorded sites in the Potential Additional Disturbance Area where PADs are mentioned on the site card. However, not all of these sites will be investigated during the test excavation program and the reasons for their exclusion are outlined in Table 4-2.



Figure 4-1: Aerial showing sites within proximity to the Potential Additional Disturbance Area.



Figure 4-2. Aerial showing the type of sites within the Proposed Additional Disturbance Area.

Glendell Continued Operations Project: Test Excavation Program Methodology

Table 4-1: Proposed	areas for	test	excavation.
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Area	Landform	Reason for test excavation
Area 1	A broad elevated spur running parallel to Bowmans Creek.	A number of artefact scatters are located within the landform.
Area 2	A large level area that is elevated above Yorks Creek on its eastern bank.	Area also occupied by Ravensworth Homestead, often an indicator of a prime occupational location.
Areas 3 & 4	Landforms on western bank of Yorks Creek close to its confluence with Bowmans Creek.	Appeared to have high archaeological potential during the survey.
Areas 5 & 6	Elevated landforms on the eastern bank of Yorks Creek close to its confluence with Bowmans Creek.	Appeared to have high archaeological potential during the survey.
Area 7	Terrace overlooking the floodplain for Bowmans Creek.	A number of surface artefacts were visible during the survey.
Area 8	Elevated landform between Swamp Creek and what appears to be an old channel for Swamp Creek.	Allows landforms in this portion of Swamp Creek to be tested.
Areas 9 & 10	Two locations on either side of Swamp Creek.	Chosen at random in order to test the nature of deposits along this portion of Swamp Creek.
Areas 11 & 12	Centred on previously recorded sites where original recorders suggested PAD may be present.	Allows the banks on either side of Yorks Creek to be tested. Includes AHIMS #37-3-0754 and #37-3-0761.

Table 4-2: Previously recorded sites with PADs not included in the test excavation program.

Site ID	Site name	GDA East	GDA North	Reason for not including in test excavation
37-3-0753	York Creek 10	317865	6412266	Disturbed location. No potential noted during survey.
37-3-0752	York Creek 9	317685	6411312	Disturbed location. No potential seen during survey.
37-3-0748	York Creek 5	317365	6411471	Low-medium archaeological significance. Better location being tested to south (Area 3).
37-3-0617	Bowmans Creek 5	318015	6409874	Disturbed location. No potential seen during survey.
37-3-0612	Bettys Creek 22	321138	6410296	Within what was once a swamp/pond? Low archaeological potential.
37-3-0469	Bowmans/Swamp Creek Trench 1	318072	6409137	Highly disturbed and partially destroyed.
37-3-0766	Bowmans Ck 10	316833	6412566	Low archaeological values. Potential not visible at time of survey.
37-3-0764	Bowmans Ck 8	317205	6412329	Disturbance from buried pipeline. Will test nearby Bowmans Ck 7 (Area 1).
37-3-0762	Bowmans Ck 6	317645	6410765	Disturbed by cultivation. Other testing sites nearby,
37-3-0760	York Creek 17	317555	6411497	Disturbed location. No potential noted during survey.
37-3-0759	York Creek 16	317827	6411497	Disturbed location. No potential seen during survey.

4.3 RATIONALE BEHIND THE TEST EXCAVATION METHODOLOGY

4.3.1 Predicative model

The 2018 OzArk assessment of the Project Area has reached the following preliminary conclusions at this stage of the archaeological investigations:

- Stone artefact sites (isolated finds and artefact scatters) are the most commonly recorded site types in the area and that other site types, such as culturally modified trees, are very rare or non-existent
- Artefacts tend to associated only with the A-Horizon soil layers indicating a date in the Holocene period (i.e. 12,000 BP to the present)
- The predominant raw materials used for stone artefact manufacture are locally sourced mudstone and silcrete
- Excavations generally reveal a low artefact density but some spatial patterning has been observed: principally concentrations of artefacts interpreted as 'knapping areas'. Other archaeological features such as hearths are rare
- Sites tend to be associated with waterways and a discernible pattern has been observed whereby larger sites are associated with larger waterways offering permanent water supplies
- While all waterways have been equally studied, Yorks and Bettys Creeks appear to have attracted past Aboriginal occupation more often than Swamp Creek. Bowmans Creek would have been a major focus of past occupation but much of the evidence of this occupation has been removed by major channel migrations or intensive historical land use disturbances such as cultivation.

4.3.2 Research questions

While any test excavation program is limited in the level of research objectives it can achieve due to the restricted nature of the excavations, the test excavations for the Project will attempt to shed light on:

- Do the results support previous findings that occupation appears denser along Yorks Creek when compared to Swamp Creek?
- Do elevated landforms associated with Bowmans Creek preserve subsurface archaeological deposits?
- Are additional archaeological features, such as hearths, present in the Potential Additional Disturbance Area?
- How do the findings in terms of raw material use compare to other investigations in the vicinity of the Potential Additional Disturbance Area?

4.4 SAMPLING STRATEGY

The excavation program will be undertaken by archaeologists and representatives of RAPs and will include the following aspects:

- 1. Twelve areas will be investigated by the test excavation program. Ten of these areas relate to newly identified PADs noted by OzArk during the pedestrian survey, and two are situated at previously recorded sites (AHIMS #37-3-0754 and #37-3-0761).
- 2. The location for the proposed test excavation program is shown on Figure 4-3 and detailed locations of transects on Figure 4-4 to Figure 4-9.
- 3 Excavation squares will generally be spaced with a 10 m interval so that a broad representation of the landform will be obtained. However, should the PAD under investigation be small in size, the excavation squares will be excavated at a 5 m interval.
- 4. Prior to any excavation, the site will be recorded via digital photography.
- 5. A minimum of six 0.5 m x 0.5 m excavation squares in a straight 50 m transect will be excavated, although the methodology allows for additional squares to be excavated should the results indicate that this is warranted. The excavation squares will be positioned so as a valid sample of the impact area is obtained so that the archaeological values of the area can be characterised. Depending on the size of the investigation area, there may be only one transect or more. For specific methodology relating to each area, see Table 4-3.
- 6. Initial excavation squares will be excavated in 5 cm spits to determine whether archaeological stratigraphy is present. If not, spit size will be increased to 10 cm. If archaeological stratigraphy is present, this will be used rather than spits.
- The excavated material from all pits will be sieved on site using dry sieving through nested sieves of 6–8 millimetre (mm) and 2.5–3.5 mm mesh (which is considered to satisfy the 5 mm aperture wire-mesh sieve requirement).
- 8. Each excavator (by hand) will be responsible for sieving the deposit from their excavation square, retrieving the artefacts and, in conjunction with the supervising archaeologist, correctly recording their provenance. There could be some room for assistance with the sieving but a self-contained approach is preferable. Deposits will be sieved on to tarpaulins and the spoil used to backfill the excavation square.
- 9. A standard excavation recording form will be used for each excavation square. Details will include; date, site recorder, spit number and depth, description of finds, description of soil, sketch plan of excavation (if relevant to show structure), end of spit levels, soil pH (when necessary or appropriate) and a bucket tally.

- 10. It is envisioned that the excavation crew will consist of an Excavation Director, two assistant archaeologists, and at least six cultural heritage field workers. The excavator of each excavation square, in conjunction with the supervising archaeologist, will be responsible for ensuring all forms are correctly completed. It will be the archaeologists' responsibility to perform all photographic tasks, undertake any planning and section drawing if required and to ensure that a correct location of each excavation square is maintained.
- 11. Given that the work will be reasonably physical, all persons participating on the test excavation program should be aware of this and be 'fit for work'.
- 12. If intact archaeological deposits or archaeological features are encountered, then additional archaeological excavation squares may be excavated to ensure documentation of any features and/or retrieval of artefacts and other relevant archaeological material. A feature would include a high density of artefacts within a square (such as in excess of 60 artefacts greater than 15 mm in size per m²), or a square containing rare or unusual artefacts (such as artefacts constructed from a stone type rarely represented in the area or less-common tool forms such as ground edge axes, hammerstones, etc.), or other signs of human occupation i.e. ground ovens/hearths or charcoal concentrations. Any expansion must adhere to Requirement 16 (5). Any expansion would only occur with the consent of the Excavation Director who will determine if an expansion is required to gain the appropriate scientific information.
- 13 Rather than expanding around an individual square as set out in Point 12, it is more likely that any expansion will involve setting out an additional transect at 90 degrees to a transect that has demonstrated significant and intact archaeological deposits. The perpendicular transect will be used to assist in determining the spatial spread of the subsurface deposits.
- 14. If appropriate (i.e. intact archaeological stratigraphy is recorded) section drawings will be completed for the appropriate excavation square(s). If no archaeological stratigraphy is recorded then digital photographs shall be taken of a representative section of each excavation square and a suitably representative drawing made of the excavation square section to show the soil profile.
- 15. Analysis of all excavated lithics will be made in order to determine the site's characteristics and to enable the site to be compared with other sites in the region. Analysis will also assist in determining what type of activities the Aboriginal people carried out at the site and their relationship with local resources (fauna, flora, water and stone). All artefacts will be analysed and selectively photographed. If charcoal from a secure stratigraphic context is obtained, it may be sent to a laboratory for Carbon 14 dating (subject to proponent's agreement).

Glendell Continued Operations Project: Test Excavation Program Methodology

- 16. Select faunal remains, if recovered, will be analysed by a fauna specialist. Remnant shell and bone fragments may assist in determining what foods Aboriginal people may have eaten at the specific site and may elucidate possible foraging strategies. In conjunction with *in situ* stone tools, bone/shell fragments may also provide evidence of specific usage of stone tools for food processing.
- 17. Artefacts will remain in the care of OzArk until such time as the analysis is complete. Every effort will be made to analyse artefacts on-site to ensure that the artefacts do not have to leave the Project Area. However, in the case of large artefact numbers or artefacts requiring further research, it may be necessary to take artefacts off-site. If taken off-site, the artefacts would be the responsibility of OzArk and every effort would be made to return all artefacts to the MOC as quickly as is possible. At the completion of analysis (whether on-site or off-site) artefacts will be returned to the MOC where they will be kept as per the MOC ACHMP until Point 19 below is enacted.
- 18. The results of the test excavation program will inform the forthcoming AAIA. Excavation results will be used to advise further courses of action in relation to the management and mitigation options for the Project Area.
- 19. Once all salvage activities for the Project Area are complete (should the Project be approved), artefacts will be amalgamated and managed as per the MOC ACHMP.

Area	Test excavation methodology
Area 1	5 x 50 m transects, with each 50 m transect separated by 50 m. Transects will be positioned running along the spur, parallel to Bowmans Creek. Area 1 includes an area of PAD recorded during the survey. Decisions on the suitability of expansion will depend on the results of the first five transects.
Area 2	4 x 50 m transects will be initially excavated to examine areas closet to Yorks Creek and a tributary to Yorks Creek located to the south of the PAD area. Decisions on whether to expand excavation will depend on results of the initial four transects.
Area 3	2 x 50 m transects will be excavated so entire PAD area is investigated.
Area 4	$5\ x\ 50\ m$ transects will be excavated to investigate areas closest to Yorks Creek and Bowmans Creek, as well as landforms near the confluence of the two creeks.
Areas 5 & 6	These PADs are too small for an entire transect. Instead two sets of two conjoined $0.5 \text{ m} \times 0.5 \text{ m}$ pits will initially investigate these areas (see Figure 4-10).
Area 7	2 x 50 m transects will be excavated running along the length of the terrace.
Area 8, 9, 10, 11 & 12	1 x 50 m transect excavated initially at each location.

Table 4-3: Sampling methodology for text excavation program.



Figure 4-3: Location of the proposed test excavation program.

Glendell Continued Operations Project: Test Excavation Program Methodology



Figure 4-4: Detailed locations for the proposed test excavation program at Area 1.

Figure 4-5: Detailed locations for the proposed test excavation program at Areas 2, 11 & 12.





Figure 4-6: Detailed locations for the proposed test excavation program at Areas 3 & 4.

Figure 4-7: Detailed locations for the proposed test excavation program at Area 7.





Figure 4-8: Detailed locations for the proposed test excavation program at Area 8.

Figure 4-9: Detailed locations for the proposed test excavation program at Areas 9 & 10.



Figure 4-10: Example of placement for test excavation pits at Areas 5 & 6.



4.4.1 Sampling strategy compliance with the Code: Requirement 16

- 1 Test excavation units must be placed on a systematic grid appropriate to the scale of the area—either PAD or site—being investigated e.g. 10 m intervals, 20 m intervals, or other justifiable and regular spacing.
 - The sampling strategy outlined in Section 4.4 complies with this requirement. As the Code
 of Practice allows excavation units to be grouped depending on a site's characteristics,
 the excavation strategy at Areas 6 and 7 complies with the Code of Practice so long as
 no more than 0.5% of the site is excavated.
- 2 Any test excavation point must be separated by at least 5 m.
 - The sampling strategy outlined in Section 4.4 complies with this requirement. It should be noted that while the initial transect will have 10 m intervals, the Code allows expansion around pits displaying notable concentrations of artefacts (i.e. more than 60 artefacts larger than 15 mm per m²) or archaeological features. These 'expansions' are limited to a maximum area of 3 m². It is also noted in Section 4.4 Point 3 that when PADs are small in area that a 5 m interval for the test excavation squares will be adapted.
- 3 Test excavations units must be excavated using hand tools only.
 - The sampling strategy outlined in Section 4.4 complies with this requirement.
- 4 Test excavations must be excavated in 0.5 m x 0.5 m units.
 - The sampling strategy outlined in Section 4.4 complies with this requirement.
- 5 Test excavations units may be combined and excavated as necessary to understand the site characteristics, however:
- the maximum continuous surface area of a combination of test excavation units at any single excavation point conducted in accordance with point 1 (above) must be no greater than 3 m²;
 - The sampling strategy outlined in Section 4.4 complies with this requirement.
- ii) the maximum surface area of all test excavation units must be no greater than 0.5% of the area—either PAD or site—being investigated.
 - The number and size of test excavations undertaken as part of this program will be managed to ensure that this requirements is satisfied.

Glendell Continued Operations Project: Test Excavation Program Methodology

- 6 Where the 0.5 m x 0.5 m excavation unit is greater than 0.5% of the area then point 5 (ii) (above) does not apply.
 - Not applicable. As the potential archaeological deposits are spatially large, less than 0.5% of the known potential archaeological deposits dimensions will be investigated.
- 7 The first excavation unit must be excavated and documented in 5 cm spits at each area —either PAD or site—being investigated. Based on the evidence of the first excavation unit, 10 cm spits or sediment profile/stratigraphic excavation (whichever is smaller) may then be implemented.
 - Complies. See in Section 4.4 Point 6.
- 8 All material excavated from the test excavation units must be sieved using a 5 mm aperture wire-mesh sieve.
 - Complies. See in Section 4.4 Point 7.
- 9 Test excavation units must be excavated to at least the base of the identified Aboriginal object-bearing units, and must continue to confirm the soils below are culturally sterile.
 - This requirement will be fulfilled in the field and all excavation squares will be excavated to the B-Horizon basal clays. To ensure that, as suspected, these basal clays are culturally sterile, several deeper probes at each excavation area will be excavated into these clays to ensure that they are, in fact, culturally sterile. The decision as to where these deeper probes are placed will rest with the Excavation Director.
- 11 Photographic and scale-drawn records of the stratigraphy/soil profile, features and informative Aboriginal objects must be made for each single excavation point.
 - Complies. See in Section 4.4 Points 9, 10, 14, 15 and 16.
- 12 Test excavations units must be backfilled as soon as practicable.
 - Complies. See in Section 4.4 Point 8.
- 13 Following test excavation, an Aboriginal Site Impact Recording form must be completed and submitted to the AHIMS Registrar as soon as practicable, for each AHIMS site that has been the subject of test excavation in accordance with the requirements of the Code.
 - It will be the responsibility of OzArk to ensure that this requirement is met.

5 REFERENCES

ACHM 2013	Australian Cultural Heritage Management Pty Limited. <i>Mount Owen</i> <i>Continued Operations Project. Aboriginal Cultural Heritage Assessment</i> <i>Report.</i> Report to Mt Owen Pty Limited.
ERM 2002	ERM Pty Limited, 2002. Ravensworth East Archaeological Investigation. Report to Coal and Allied Pty Limited.
OEH 2011	Office of Environment and Heritage. 2011. <i>Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in New South Wales.</i> Department of Environment, Climate Change and Water, Sydney.
OzArk 2013	OzArk Environmental & Heritage Management Pty Limited. 2013. Aboriginal Archaeological Values Assessment. Mount Owen Continued Operations. Near Ravensworth. Upper Hunter Valley, NSW. Report for Mt Owen Pty Ltd.
OzArk 2015	OzArk Environmental & Heritage Management Pty Limited. 2015. Archaeological Salvage. Liddell Coal Operations Development Modification 5. Report for Liddell Coal Operations.
OzArk 2017	OzArk Environmental & Heritage Management Pty Limited. 2017. Aboriginal Archaeological Salvage Report. Mount Owen Continued Operations. Near Ravensworth, Upper Hunter Valley, NSW. Report for Mt Owen Pty Ltd.
Umwelt 2013	Umwelt (Australia) Pty Limited. 2013. Part 4 – Bettys Creek Salvage Program, Glendell Mine Surface and Subsurface Salvage under Section 90 Aboriginal Heritage Impact Permit #2267. Report for Xstrata Mount Owen.

11.3.20 Archaeological Test Excavation 28 Day Review Feedback from RAPs

Group/Organisation	Contact Person	Methodology Comments Received	Agree with Methodology
Culturally Aware	Tracey Skene	Email received from Tracey Skene 20/2:	Yes
		Good evening Bridie,	
		I have viewed methodology and familiar with the Survey location, at this point of time I have no concerns in regard to the proposed methodology.	
		Please keep me updated on the progress of the upcoming fieldwork and look forward to the next step of this Assessment.	
		Thanks Tracey Skene	
Lower Hunter Aboriginal	Les Ahoy	Hi	Yes
		On behalf of LHAI I endorse the Glendell ACHA survey methodology with no further comments to add.	
		Thank You	
		David Ahoy	
Nyanga Walang	Kevin Duncan	Hi Bridie,	No
		Thank you for your invitation to be a party to the Glendell Operations project. As a Traditional stakeholder to our tribal lands throughout this region and our people having a long continuous connection these lands are always have been very special and sacred to our peoples' adamant in my decision to not support any Mining projects on our lands it goes against everything that our Cultural moral ,spiritual beliefs in the preservation and protection of our lands.	
		I cannot allow or be a party to such destructive practices as it goes against everything we are as Aboriginal people. In saying this I will like my comments to be noted as a registered stakeholder for this project and hope my comments are taken seriously and respectively in this decision.	
		Thank you	
		Kevin Duncan	
Tocomwall Pty Ltd	Scott Franks	Scott Franks responded via email 29/3/18	No
		Sorry for the delay in responding to the comments I raised with you regarding the Ozark Methodology, in short, the proposed methodology simply has know (sic) value or worth in understanding my people's heritage. after reading the draft it was clear to me that know (sic) real background research has be done or any understanding of the cultural land scape or any of the more recent assessments that have been completed on adjoining mining operations owned by Glencore coal.	
		The draft provides an isolated attempt to box in our heritage to a single location using a mining EL boundary, this type of assessment falls short of really giving our heritage a fair and real voice in any assessment process. I cannot support the approach as by its own design is it a science- based assessment and clearly know (sic) real cultural assessment attached to it, this process fall very short of the current required approvals under the NPSW Acts (sic) for OEH.	
Murra Bidgee Mullangari Aboriginal Corporation	Ryan & Darleen Johnson-Carroll	Hi Bridie, I have read the project information and draft test pitting methodology and endorse the recommendations made. Kind regards	Yes
		Ryan Johnson	
Muragadi Heritage Indigenous Corporation	Jesse Carroll-Johnson	To whom it may concern, I have read the recommendations for the Glendell project and endorse the recommendations made by Ozark, if you require further details please contact. Kind regards Jesse	Yes
Wonnarua Nation	Laurie Perry	Hi Bridie	

Aboriginal Corporation		Thank YouI will have a look and get back to you	
		cheers	
Nyanga Walang	Kevin Duncan	Yaama Bridie,	No
		Thank you for the results of the Draft Test Pitting Methodology for the Glendell Project. I as an Aboriginal Traditional Custodian of these areas strongly disapprove of Mining in our Traditional Lands as Mining has done much damage to our natural Environment and Cultural Space. Or thousands of years these lands have been important places for our people. In the result of Mining across the Valley into Jerry's Plains the Land itself will never recover and thousands of years of Cultural History wiped forever. My words I know will probably not be recognised in context to my Human Right as an Indigenous person under United Nations Charter of Indigenous Peoples Rights which Australia is Signatory. So even in my protest to protect and preserve Culture that is older than the Pyramids themselves they will ultimately be destroyed. This is my True expression of who I am as an Aboriginal Person and of my feelings for my Ancestral Homelands. Sincerely Kevin Duncan Gomeroi, Wonnorua Awaba,People	

11.4 ACHAR 28-Day Review Feedback

GLENCORE

18 September 2019

Dear Registered Stakeholder,

Glendell Continued Operations Project Draft Aboriginal Cultural Heritage Assessment Report – Invitation for Comment

Glencore is continuing to progress environmental assessments and stakeholder consultation associated with the preparation of the Glendell Continued Operations Project (the Project) Environmental Impact Statement. In this regard, please find in the email a link to a copy of the draft *Aboriginal Cultural Heritage Assessment Report* prepared by Australian Cultural Heritage Management (ACHM) with significant contributions from the Registered Aboriginal Parties, Knowledge Holders and OzArk Environmental and Heritage Management (OzArk). For security reasons, access is available through to 18 October 2019 to download the file after which time the link will expire. Please follow the directions provided in the email to download the report.

We invite all Registered Aboriginal Parties to provide, in writing, comments on the draft *Aboriginal Cultural Heritage Assessment Report* (ACHM 2019) by **Friday 18 October 2019**. To assist, attached to this correspondence is an associated response form to enable you to provide your feedback.

For correspondence including the provision of comments, additional information or to request additional copies of the report please contact me on the details provided below.

We have also included a copy of the community information sheet in the link provided, which provides an overview of the Project, a summary of the Project impacts and key findings of the environmental and social studies that have been undertaken.

Thank you again for your ongoing involvement in relation to the Aboriginal Cultural Heritage Assessment for the Glendell Continued Operations Project and we look forward to your response.

Kind regards,

Bradly Snedden Project Approvals Manager Email: <u>bradly.snedden@glencore.com.au</u> Phone: 0428 466 820

GLENCORE

Glendell Continued Operations Project

Draft Aboriginal Cultural Heritage Assessment Report Comments

Comments are required to be provided in writing or via oral communication by Friday, 18 October 2019.

Your comments can be submitted by either email or post using the details listed below.

Phone: 0428 466 820

Email: bradly.snedden@glencore.com.au

Mail: Attention Bradly Snedden (Project Approvals Manager) c/o Mount Owen Complex Private Mail Bag 8, Singleton, NSW 2330

Do you agree with the draft *Aboriginal Cultural Heritage Assessment Report (ACHM 2019)?*

YES NO

Do you have any comments on the draft *Aboriginal Cultural Heritage Assessment Report (ACHM 2019)?* (*List here or on a separate sheet*):



30 October 2019

Ms B McWhirter Environmental Scientist Umwelt (Australia) Pty Ltd Email: bmcwhirter@umwelt.com.au

Dear Bridie

RE: ACHAR REVIEW COMMENTS – GLENDELL CONTINUED OPERATIONS PROJECT

This letter from the Wanaruah LALC does not express the views of any other Aboriginal stakeholder groups (whether their representatives are members of the LALC or not) or individuals who have chosen to speak in their own right. The comments provided are considered appropriate under Clause No. 42(4) (a) and (b) of the Aboriginal Land Rights Act (1983) (and its amendments) in relation to the role of the LALC in the protection and the promotion of awareness in the community, of culture and heritage for Aboriginal people within its boundary.

We have reviewed the above document and although we are generally in agreement with the draft report and its recommendations for the ongoing protection of artefacts and sites (on site management recommendations), we wish to make the following comments on the cultural aspects and the off site management recommendations:

- 1. In Section 6.8 (Dominant Themes) and in regard to the destruction of landscapes and their cultural values, it is stated that there is an õ... overwhelming fear that people in the future will think the people of today stood by and watched their 'country' being 'destroyed' without defending it (i.e. sense of guilt)...ö. There seems to be nothing that todayøs Aboriginal people can do to stop big business and the Australian governments (state or federal), from ignoring its First Nation peoples, while they strive to -milkøeverything they can get out of our Country for financial profit regardless of the effects it has on our unique natural environment and the people who have looked after it for thousands of years. It is NOT -guiltø it is -frustrationø -angerø helplessnessøand -sadnessø We have nothing to feel guilty about, we have and continue to (futile that it may seem), survive in this Country and try to keep our heads high and proud and to keep speaking out, while we continue to protect what we believe is culturally significant and sacred to us ó our heritage and our families.
- 2. In Section 8 (Recommendations): Table 8.2 (Recommendations made by the Wanaruah Local Aboriginal Land Council), these recommendations [(WLALC01) Local historical research to fill in gaps or confirm existing knowledge; (WLALC02) Creation of an Aboriginal controlled cultural

education unit; (WLALC03) Apprenticeships for 3-5 Wonnarua (sic.) people; and (WLALC04) Support for business start-up] have not been reflected in 8.2.3 (Notes on RAP Recommendations) and Table 8.4 (Consolidated management recommendations). However, we presume they have been included (or need to be included) in Table 8.6 (Proposed off site Management Measures). These issues need to be addressed and **seriously** considered.

Thank you for this opportunity to review the draft report.

Kind regards,

Suzie Worth Indigenous Archaeologist for the Wanaruah LALC

From: Will Moon <william@tocomwall.com.au>
Sent: Wednesday, 13 November 2019 8:38 AM
To: Scott, Shane (Newcastle - AU) <Shane.Scott@glencore.com.au>
Cc: Scott Franks <scott@tocomwall.com.au>
Subject: ACHAR Glendell Project Area

Hi Shane

Thanks for your message yesterday regarding feedback for the ACHAR. After reviewing the report we concluded that it really did not offer any new knowledge for how the Aboriginal people used this part of the Hunter landscape. We were surprised that a study of this scale and duration offered nothing new. It seemed to just offer up the same conclusions of so many other reports for the area in terms of an increase in artefact numbers and density approaching water sources and the typical trends for raw materials for the area. Nothing else. The degree of reduction evident for many of the artefacts suggested that groups using the area were very mobile however there was no further analysis of this that might have provided some new insight or knowledge about the mobility of people in the area, or the reasons for what appears to be a high percentage of artefacts subjected to tertiary reduction. Generally a disappointing outcome from the perspective of learning something new for the area.

Regards

Will Moon

Senior Archaeologist

Tocomwall Pty Ltd m: 0419399230 e: <u>william@tocomwall.com.au</u> www.tocomwall.com.au



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11.5 Aboriginal Archaeology Impact Assessment (AAIA) Report





A heavily worked mudstone core from Glendell North OS32 located on the bank of Bowmans Creek.

ABORIGINAL ARCHAEOLOGY IMPACT ASSESSMENT

GLENDELL CONTINUED OPERATIONS PROJECT

GLENDELL MINE, RAVENSWORTH, NSW NOVEMBER 2019

Report Prepared by OzArk Environment & Heritage for Umwelt Environmental & Social Consultants on behalf of Glendell Tenements Pty Ltd

OzArk Environment & Heritage

145 Wingewarra St (PO Box 2069) Dubbo NSW 2830

Phone: (02) 6882 0118 Fax: (02) 6882 0630 enquiry@ozarkehm.com.au www.ozarkehm.com.au This page has intentionally been left blank.

DOCUMENT CONTROLS

Proponent	Glendell Tenements Pty Ltd		
Client	Umwelt Environmental & Social Consultants		
Project No / Purchase Order No			
Document Description	Aboriginal Archaeolo Operations Project	gy Impact Assessment. Glendell Continued	
	Name	Signed	Date
Clients Reviewing Officer			
Client's representative mana	iging this document	OzArk person(s) managing th	nis document
Bridie McWhirter		Ben Churcher	
Location		OzArk Job No.	
 OzArk EHM Data ► Client Glendell GCOP 2018 ► Re 	s ►Umwelt Australia eport items	1885	
Document Status V3.0 FINA	،L	Date 22 November 2019	
Draft V1.1 Author to editor OzArk 1 st Internal (Series V1 = OzArk internal edits)		V1.0–1.3: TD and SR prepare site descriptions and preliminary sections V1.4–V1.6. BC edits and revisions. March–December 2018	
Draft V2.0 Report draft for release to client (Series V2 = OzArk and Client edits)		V2.0: to Umwelt 14/12/18 V2.1–V2.3 OzArk amendments May–July 2019 V2.4 BC amends for new PADA 6/8/19 V2.5–V2.6 BC amendments August–September 2019 V2.7: BC includes RAP comments on ACHAR 22/11/19	
FINAL V3once latest version of draft approved by client		V3.0 BC finalises 22/11/19	
Prepared for		Prepared by	
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Teralba, NSW 2284		Dubbo NSW 2830	
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Enquiries should be addressed to OzArk Environment & Heritage.

Acknowledgement

OzArk acknowledge the Wonnarua Traditional Owners of the area on which this assessment took place and pay respect to their beliefs, cultural heritage and continuing connection with the land. We also acknowledge and pay respect to the post-contact experiences of Aboriginal people with attachment to the area and to the elders, past and present, as the next generation of role models and vessels for memories, traditions, culture and hopes of local Aboriginal people.

OzArk would like to thank all RAP representatives who participated in the survey and test excavation program. As this involved many people it is impossible to thank everyone individually although OzArk acknowledges that your hard work, and the dedication you showed towards the understanding and protection of your cultural heritage, contributed to the success of this assessment program.

ABBREVIATIONS

The following abbreviations are used in this report.

AAIA	Aboriginal Archaeology Impact Assessment
ACHAR	Aboriginal Cultural Heritage Assessment Report
ACHM	Australian Cultural Heritage Management Pty Ltd. (authors of the ACHAR)
ACHMP	Aboriginal Cultural Heritage Management Plan
AHIMS	Aboriginal Heritage Information Management System
AHIP	Aboriginal Heritage Impact Permit
ASIRF	Aboriginal Site Impact Recording Form
BCE	Before the Common Era (an alternative for using BC in dates)
BCD	Biodiversity and Conservation Division (formerly OEH)
BP	Before Present
DECC	Former New South Wales Department of the Environment and Climate Change (now BCD)
DPIE	Department of Planning, Industry and Environment
EIS	Environmental Impact Statement
EP&A Act	Environmental Planning and Assessment Act 1979
GCO	Glendell Continued Operations
GIS	Geographical Information System
Glendell	Glendell Mine; the proponent
GPS	Global Positioning System
LALC	Local Aboriginal Land Council
LCO	Liddell Coal Operations
LGA	Local Government Area
NPW Act	National Parks and Wildlife Act 1974
NSW	New South Wales
NSW NPWS	New South Wales National Parks and Wildlife Service
MOC	Mount Owen Complex. Includes the Mount Owen, Ravensworth East and Glendell mines.

OEH	Former New South Wales Office of the Environment and Heritage, now BCD
OzArk	OzArk Environment & Heritage
PA	Project Approval
PAD	Potential archaeological deposit
PCWP	Plains Clans of the Wonnarua People, Native Title Claimant Group
Project	Glendell Continued Operations Project
RAP	Registered Aboriginal Party
SBB	Sydney Basin Bioregion
SEARs	Secretary's Environmental Assessment Requirements
SSD	State significant development
Umwelt	Umwelt (Australia) Environmental & Social Consultants

GLOSSARY

- Assemblage: Refers to all artefacts recorded at a particular location. In this report, assemblage refers to stone artefacts as this was the only artefact class recorded.
- Bondaian: A chronological period where bondi points become more frequent in artefact assemblages. Post-3000 BP, although earlier at some sites.
- Capertian: Chronological phase preceding the Bondaian Phase. Pre-3000 BP, although earlier at some sites.
- Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales under Part 6 NPW Act. Issued by DECCW in 2010, the Code of Practice is a set of guidelines that allows limited test excavation without the need to apply for an AHIP. The test excavation program for this assessment was conducted under the Code of Practice.
- Debitage: The term debitage refers to all the waste material produced during lithic reduction and the production of stone tools. Therefore, technically, all artefacts other than reworked tools are debitage. However, in this report debitage is used in its other common meaning being the small flakes and chips produced purely as a byproduct of knapping. This distinguishes these small flakes from the larger flakes that were removed (while technically 'debitage', a non-retouched flake can be used as a tool and therefore could have been the intended end point for a knapping event).
- Holocene: Is the geological epoch which lasted from around 12,000 years ago to the present (10,000 BCE). This period is generally warmer and wetter than the preceding Pleistocene period.
- Pleistocene:Is the geological epoch which lasted from about 2.5 million years ago to
10,000 BCE. This period spans the world's recent period of repeated glaciations.
Aboriginal occupation of Australia occurs during the upper Pleistocene.
- Taphonomy:The study of how artefacts can be moved in archaeological deposits due to
natural occurrences such as animals burrowing or treadage into the ground.

EXECUTIVE SUMMARY

OzArk Environment & Heritage (OzArk) has been engaged by Umwelt (Australia) Environmental & Social Consultants (Umwelt) on behalf of Glendell Tenements Pty Limited (the proponent) to complete an Aboriginal Archaeology Impact Assessment (AAIA) for the Glendell Continued Operations Project (the Project). The purpose of the assessment is to form part of an Environmental Impact Statement (EIS) being prepared by Umwelt to accompany an application for development consent under Division 4.1 and 4.7 of Part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act) for the Project.

Australian Cultural Heritage Management Pty Limited (ACHM) will prepare the *Aboriginal Cultural Heritage Assessment Report* (ACHAR). This AAIA will be an appendix to the ACHAR.

The Project seeks to extend the life of Glendell Mine to 2044 with an increase in the current approved extraction rate of 4.5 million tonnes per annum (Mtpa) to up to 10 Mtpa over the life of the Project.

Key aspects of the Project include the continuation of the Glendell Pit to the north (Glendell Pit Extension), the realignment of a section of Hebden Road, the realignment of a section of Yorks Creek, construction of a new mine infrastructure area (MIA), and relocation of Ravensworth Homestead.

The fieldwork component of this assessment consisting of survey and test excavation was undertaken by OzArk, Registered Aboriginal Parties (RAPs) and Wonnarua Knowledge Holders over the course of several weeks in April, May and September 2018. The field survey (discussed in **Section 5**) and the test excavation (discussed in **Section 6**) was broken into five weeks and involved 25 field days in total. OzArk and RAPs also participated in the historic heritage test excavation program completed over 15 days between October and November 2018.

69 new sites were recorded during the survey consisting of: 39 artefact scatters; 29 isolated finds; and one scarred tree.

Of the artefact scatters, 32 sites recorded less than 10 artefacts and no site contained more than 70 artefacts. At nine locations it was assessed that there are subsurface deposits. One of these sites was determined to have a moderate artefact density (Glendell North OS6), however, none of the recorded sites was remarkable in its manifestation; either in terms of the types of artefacts recorded, the raw material the artefacts were manufactured from or the density and nature of the surface artefact manifestation. The recorded sites are also very representative of artefact sites in the upper Hunter Valley both in terms of the types of artefacts recorded and the raw materials from which the artefacts were manufactured.

The test excavation program involved excavation of 152 0.5 m by 0.5 m excavation squares at 12 separate localities: a total of 38 square metres. From this area of excavation, 180 artefacts were recovered; an average of 4.7 artefacts per square metre or 1.18 artefacts per excavation square.

This density of artefacts is extremely low and only two excavation squares recorded more than 15 artefacts.

Most of the excavation squares did not have overt evidence of disturbance, apart from Areas 2 and 12 where historic items were recorded in some of the excavation squares. However, as most of the squares had what can be described as a very truncated A1-Horizon and a leached A2-Horizon, the implication is that the landscape has been subject to the stripping of the A1-Horizon and the exposure of the A2-Horizon. The implicit conclusion is, therefore, that the landscape has undergone a high general disturbance from soil loss that has compromised the archaeological deposits across the Additional Disturbance Area. As such, the general condition of the archaeological landscape within the Additional Disturbance Area is assessed to be poor.

No evidence of colonial conflict or skeletal remains was identified during the survey or test excavation programs. As such, nothing in the current archaeological assessment was able to corroborate or extend the scant information the written sources provide regarding colonial conflict.

Undertaking an assessment of scientific significance for all sites within the Additional Disturbance Area shows that 84.6% of sites (n=77) have a low scientific significance as they are either isolated finds or low-density artefact scatters (**Section 8.2**). Nine sites have low-moderate scientific significance, five sites have moderate scientific significance, and no sites have been assessed as having high scientific significance.

An assessment of potential impacts to the archaeological values in the Additional Disturbance Area shows that 52 of the 69 newly recorded sites are within or in very close proximity to the Additional Disturbance Area and 39 previously recorded sites are within the Additional Disturbance Area (Section 8.3).

In total, 91 sites are located within the Additional Disturbance Area and will be impacted should the Project be approved. 55 of these sites are artefact scatters (15 of which have PAD) and 36 are isolated finds (one of which has PAD). In general, the artefact scatters have a low artefact density with most sites recording less than 10 artefacts.

Management recommendations are made in **Section 9** to mitigate this loss of archaeological value. These recommendations include:

- Conserving all sites outside of the Additional Disturbance Area by extending the current site monitoring and verification protocols contained in the MOC ACHMP (Section 9.4.8);
- Undertaking a collection and recording of all surface artefacts at all sites within the Additional Disturbance Area where there is a surface manifestation of artefacts (**Section 9.5.1**); and
- To undertake limited manual archaeological excavation at four locations to confirm the nature of the archaeological deposits (**Section 9.5.2**).

Further recommendations regarding Aboriginal cultural heritage are made in the ACHAR that this AAIA accompanies.
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1 INTRODUCTION

OzArk Environment & Heritage (OzArk) has been engaged by Umwelt Environmental & Social Consultants (Umwelt) on behalf of Glendell Tenements Pty Limited (the proponent) to complete an Aboriginal Archaeology Impact Assessment (AAIA) for the proposed Glendell Continued Operations Project (the Project). The purpose of the assessment is to form part of an Environmental Impact Statement (EIS) being prepared by Umwelt to accompany an application for development consent under Division 4.1 and 4.7 of Part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act) for the Project.

Australian Cultural Heritage Management Pty Limited (ACHM) will prepare the *Aboriginal Cultural Heritage Assessment Report* (ACHAR). This AAIA will be an appendix to the ACHAR.

1.1 PROJECT OVERVIEW

The Mount Owen Complex (MOC), which includes the Project Area, is located within the Hunter Coalfields in the upper Hunter Valley of New South Wales (NSW), approximately 20 kilometres (km) northwest of Singleton, 24 km southeast of Muswellbrook. The MOC is situated in the Singleton Local Government Area (LGA) (**Figure 1-1**).

The MOC includes approved open cut operations in three pit areas, the Bayswater North Pit and North Pit (both approved under the Mount Owen Continued Operations Project consent (SSD-5850 as modified) and the Glendell Pit, approved under the Glendell Mine consent (DA 80/952 as modified). The Coal Handling and Preparation Plant (CHPP) washes coal from all three pit areas. The water management system for the MOC is integrated, as well as being linked to Glencore's Greater Ravensworth Area Water and Tailings Scheme (GRAWTS). The MOC is approved to process up to 17 million tonnes per annum (Mtpa) run of mine (ROM) coal through the CHPP with production at each of the three pits approved as follows:

- North Pit up to 10 Mtpa;
- Bayswater North Pit up to 4 Mtpa; and
- Glendell Pit up to 4.5 Mtpa.

The Project seeks to extend the life of Glendell Mine to 2044 with an increase in the current approved extraction rate of 4.5 Mtpa to 10 Mtpa over the life of the Project. Key aspects of the Project include the continuation of the Glendell Pit to the north (Glendell Pit Extension), the realignment of a section of Hebden Road, the realignment of a section of Yorks Creek, construction of a new mine infrastructure area (MIA), and relocation of Ravensworth Homestead (**Figure 1-2**).









1.2 THE PROJECT AREA

All proposed impacts related to construction and operation of the Project will be confined to the Project Area shown on **Figure 1-3**. The Project Area comprises approximately 2,900 hectares (ha); the majority of which is already cleared or is approved for disturbance as part of existing approvals. A large proportion of the Project Area within the MOC has been subject to salvage programs.

The topography of the Project Area is characterised by several low ridges with spurs and low to moderate gradient slopes. Lower topographic areas are associated with Bowmans, Swamp, Yorks and Bettys Creeks (**Figure 1-3**). The creek lines generally flow from the north to the south. Portions of Swamp, Yorks and Bettys Creek have been diverted within the Project Area as a result approved mining activity. The Project Area also contains several unnamed tributaries associated with the previously listed creek lines which flow between the spurs. In the portions of the Project Area that are outside of approved mining areas, the topography is generally flat ranging between around 60 meters (m) above sea level to small rises that are around 140 m above sea level.

The Project Area has been subject to agricultural land uses, including intensive grazing and pasture improvement, as well as mine related activities. All woodland in the Project Area is regrowth and mature trees are very rare. **Figure 1-4** shows the Project Area superimposed on an aerial photo dating from 1958. This shows the almost complete nature of the clearing across the Project Area and large areas of visible sheet wash erosion. Woodland regrowth tends to be thick stands of Casuarina along creek lines and open Eucalyptus woodland on slopes. Other extensive areas within the Project Area have been previously cleared and are still open grasslands currently used for cattle grazing.









1.3 THE ADDITIONAL DISTURBANCE AREA

The Additional Disturbance Area is the area in which all Project impacts currently outside of approved disturbance areas will be located (**Figure 1-5**). The Additional Disturbance Area occupies approximately 750 ha.

The Additional Disturbance Area consists of a large contiguous block to the east of Bowmans Creek. There are also smaller portions to the north of the Ravensworth East mine, as well as a small area in the east on either side of Bettys Creek.

The principal area of the Additional Disturbance Area consists of flat landforms associated with Bowmans Creek and the gentle gradient slopes to the east. While there are some prominent but low hills within the Additional Disturbance Area to the north of the access road to the Glendell Mine, generally the Additional Disturbance Area has a low gradient. As such, the entirety of the Additional Disturbance Area has been subject to cultivation (in areas adjacent to Bowmans Creek) or grazing (in areas away from the Bowmans Creek). Most of the area remains cleared and large portions continue to be used for cattle grazing.

1.4 THE SURVEY AREA

As the Project progressed during 2018, the Additional Disturbance Area has been reduced in size. As such, when the field survey for this assessment was undertaken in April/May 2018, it assessed an area larger than the current Additional Disturbance Area. The area included in the survey for the Project will be termed the 'survey area'. As shown on **Figure 1-6**, the principal areas included in the survey which are no longer part of the Additional Disturbance Area are:

- A large area to the west of Bowmans Creek in the northwest of the Project Area;
- Areas to the north of the Project Area adjacent to Yorks Creek;
- An area to the southwest of the Project Area on either side of Bowmans Creek; and
- A reduced area in the east of the Project Area near Bettys Creek.

The survey area covered approximately 1,010 ha. All areas included in the current Additional Disturbance Area were included in the survey area and have been assessed.

This AAIA will note recordings made within the survey area but any discussion of Project impacts will be limited to the Additional Disturbance Area.









2 THE ARCHAEOLOGICAL ASSESSMENT

2.1 RELEVANT LEGISLATION

Cultural heritage is managed by a number of state and national Acts. Baseline principles for the conservation of heritage places and relics can be found in the *Burra Charter* (Australia ICOMOS 2013). The *Burra Charter* has become the standard of best practice in the conservation of heritage places in Australia, and heritage organisations and local government authorities have incorporated the inherent principles and logic into guidelines and other conservation planning documents. The *Burra Charter* generally advocates a cautious approach to changing places of heritage significance. This conservative notion embodies the basic premise behind legislation designed to protect our heritage, which operates primarily at a state level.

Several Acts of parliament provide for the protection of heritage at various levels of government.

2.1.1 Commonwealth legislation

Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)

Matters of National Environmental Significance listed under the EPBC Act include the National Heritage List and the Commonwealth Heritage List, both administered by the Commonwealth Department of the Environment and Energy. Ministerial approval is required under the EPBC Act for proposals involving significant impacts to National/Commonwealth heritage places.

Aboriginal and Torres Strait Islander Heritage Protection Act 1984

The *Aboriginal and Torres Strait Islander Heritage Protection Act 1984* is aimed at the protection from injury and desecration of areas and objects that are of significance to Aboriginal Australians. This legislation has usually been invoked in emergency and conflicted situations.

2.1.2 State legislation

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

This Act, amended by the *Environmental Planning and Assessment Amendment Act 2017,* establishes requirements relating to land use and planning. The framework governing environmental and heritage assessment in NSW is contained within the following parts of the EP&A Act:

- **Part 4:** Local government development assessments, including heritage. May include schedules of heritage items;
 - **Division 4.7:** Approvals process for state significant development.

As the Project is a State Significant Development (SSD), Section 4.41 of the EP&A Act (formerly Section 89J) applies and certain authorisations, such as an Aboriginal Heritage Impact Permit (AHIP), are not required for the Project. This section also provides a defence for any investigative

or other activities that are required to be carried out for the purpose of complying with any environmental assessment requirements (i.e. SEARs: see below).

National Parks and Wildlife Act 1974 (NPW Act)

Amended during 2010, the NPW Act provides for the protection of Aboriginal objects (sites, objects and cultural material) and Aboriginal places. Under the Act (Part 6), an Aboriginal object is defined as: any deposit, object or material evidence (not being a handicraft for sale) relating to indigenous and non-European habitation of the area that comprises NSW, being habitation both prior to and concurrent with the occupation of that area by persons of European extraction, and includes Aboriginal remains.

An Aboriginal place is defined under the NPW Act as an area which has been declared by the Minister administering the Act as a place of special significance for Aboriginal culture. It may or may not contain physical Aboriginal objects.

As of 1 October 2010, it is an offence under Section 86 of the NPW Act to 'harm or desecrate an object the person knows is an Aboriginal object'. It is also a strict liability offence to 'harm an Aboriginal object' or to 'harm or desecrate an Aboriginal place', whether knowingly or unknowingly. As the Project is a SSD, if approved, Section 4.41 of the EP&A Act will apply and an AHIP under section 90 of the NPW Act to harm Aboriginal objects is not required. Instead, all management related to Aboriginal cultural heritage within the Additional Disturbance Area will be governed by the policies within an approved Aboriginal Cultural Heritage Management Plan (ACHMP).

Under Section 89A of the Act, it is a requirement to notify the Chief Executive of the Biodiversity and Conservation Division (BCD, formerly OEH) of the location of an Aboriginal object. This is normally done by submitting a site card to the Aboriginal Heritage Information Management System (AHIMS) that is administered by the Department of Premier and Cabinet.

Secretary's Environmental Assessment Requirements

Secretary's Environmental Assessment Requirements (SEARs) were issued for the Project (SSD 9349) on 7 June 2018.

The SEARs recognise heritage as a key issue to be examined in the EIS and state (in part):

an assessment (will be undertaken) of the potential impacts of the development on Aboriginal heritage (cultural and archaeological), including consultation with relevant Aboriginal communities/parties and documentation of the views of these stakeholders regarding the likely impact of the development on their cultural heritage

To inform the SEARs, the BCD (formerly OEH) provided input regarding Aboriginal cultural heritage. The BCD input is set out in **Table 2-1** along with a concordance of where the BCD requirements are addressed in this AAIA.

2.1.3 Applicability to the Project

The Project will be assessed under Divisions 4.1 and 4.7 of the EP&A Act.

Any Aboriginal sites within the Additional Disturbance Area are afforded legislative protection under the NPW Act. It is noted, however, that Section 4.41 of the EP&A Act removes the requirement for SSD projects to apply for an AHIP to harm Aboriginal objects.

It is noted there are no Commonwealth or National heritage listed places within the Additional Disturbance Area and as such, the heritage provisions of the EPBC Act do not apply.

Further, a submission made under Part 2, Division 1 Section 10 of the *Aboriginal and Torres Strait Islander Heritage Protection Act 1984* seeking to protect an area that included the Project Area as an Aboriginal Place was withdrawn by the Applicant in September 2019.

The BCD requirements set out in the SEARs are listed in **Table 2-1**, along with a concordance of where this requirement, if applicable, is addressed in this AAIA.

BCD requirement	Where addressed in the AAIA
The Environmental Impact Assessment (EIS) must identify and describe the Aboriginal cultural heritage values that exist across the whole area that will be affected by the development and document these in the Aboriginal Cultural Heritage Assessment Report (ACHAR). This may include the need for surface survey and test excavation. The identification of cultural heritage values should be guided by the <i>Guide to</i> <i>investigating, assessing and reporting on Aboriginal Cultural</i> <i>Heritage in NSW</i> (DECCW, 2011) and consultation with OEH regional branch officers.	This AAIA contains the results of the Aboriginal archaeological survey and test excavation program undertaken for the Project. It also assesses the scientific, or archaeological, values present within the Additional Disturbance Area. This report is part of the ACHAR that will examine the cultural, aesthetic and historic values of the Additional Disturbance Area.
Consultation with Aboriginal people must be undertaken and documented in accordance with the <i>Aboriginal cultural heritage consultation requirements for proponents</i> 2010 (DECCW). The significance of cultural heritage values for Aboriginal people who have a cultural association with the land must be documented in the ACHAR.	This requirement has been followed by the Project and is documented in the ACHAR.
Impacts on Aboriginal cultural heritage values are to be assessed and documented in the ACHAR. The ACHAR must demonstrate attempts to avoid impact upon cultural heritage values and identify any conservation outcomes. Where impacts are unavoidable, the ACHAR must outline measures proposed to mitigate impacts. Any objects recorded as part of the assessment must be documented and notified to OEH.	Impacts to the scientific values within the Additional Disturbance Area are discussed in Section 8.3 . Management considerations ranging from a 'do nothing' scenario through to an 'unavoidable impact' scenario is discussed in Section 9.2

Table 2-1: Concordance between the BCD input to the SEARs and this AAIA.

2.2 ASSESSMENT APPROACH

The current assessment follows the Code of Practice for the Investigation of Aboriginal Objects in New South Wales (Code of Practice; DECCW 2010).

Field assessment and reporting followed the *Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW* (OEH 2011).

2.3 PURPOSE AND OBJECTIVES

The purpose of the AAIA is to identify and assess heritage constraints relevant to the Project.

2.3.1 Aboriginal archaeological assessment objectives

The AAIA will apply the Code of Practice, in the completion of an Aboriginal archaeological assessment, to meet the following objectives:

- <u>**Objective One</u>**: Undertake background research on the region to formulate a predicative model for Aboriginal site location within the Additional Disturbance Area</u>
- **<u>Objective Two</u>**: Identify and record objects or sites of scientific or archaeological significance within the Additional Disturbance Area, as well as any landforms likely to contain further archaeological deposits

<u>Objective Three</u>: Assess the likely impacts of the Project to Aboriginal archaeological sites and/or deposits and provide management recommendations.

2.4 DATE OF ARCHAEOLOGICAL ASSESSMENT

The fieldwork component of this assessment was undertaken by OzArk, Registered Aboriginal Parties (RAPs) and Wonnarua Knowledge Holders over the course of several weeks in April, September, October and November 2018. The survey and test excavation during this time was broken in nine weeks and involved 40 field days in total, namely:

- Week 1: 9-12 April (5 days; survey);
- Week 2: 16-13 April (5 days; survey);
- Week 3: 30 April and 1 May (2 days; survey);
- Week 4: 3-7 September (5 days; Aboriginal test excavation);
- Week 5: 10-14 September (5 days; Aboriginal test excavation);
- Week 6: 17-19 September (3 days; Aboriginal test excavation);
- Week 7: 29 October to 2 November (5 days; historic test excavation);
- Week 8: 5-9 November (5 days; historic test excavation); and
- Week 9: 12-16 November (5 days; historic test excavation).

The historic test excavations were directed by Casey & Lowe and are reported in the Statement of Heritage Impact appended to the EIS. However, an OzArk archaeologist and up to two RAP representatives (including a representative from the Plains Clans of the Wonnarua People (PCWP) were present during the historic test excavations to manage any Aboriginal cultural heritage finds.

2.5 ABORIGINAL COMMUNITY INVOLVEMENT

The Project has followed the Aboriginal Cultural Heritage *Consultation Requirements for Proponents* including the identification of RAPs and the provision of both survey and test excavation methodologies for RAP review and comment (**Appendix 1**; **Appendix 5**).

RAPs, or their representatives, accompanied the field survey and test excavation programs (both the Aboriginal and historic heritage programs). As up to eight members of the Aboriginal community were present for the field survey days highlighted above, and up to six were present during the test excavation program, 186-person days of Aboriginal community involvement has been included in the assessment.

Full details of the consultation undertaken is provided in the ACHAR that this AAIA supports.

2.6 OZARK INVOLVEMENT

2.6.1 Field assessment

The fieldwork component for the AAIA was undertaken by:

- Fieldwork director: Ben Churcher (OzArk Principal Archaeologist, BA [Hons], University of Queensland; Dip Ed, University of Sydney);
- Fieldwork director: Dr Jodie Benton (OzArk Director and Principal Archaeologist, PhD University of Sydney);
- Archaeologist: Stephanie Rusden (OzArk Project Archaeologist, BSc, University of Wollongong, BA, University of New England);
- Archaeologist: Dr Alyce Cameron (OzArk Project Archaeologist, BA [Hons] and PhD [Archaeology & palaeoanthropology] Australian National University);
- Archaeologist: Philippa Sokol (OzArk Project Archaeologist, BA and DipScience, University of New England); and
- Archaeologist: Tom Dooley (OzArk Project Archaeologist BA [Hons]).

2.6.2 Reporting

The reporting component of the AAIA was undertaken by:

- Report Author: Ben Churcher;
- Major contributor: Stephanie Rusden;
- Contributor: Tom Dooley; and
- Reviewer: Dr Jodie Benton.

3 LANDSCAPE CONTEXT

An understanding of the environmental contexts of a project area is requisite in any Aboriginal archaeological investigation (DECCW 2010). It is a particularly important consideration in the development and implementation of survey strategies for the detection of archaeological sites. In addition, natural geomorphic processes of erosion and/or deposition, as well as humanly activated landscape processes, influence the degree to which these material culture remains are retained in the landscape as archaeological sites; and the degree to which they are preserved, revealed and/or conserved in present environmental settings.

The Additional Disturbance Area is located wholly within the Hunter Subregion of the Sydney Basin Bioregion (SBB). The Hunter subregion is situated at the far north of the SBB and contains the townships of Scone, Muswellbrook, Singleton, Cessnock, Maitland and the city of Newcastle. The Hunter subregion is predominantly comprised of rolling hills, wide valleys and the meandering system of the Hunter River on a wide floodplain. A wide range of environments are present within the greater subregion including coastal, dune, estuarine, rainforest, plateau, lowland, riparian and swamp ecosystems; not all of which are represented in the Additional Disturbance Area. The Hunter subregion encompasses the catchments of Goulburn, Hunter, and Paterson Rivers (NSW NPWS 2016).

3.1 **TOPOGRAPHY**

The Additional Disturbance Area falls within the southern portion of the Gloucester foothills topographic zone of the Hunter central lowlands. This greater landscape is characterised by gently undulating lowlands developed on easily eroded Permian sedimentary rock above the alluvial belt of the Hunter River, gradually transitioning into rounded to steep hills with rock outcropping in excess of 300 m AHD (Australian Height Datum) (NSW EPA 2013; Umwelt 2007). The topography of the Additional Disturbance Area is characterised by a number of low ridges with spurs and low to moderate gradient slopes. Elevation is at its greatest (up to 140 m AHD) on the steep conglomerate ridge in the centre of the area (**Figure 3-1**), abruptly transitioning into undulating hills and gentle slopes. These gentle landforms represent the greatest portion of the landscape, together forming a series of minor valleys sloping towards Bowmans Creek, Yorks Creek, and Swamp Creek respectively before levelling out into flats and floodplains (**Figure 3-1**).

For the purposes of this assessment, this landscape can be divided into three survey units based on topographic zones which inform an archaeological characterisation of its landforms. These contiguous areas can be briefly characterised as follows:

• <u>Flats and floodplains</u>: Approximately 414 ha or 55 per cent of the Additional Disturbance Area consists of flat terrain or gentle toe slopes. This terrain contains the named waterways of the Additional Disturbance Area as well as sections of their unnamed tributaries. These areas include substantial sections of floodplain and creek terraces, especially adjacent Bowmans, Yorks and Swamp Creeks. Most of this landscape zone is currently cleared and either consists of grass paddocks or small stands of regenerating woodland. Soil depths are variable, and it is only in the southwest of the Additional Disturbance Area adjacent to Bowmans Creek where aggrading conditions have allowed soil depth to accumulate.

- <u>Slopes</u>: Approximately 299 ha or 40 per cent of the Additional Disturbance Area consists mostly of elevated sloping landforms (lower to upper slopes). This zone is predominantly located in the south-east and central northern portions of the Additional Disturbance Area. This topography contains steep gradients in places but is more generally characterised by moderate slopes. These landforms primarily represent open grassland paddocks, yet also currently support select areas of open woodland of regenerated trees with very few mature trees. Rock outcrops are frequent in the central portion and, to a lesser extent, the northern portion of the Additional Disturbance Area. Soils tend to be very thin due to soil loss when this area was historically cleared of vegetation.
- <u>Ridges</u>: Approximately 37 ha or five per cent Additional Disturbance Area consists of raised areas with a confined summit. This zone includes two discrete ridge lines; the first a north-south trending ridge line in the north west of the Additional Disturbance Area; and the second a generally east-west trending ridge in the central portion of the Additional Disturbance Area. These landforms currently support areas of open woodland of regenerated trees with very few mature trees, as well as cleared, grassed paddocks. Outcropping rock is present across the ridges and consists on conglomerate, the underlying bedrock of the area. Soils tend to be very thin due to soil loss due to the naturally eroding nature of the landform type.

Figure 3-1 maps the major topographic zones of the Additional Disturbance Area and **Figure 3-2** shows a representative view of each of these topographic zones.







Figure 3-2: Examples of the topography of each survey unit.

3.2 GEOLOGY AND SOILS

The Additional Disturbance Area is situated within the Permian Singleton Coal Measures, with some surface geology also being formed by the Permian Wittingham Coal Measures, as determined from regional geological mapping (Kovac and Lawrie 1991). According to Umwelt (2019: 15–21) there are six soil orders within the main portion of the Additional Disturbance Area:

- Sodosol: brown, red, yellow, grey or back Sodosols occur on the hillslope or foot slope of the rolling hills. Sandstone rock outcrop and surface rocks are scattered throughout the hillslopes, however the densities of these are low and occurrences are random. Rock outcrops are predominately flat. The Sodosols within the Additional Disturbance Area were generally characterised by A-Horizons with a silty or sandy loam to silty or sandy clay texture overlying a B2-Horizon with a light medium to medium heavy clay texture. Many of the Sodosols showed a bleached A2-Horizon and medium pebbles were often present. Bleaching of the soils is likely attributed to imperfect drainage and water logging.
- Tenosol: occur as brown-orthic and are associated with the floodplains of Yorks, Bowmans and Swamp Creeks. Due to the lower flow capacity of Yorks and Swamp Creek, the floodplain and associated Tenosols have a relatively narrow distribution. The textures of soils on the lower terraces were sandy clay loams, sandy loams and sand. On the upper terraces, sandy to silty clay loams are the dominant soil textures. Soils structures are mainly apedal to weak sub-angular blocky.
- Rudosol: clastic rudosols occur on hill crests where weathering of parent material is insufficient to form a more mature soil profile. Stratic Rudosols are found where repeated fluvial depositions have occurred without further soil profile development. The clastic Rudosols are derived from the underlying sandstone whereas the stratic Rudosol is formed from *ex situ* material deposit. The clastic rudosols have a sandy clay loam texture with a weak granular to strong sub-angular blocky structure and few coarse fragments throughout the profile. Soil textures of the stratic rudosols ranged from loamy coarse sand to silty clay loam, the profiles showed an apedal to weak, granular and sub-angular blocky structure.
- Kandosol: brown Kandosols occur isolated on hilltops, foot slopes and on a lower alluvial terrace. The occurrence of Kandosols may be a result of the weathering of isolated, coarser grained sandstones or sandstone conglomerates. Soils have a clay loam texture grading into light clay or sandy loam with apedal massive to moderate sub-angular blocky structures. Common to many moderate mottles were evident in the B-Horizon of all profiles which indicates waterlogging.
- Chromosol: brown or black Chromosols occur on the upper terrace of the creek floodplains and in one occasion on the mid-slope of the rolling hill. The Chromosols from the floodplain are derived from *ex situ* material. The A-Horizon texture of the floodplain Chromosols ranged from sandy loam, sandy clay loam and silty clay loam with a weak to moderate, granular to sub-angular blocky structure. The upper B textures were coarse sandy light medium clay medium clay and medium heavy clay, with predominately moderate sub-angular and angular blocky structures.
- Dermosol: red, black and brown Dermosols are found in isolation in floodplains areas and to a limited extent on a mid to lower slopes. Dermsolos on the floodplains are formed from exsitu material, while on the mid to lower slopes it may be a result of a slight variation of the
underlying sedimentary (mudstone) geology. The A-Horizon has a light clay texture with a moderate granular structure.

The majority of the Additional Disturbance Area is covered by soils that have a minor to moderate susceptibility to erosion, poor fertility, and high salinity, except for areas adjacent to Bowmans Creek where chemical fertility is higher and salinity levels more benign.

3.3 HYDROLOGY

The primary watercourse and catchment zone within the Additional Disturbance Area is Bowmans Creek (**Figure 3-3**). This stream traverses the western boundary of the Additional Disturbance Area along a generally north–south orientation, intersecting the boundary in several places. In the vicinity of the Additional Disturbance Area, Bowmans Creek is joined by Yorks Creek, Swamp Creek, Bettys Creek, along with a number of unnamed tributaries and flows towards its confluence with the Hunter River 3.5 km to the south.

Many sections of drainage lines near the Additional Disturbance Area, especially unnamed tributaries, have been subject to heavy erosion, sedimentation, and bank collapse. Some display evidence of salinity, primarily in the form of areas of spiny rush (*Juncus acutus*). Additionally, local sections of Yorks, Swamp, and Bettys Creeks have been diverted and/or modified because of approved mining activities (**Figure 3-3**).

At the time of the survey, Yorks Creek, Swamp Creek, and Bettys Creek were dry because of drought conditions preceding the survey (**Figure 3-4**). While the routes of these drainages have seen significant alteration in the historic period, the dryness of these creek systems in the Additional Disturbance Area are an indication of their ephemeral nature. While these systems may have contained ponds prior to their channelisation, it is unlikely that these ponds would have been extensive enough to retain water during long dry spells.

Bowmans Creek retained some silted, standing pools of water in some areas. However, the level of these pools diminished over the course of the survey. This may suggest that this system has the capacity to retain water during dry spells for a restricted period of time.







Figure 3-4: Examples of the hydrology within the Additional Disturbance Area.

3.4 VEGETATION

In the past, Aboriginal people would have encountered a variety of vegetation communities in the region of the Additional Disturbance Area, however, extensive areas of native vegetation have been cleared since colonial settlement.

The Additional Disturbance Area encompasses sections of the Central Hunter Foothills, and Upper Hunter Channels and Floodplains landscape units (Mitchell 2002). Before historical clearing, the dominant vegetation of the Central Hunter Foothills landscape unit would have been comprised of woodlands to open forest of spotted gum, forest red gum, narrow-leaved ironbark, red ironbark, white box, slaty gum, rough-barked apple, with kangaroo and wallaby grass (Mitchell 2002: 112). The vegetation of the Upper Hunter Channels and Floodplains landscape unit would have comprised of open grassland with Blakely's red gum, white box, yellow box, and rough-barked apple on saline flats, with casuarinas along streams (Mitchell 2002: 89).

Currently, the primary vegetation of the Additional Disturbance Area includes mostly derived native grassland paddocks with small pockets of exotic grasslands, dense casuarina regrowth forests and stands of open regrowth eucalypt woodland on flats and slopes (**Figure 3-5**). Similarly, local ridges and spurs have shallow soils as evidenced by rock outcropping and primarily support sparse grass cover. Vegetation along the named drainage lines largely constitute boxthorn thickets and stands of regrowth casuarina, with few remnant mature trees remaining. As such, there are no noteworthy stretches of remnant vegetation which would be consistent with those characterising the landscape pre-colonial settlement.



Figure 3-5: Examples of vegetation types within the Additional Disturbance Area.

3.5 CLIMATE

The nearest Bureau of Meteorology (BoM) record station to the Additional Disturbance Area is situated at the Singleton STP location (BoM 2018). Climate statistics from the Singleton STP indicate that the region experiences a mostly temperate climate with temperatures above zero during the cooler months. The climate statistics show that the highest mean monthly temperatures are in January (31.9°C) and the lowest mean monthly temperatures are in July and August (4.3°C). Rainfall

is greatest in February (mean rainfall: 85.6 millimetres [mm]) and the lowest in July (mean rainfall: 24.3 mm). The annual average rainfall is 659.1 mm.

As such, the climate of the region would not have offered any obstacles to past Aboriginal occupation.

3.6 LAND USE HISTORY AND EXISTING LEVELS OF DISTURBANCE

The Additional Disturbance Area is bordered to the southeast and east by the existing Glendell and Ravensworth East coal mines, respectively. Land parcels situated within and to the north, west and south of the Additional Disturbance Area are dominated by low intensity grazing. Collectively these land uses dominate the area surrounding the Additional Disturbance Area.

Figure 3-6 shows the Additional Disturbance Area superimposed on to a 1958 aerial image. This imagery allows an examination of the types of impacts that have occurred to the landforms within the Additional Disturbance Area because of European farming practices. These include:

- <u>Extensive clearing of native vegetation</u>. Apart from some small pockets of vegetation along sections of creek lines, the majority of the Additional Disturbance Area has been cleared. This would suggest that certain site types, such as scarred trees, will be extremely rare within the Additional Disturbance Area. In addition, extensive clearing will have encouraged downslope movement of soils. As the Additional Disturbance Area is generally sloping from east to southwest, this would indicate that soils, as well as the artefacts that may have been within them, have accumulated in the south-western portions of the Additional Disturbance Area or along drainage lines.
- <u>Soil movement</u>. As noted above, landforms within the centre and east of the Additional Disturbance Area are within degrading environments, while landforms in the southwest adjacent to Bowmans Creek are within an aggrading environment. The archaeological implications are that sites in the north may have been displaced or destroyed, while sites in the southwest are either buried or are representations of artefacts that have accumulated in these more low-lying areas.
- <u>Cultivation</u>. The 1958 aerial shows several areas of the Additional Disturbance Area under cultivation. Physical inspection confirmed that cultivation has impacted the floodplains and terraces of many creek lines within the Additional Disturbance Area. Cultivation acts to redistribute artefacts both horizontally and vertically within the soil profile and ultimately destroys the integrity of artefact assemblages within the top 50 centimetres (cm) of the soil profile.
- <u>Erosion</u>. Inspection of the 1958 aerial does not suggest that erosion adjacent to creeks was
 extensive during this time. However, physical inspection of the Additional Disturbance Area
 during the current assessment found that erosive degradation of drainages has been
 extensive in the past. The drainage systems of the Additional Disturbance Area, especially,

Yorks, Swamp, and Bettys Creeks, have become channelised and many show evidences of bank collapse. Previous studies of the soil profiles exposed in the banks of Swamp, Yorks and Bettys Creeks indicate that these creeks formerly had shallow channels with a chain of ponds morphology (Umwelt 2004). In some areas, erosion has formed gullies up to 2 m deep. Large areas of sheet wash erosion are present in the north and centre of the area. Additionally, extensive gully erosion of unnamed drainages and sheet wash erosion of adjacent landforms was identified across the Additional Disturbance Area.

More recently, approved coal mining activities, has been the major source of impact within the landscape. Coal mining activities have resulted in the modification of portions of Yorks Creek, Swamp Creek, Bettys Creek and surrounding landforms.

In summary, the impact of European farming practices within the Additional Disturbance Area has led to a significant modification of the pre-1788 environment. This includes a marked change in vegetation cover, increased erosion and morphological changes to the local creeks. The impact of all these disturbances on the archaeological record is profound and any archaeological investigations of areas such as the Additional Disturbance Area are inevitably examining a depleted and disrupted archaeological landscape.

3.6.1 Land use conclusion

The predominant land uses within the localities surrounding the Additional Disturbance Area include grazing, intensive agriculture, rural residential and commercial land uses. Other surrounding land uses include bushland, areas set aside for conservation, community uses, Commonwealth Government land use and State Forest.

The Additional Disturbance Area has been subject to agricultural land uses, including intensive grazing, pasture improvement and cultivation. This has resulted in a landscape that is a patchwork of existing and demolished residences, fencing, roads, and dams and other earthworks. Due to the erodible nature of the soils the intensive use of the area has resulted in sizeable areas of erosion; both sheet wash and gully erosion (**Figure 3-7**).

Other disturbances within the Additional Disturbance Area include infrastructure installations such as former and current communications, including a Telstra communications tower, and electricity transmission lines (ETLs), approved mine related activities related to the establishment of operational areas and infrastructure, exploration, installation of groundwater monitoring bores and other soil investigations (**Figure 3-7**). Mining related disturbances were subject to Due Diligence inspections prior to the works commencing (OzArk 2015a; EMM 2017 & 2018; OzArk 2017b, c & d; OzArk 2018a & b).







Figure 3-7: Examples of disturbances within the survey area.

3.7 Environmental context conclusion

Review of the environmental landscape of the Additional Disturbance Area and surrounding landforms presents a landscape that has been extensively disturbed and modified, primarily because of agricultural practices and associated hydrological changes.

In the past, the presence of semi-permanent watercourses, such as Bowmans Creek and its tributaries, would have provided resources to enable short-term occupation within the Additional Disturbance Area. However, due to the naturally occurring high salinity of the watercourses within the Additional Disturbance Area, occupation was probably more restricted along this watercourse when compared to areas closer to the Hunter River.

As all watercourses within the Additional Disturbance Area have a relatively restricted catchment, and all were dry or diminishing at the time of the survey, the indication is that these systems would have only supported sporadic and short-term visitation. While it is accepted that some of these systems may have had a Chain of Ponds morphology prior to their modification following colonial settlement, it is suspected that these ponds would not have been extensive enough to encourage long-term occupation.

Mapping these landform features demonstrates the environmental zones most conducive to Aboriginal occupation within the Additional Disturbance Area (**Figure 3-8**). This figure shows the Additional Disturbance Area with a 100 m buffer on either side of Bowmans, Swamp, Yorks and Bettys Creeks, all semi-permanent or ephemeral waterways, and a 50 m buffer on either side of the tributaries of these named waterways. **Figure 3-8** shows that most of the Additional Disturbance Area is outside of any environmental zones conducive to Aboriginal occupation.

Extensive clearing of much of the Additional Disturbance Area has likely removed any culturally modified trees, disturbed significant portions of the landscape, and translocated much of the archaeological material record into a secondary context. Erosion, however, will also mean that larger sites, while disturbed, will be more visible and more likely to be recorded.





4 ABORIGINAL ARCHAEOLOGY BACKGROUND

4.1 ETHNO-HISTORIC SOURCES OF REGIONAL ABORIGINAL CULTURE

The Additional Disturbance Area is in the Wonnarua tribal area of the upper Hunter Valley.

The Aboriginal people in the region of the Additional Disturbance Area lived in an environment rich in food resources. Freshwater fish, shellfish, reptiles, mammals, birds and plant food provide a diverse diet. Brayshaw (1986: 82) suggests that inland groups visited the coast during the summer when marine resources were plentiful, and coastal groups travelled inland to participate in the winter kangaroo hunts. Trade and/or exchange also occurred between the coastal and inland groups including visiting by coastal and inland groups for initiations and ceremonies seemed to occur. These were conducted within earthen circles. Carved trees were associated with these sites (Brayshaw 1986: 86). Reed spears and shells were traded inland for possum skin rugs and fur cord (Brayshaw 1986: 41).

The only known ethnographic mentions of the use of stone artefacts relate to the use of stone hatchets as multi-purpose tools and of the attachment of quartz flakes as barbs on spears (Brayshaw 1986: 66, 68). There is also little ethnographic evidence concerning the locations of regional Aboriginal camping places, however, the factors of proximity to fresh water and of elevation for visibility are mentioned as important considerations (Fawcet 1898).

4.2 COLONIAL OCCUPATION

Due to its proximity to Sydney, its nutrient rich alluvial soils, grazing pastures for livestock and cedar trees on the higher terraces of the valley, the Hunter Valley was a desirable location for early colonial settlement. Within a short timeframe, the Aboriginal people of the area had to deal with the depletion of their resources and major changes to the environment caused by ill-informed colonial farming practices.

The early colonial settlers observed valleys of grassland and rich alluvial soils adjacent to the major waterways that were ideal for agriculture and cattle/sheep grazing, and soon the prime land was occupied. But the allure of the area continued and as more colonists settled in the Hunter Valley the more marginal hill slopes were occupied and cleared of standing timber.

As noted by Tocomwall (2017: 35):

By 1825 more land was owned by the new settlers and the original Aboriginal inhabitants became increasingly disenfranchised from their traditional lands. The invasion by the European settlers changed the distribution of vegetation, with increasing landscape instability as a result of the logging of the forested areas around the higher elevations and the clearing of the brush around the understorey and along the tributaries for agriculture and pastoral farming. Aboriginal dependence of the Hunter River for many staples meant that the Wonnarua suffered severely when the Europeans settled: they immediately lost access to water and the raw materials in the river and on the banks. They also lost their game to the intruders who chased kangaroos in hunts to reduce competition for their introduced grazing animals; shellfish and fish populations also declined. Breton (1833) wrote that he only noted 16 kangaroos, in contrast to a previous visit to the area when they had numbered in the hundreds. The loss of fish for protein and the loss of managed plains for game hunting and seed gathering destroyed long established hunting and gathering practices of the Aboriginal community. This exclusion and alteration of the landscape by the Europeans brought them into conflict with the local Wonnarua People.

Conflict between the Wonnarua and colonial settlers is documented in the wider region of the Additional Disturbance Area. AHIMS site 37-3-0390 (Ravensworth Massacre Site) is located on the western side of the New England Highway and outside of the Project Area (**Figure 4-2**). This site recording registers the historic account of the murder of 18 Aboriginal people in 1827, however primary source historic information has this event occurring in September 1826.

As noted on the site card, the location of the massacre was 'near (the) town of Ravensworth' although the 'exact location (is) unknown'. However, available historic information indicates that the massacre was not 'near the town of Ravensworth' as research has shown that the event occurred approximately 20 miles (32 km) from Alcorn's hut, which was the site of an earlier skirmish near Glennies Creek. The plotting of a 32 km radius circle from Alcorn's hut near Glennies Creek places the massacre event well beyond the Project Area. While the exact location may now be extremely difficult to pin-point, the historical accounts show that the wide-spread frontier war that accompanied the first colonial settlement of Aboriginal lands across Australia, also occurred in the Hunter Valley.

Further details on the outcomes of historical research by Dr Mark Dunn into the interactions between Aboriginal people and early settlers at the Ravensworth Estate and surrounding areas are provided in the ACHAR.

4.3 REGIONAL ARCHAEOLOGICAL CONTEXT

There have been numerous archaeological investigations in the local area with a significant number undertaken in the Additional Disturbance Area itself. The results of these investigations provide an archaeological context for the current assessment and were used in the preparation of a predictive model of Aboriginal site location (Section 4.5). The following section (Section 4.3.1) refers to archaeological investigations in areas outside of, but relevant to, the Additional Disturbance Area. Section 4.4.2 refers to those investigations that were entirely or partially within the Additional Disturbance Area, including salvage programs that have taken place at Glendell.

No declared Aboriginal places (under section 84 of the NPW Act) have been identified in the Additional Disturbance Area or its surrounds.

Aboriginal cultural heritage values may be identified through further Aboriginal consultation concerning the Additional Disturbance Area. These may relate to social, cultural or historic values associated with Aboriginal sites and objects or places with intangible values. If such cultural values are provided, they will be set out in the ACHAR.

4.3.1 Previous archaeological studies in the region

4.3.1.1 Antiquity

The Aboriginal occupation of Australia begins prior to 40,000 BP (years before present) and possibly earlier than 50,000 BP. Dates exceeding 20,000 years occur in almost all parts of Australia resulting in the expectation that most areas should have a Pleistocene (>12,000 BP) occupational signature. However, such dates remain relatively rare due to a range of factors, both behavioural and post-depositional. These factors include a possible low density of occupation in the Pleistocene period, poor preservation of archaeological materials (particularly dateable organic materials) and significant coastline change over the past 18,000 years.

In 1986, Koettig undertook an archaeological survey approximately 6 km southeast of the Project Area between Glennies Creek and Singleton (cited in Umwelt 2003). Following that survey, Koettig carried out several excavations at six locations along Glennies Creek. Koettig considered artefacts found in Site SGCD 16 (about 1 m deep in Unit B of on an old alluvial terrace) were 'markedly different' to artefacts recovered from the artefacts in Unit A. Her conclusion was formed based on the raw material used, large number of cores, the large percentage of cortex remaining on artefacts and larger sizes of artefacts. Artefacts from Unit B were from volcanic rocks while those in Unit A were predominantly mudstone and silcrete. Later, a date of >20,200 BP was obtained from a hearth associated with the artefacts placing the site well into the Pleistocene.

4.3.1.2 Archaeological characteristics

Evidence from the Central Lowlands sub-region of the Hunter Valley (broadly between Murrurundi in the north and Cessnock in the south-east), suggests that archaeological material is scattered almost continuously, but in varying density, along most creek banks and flats. It has been suggested that archaeological material is primarily contained in a corridor approximately 100 m wide on either side of a creek channel (Koettig 1990: 13).

In broad terms, these open artefact scatters appear to be confined to the A-Horizon of the soil (topsoil) profile which is generally less than 50 cm in depth (Hughes 1981; Stern 1981). These sites are often disturbed, and stratification is unclear (Hughes 1984: 8). Artefacts are generally manufactured from indurated mudstone and silcrete, with quartz, petrified wood and chert occurring less frequently (Hiscock and Koettig 1985). Features found at open surface scatters include hearths, pits, ovens and heat treatment areas (Burton *et al.* 1990). These sites are generally detected where some form of ground disturbance has occurred, for example erosion due to both cultural and non-

cultural processes, and thus the extent of the site is often difficult to determine. Often the density of artefacts on the surface do not relate to the amount of subsurface archaeological material (see Koettig 1990: 15).

Archaeological excavations have so far determined that human occupation of the Hunter Valley has occurred since the last Glacial Maximum approximately 27,000–17,000 BP (HLA-Envirosciences 2005). It is hypothesised that evidence predating this period will likely be discovered in the future.

A review of GHD (2005), HLA-Envirosciences (2005) and Umwelt (2007) provides the following regional synthesis:

- Archaeological sites, even where surface evidence is not present, occur on most landforms. This was confirmed by an HLA-Envirosciences (2005) excavation program, in which Aboriginal sites were encountered on alluvial terraces, flats, slopes, bench areas, spurs and ridgelines. HLA-Envirosciences acknowledges that the sample areas were biased somewhat as they were all near creek lines;
- Site frequency and density are dependent on their location in the landscape. This theme is consistent throughout NSW and is influenced by a range of factors, the most relevant of which the existing level of disturbance. More specifically, the potential for undisturbed *in situ* deposits remaining in the upper Hunter Valley on a mining property is generally low;
- The highest concentration of Aboriginal sites on the floor of the Hunter Valley is associated with creeks and waterways;
- Few scarred trees are recorded reflecting the high degree of tree clearing in the region;
- The most frequently recorded raw material is indurated mudstone (a fine gained siliceous material) associated with Hunter River gravels. Other frequently recorded materials include locally sourced silcrete, quartz and volcanic stones; and
- Assemblages recorded in the region consist largely of unmodified flakes with few formed tools. Backed blades comprise the characteristic diagnostic artefact in the region. The midto late-Holocene appears to have witnessed this move to smaller tools, perhaps as an impetus to conserve raw material during tool manufacture or due to new functionality requirements. This impetus seems to have driven the development of what Hiscock (1993) calls the Redbank A Strategy (RAS, after three sites along Redbank Creek within the United Colliery south of Singleton) of backed blade production. It is noted that RAS reduction has been infrequently recorded at other sites in the district.

4.3.1.3 Previous studies

A very large amount of archaeological work has been undertaken in the Hunter Valley and only a brief regional archaeological context that focuses on work in similar landforms to the Additional Disturbance Area is provided here.

Previous studies conducted in closer proximity to the Additional Disturbance Area are outlined below.

Resource Planning (1991) undertook a large assessment for the Mount Owen Coal Project that was focussed on Swamp and Yorks Creeks, located immediately east of the Additional Disturbance Area. This study included 25 km of drainage line (including left and right banks) along Swamp Creek and Yorks Creek. Traverses were also made across side slopes and along ridge lines. The survey area totalled 370 ha. 98 Aboriginal archaeological sites, ranging from isolated artefacts to dense concentrations of more than 100 pieces of flaked stone, were mapped and recorded. Table 4-1 presents the artefact densities recorded by Resource Planning and this shows clearly that Swamp Creek displays a lower artefact density when compared to Yorks Creek. In the case of Swamp Creek over 75% of sites were isolated finds or very low-density artefact scatters while along Yorks Creek 54% of sites recorded over 50 artefacts at each site (a moderate artefact density). Resource Planning noted that the sites in the Swamp Creek catchment are regarded as an excellent representative assemblage of occupational evidence in the small tributary valleys of the Hunter River (Resource Planning 1991: 5). This report recommends, based on the survey evidence "that part of the Yorks Creek drainage line would be set aside as an archaeological conservation zone" (Resource Planning 1991: 5): a recommendation that was followed as a section of the northern reaches of Yorks Creek are now within a permanent Voluntary Conservation Area (VCA). The Yorks Creek VCA is located outside the Project Area.

Artefact Numbers	Swamp Creek (%)	Yorks Creek (%)
Isolated Artefact	28	9
<10 Flakes	50	18
10-20	14	18
20-50	6	27
50-100	2	18
>100	0	9

Table 4-1: Artefact densities at sites recorded by Resource Planning 1991.

<u>Resource Planning (1993)</u> surveyed areas along Bettys Creek: locations that are now within the current Mount Owen disturbance area to the northeast of the Additional Disturbance Area. The western boundary of the survey area was defined by the drainage divide between Bettys Creek and Swamp Creek (now no longer extant but can be seen in historic aerial photographs: **Figure 3-6**). The southern boundary was formed by the proposed lease extension boundary. The proposed extension resulted in the disturbance of an additional 260 ha of land, including approximately 100 ha of the then Ravensworth State Forest.

The survey recorded 39 archaeological sites, of which 34 were recorded in detail. It was found that most sites were situated close to the drainage lines and that their location represented a verifiable distribution and was not a bias of survey coverage. It was, however, noted that erosion plays a vital role in the identification of sites. This is because, the report argued, most sites are subsurface in origin.

All the sites recorded were open artefact scatters although their content varied from one artefact to several hundred artefacts. The artefact types appear in the main to be the product of backed blade manufacture (Resource Planning 1993: 4). There were some sites, in the report's opinion, which had a high potential for further archaeological investigations due to their potential to contain subsurface deposits and the quantity of artefacts present. Several artefacts revealed retouch, the majority of which were classed as part of the backed blade industry. As with other sites in the Swamp Creek area, and other parts of the Hunter Valley, the dominant raw material was indurated mudstone/tuff followed by silcrete.

<u>OzArk (2017a)</u> was engaged by Umwelt, on behalf of Mt Owen Pty Limited to complete an Aboriginal Cultural Heritage Assessment Report (ACHAR) for the Mount Owen Continued Operations Modification 2.

The proposed modification disturbance area consisted of two portions: a smaller northern portion on both sides of, and south of, an existing diversion of Bettys Creek (Area A; approximately 9 ha); and a larger portion to the southeast of the Mount Owen North Pit (Area B; approximately 37 ha). Both areas are to the east of the Additional Disturbance Area.

The fieldwork component of the assessment was undertaken by an OzArk archaeologist and representatives of RAPs and Wonnarua Knowledge Holder Groups on 31 August 2017.

No Aboriginal sites were recorded during the assessment. Further, no landforms within the proposed disturbance area was seen as having potential to contain further, subsurface archaeological deposits due to the moderate level of disturbance across the proposed disturbance area and the generally thin soils.

MOCO IF-3 (37–3–1198) was the only valid previously-recorded site within the proposed disturbance area. This site was revisited during the site inspection, however, despite good areas of exposure, the artefact was unable to be located. One previously recorded site 37-3-0687 (MC-7) is located outside but close to the proposed disturbance area. This site may be harmed by future erosion stabilisation works along Main Creek and management recommendations regarding this site are made in OzArk 2017a.

4.3.2 The Place

The Place is shown in **Figure 4-1** and defined as being all the land located within the historic boundaries of the three land grants forming the core of the Ravensworth Estate (including Ravensworth Homestead), which is Portions 149 and 150 of the Parish of Liddell and Portion 1 of the Parish of Vane. Together this land comprises Dr. James Bowman's original "10,000" (10,439) acre (4,300 ha) land grants applied for under Governor Brisbane in 1824. The heritage significance of items within the Place is considered further in the Statement of Heritage Impact (refer LSJ 2019).

Two AHIMS searches were completed on 9 May 2019 and used in conjunction with the four searches completed on 5 November 2019 to provide coverage over The Place. 258 registered AHIMS sites are located within The Place, 158 of which remain extant in the landscape and five that are partially destroyed (**Figure 4-1**). Of the remaining valid or partially destroyed sites, site types include artefact site (unspecified number) (n=123), isolated find (n=19), artefact with PAD (12), PAD (n=1), art (engraving) (n=1), scarred tree (n=1), conflict (exact location unspecified) (n=1).

Sites with higher Aboriginal cultural significance are limited to an engraving site on Bowmans Creek (37-3-0772; Bowmans Creek 16) and a scarred tree recorded as part of the assessment for the Project (37-3-1561; GN ST1) as this site type is relatively rare in the immediate region. The conflict site (37-3-0390; Ravensworth Massacre) is significant but as the site card says '*location unknown*' it cannot be certain that the events described by this site recording were located within The Place.

The Place also contains the Yorks Creek Voluntary Conservation Area (VCA) located in the north of the MOC. The Yorks Creek VCA has been highly disturbed by past land clearing and agricultural activities and comprises degraded open pasture land and areas of historic and active erosion along Yorks Creek and its tributaries. The Yorks Creek Catchment Enhancement Project (YCCEP) area, incorporating the Yorks Creek VCA, aims to rehabilitate the landscape to preserve the cultural heritage values contained within it. The Yorks Creek VCA contains approximately 29 ha area of land along Yorks Creek and was established because of the recognised Aboriginal cultural heritage values of the area. These values primarily stem from moderate to high artefact densities in sites associated with Yorks Creek that include knapping floors and a possible hearth.

Two items listed on the Singleton Local Environmental Plan of 2013 (LEP) are located within The Place. These include the Ravensworth Homestead (I41) and the former Ravensworth Public School (I42). The former Ravensworth Public School was destroyed by an arson attack in May 2019. No places listed on either the national or commonwealth heritage lists are located within The Place.

The Place includes land currently subject to Native Title Claim NC2013/006 (NSD1680/2013, Scott Franks and Anor on behalf of the Plains Clans of the Wonnarua People).





4.4 LOCAL ARCHAEOLOGICAL CONTEXT

4.4.1 Desktop database searches conducted

A desktop search was conducted on the following databases to identify any potential previouslyrecorded heritage within the Additional Disturbance Area. The results of this search are summarised in **Table 4-2** and presented in detail in **Appendix 2**.

Name of Database Searched	Date of Search	Type of Search	Comment
Commonwealth Heritage Listings	30/10/18	Singleton LGA	No places listed on either the National or Commonwealth heritage lists are located within the Additional Disturbance Area.
National Native Title Claims Search	30/10/18	NSW	One registered Native Title claim encompasses the Additional Disturbance Area.
Department of Premier and Cabinet Aboriginal Heritage Information Management System (AHIMS)	05/11/18	GDA Zone 56 Eastings: 315100- 321800; Northings: 6406400-6415100. Four searches totalling 6.7 by 8.7 km centred on the Additional Disturbance Area. (see Appendix 2)	302 ¹ sites within the total search area. 39 sites are within the Additional Disturbance Area.
Local Environment Plan (LEP)	30/10/18	Singleton LEP of 2013	Ravensworth Homestead (I41) is located within the Additional Disturbance Area and a former public school (I42) is located 590 m to the west of the Additional Disturbance Area. However, none of the Aboriginal places noted in the LEP occur near the Additional Disturbance Area.

Table 4-2: Al	boriginal heritage	desktop-database	search results.

As per **Table 4-2**, it is noted that the wider region of the Additional Disturbance Area includes land currently subject to Native Title Claim NC2013/006 (NSD1680/2013, Scott Franks and Anor on behalf of the Plains Clans of the Wonnarua People). However, it is understood that there are no Crown parcels eligible for Native Title claim within the Additional Disturbance Area.

Four searches of the AHIMS database² together returned 330 records for Aboriginal heritage sites within a 6.7 km by 8.7 km combined search area centred on the Additional Disturbance Area. 28 of the returned records relate to sites newly recorded during the current assessment which have since been registered. These sites have been removed from consideration in the following discussion of previously recorded AHIMS sites.

Figure 4-2 maps the Additional Disturbance Area in relation to nearby previously recorded AHIMS sites. **Table 4-3** tabulates the AHIMS sites from the search divided into site type.

¹ 28 of the returned sites relate to newly recorded sites. These have not been included in the total.

² Four searches were required due to the number of sites recorded and the extent of the area. AHIMS extensive searches only allow for 120 sites per search.





Site Type	Number	% Frequency (may not equal 100% due to rounding)
Isolated Find	42	14%
Artefact (number unspecified)	214	71%
Artefact Scatter	33	11%
Potential Archaeological Deposit (PAD)	2	<1%
Artefact scatter with PAD	7	2%
Artefact scatter with quarry and PAD	1	<1%
Conflict	1	<1%
Art ³ (engraving)	1	<1%
Restricted	1	<1%
Total	302	

Table 4-3: Previously recorded AHIMS sites near the Additional Disturbance Area: site types and frequencies.

The high sample size of the combined results for these searches allows for a representative understanding of the distribution of site types across the landscape surrounding the Additional Disturbance Area. Stone artefact sites (isolated finds, artefact scatters) are by far the most commonly recorded local site types, together representing 286 (95%) of the 302 sites returned in the AHIMS search area. The majority of these have been recorded in areas of high exposure, with the densest and most complex sites being recorded on distinct landforms in proximity to watercourses. The absence of modified trees conforms with the rarity of this site type for the region, likely related to the extensive clearance that has occurred historically.

These results inform the predictive model for site distribution outlined in Section 4.5.

One site is currently listed on AHIMS as a restricted site. This site, Bowmans Creek Complex (37-3-1506) was registered on 25 September 2018. This site is registered as an Aboriginal resource and gathering site, a burial site and a conflict site. After the registration, AHIMS changed the site status to 'not a site' pending further information being provided to determine the veracity of the large site area. Although this site covers all the Additional Disturbance Area, it does not currently need to be considered as it has no statutory protection⁴. However, should this change, and the site is reinstated on the AHIMS register, the following factors would need to be considered to determine if the values embodied with the site registration exist within the Additional Disturbance Area:

 <u>Aboriginal resource and gathering site</u>: all portions of the Additional Disturbance Area have been cleared of native vegetation in the past and currently only support regrowth trees. While the past disturbances to the landscape do not preclude the presence of Aboriginal resource plants or animals in the Additional Disturbance Area, it is likely that these have been highly disturbed. Further, there are contiguous and identical landforms to the north, and to a lesser

³ Two additional sites are listed on AHIMS as 'art' sites, however the site cards note the sites as being isolated finds.

⁴ As the site is listed as 'not a site' on AHIMS, the site is not included as an AHIMS site within the Additional Disturbance Area for the remainder of this report.

degree to the west, of the Additional Disturbance Area and should Aboriginal resource plants and animals be present within the Additional Disturbance Area, they will continue to be represented in these nearby areas;

- <u>Burial site</u>: due to the agricultural phase of land use in the Additional Disturbance Area, soil
 loss has been considerable and had there been burials in the area, it is likely that these have
 been disturbed and/or dispersed. Further, the Additional Disturbance Area does not contain
 sand bodies—a favoured burial location—and burials are extremely rare at the regional level
 potentially precluding their existence in the Additional Disturbance Area; and
- <u>Conflict site</u>: it is acknowledged that the wider area saw conflict between early colonial settlers and Aboriginal people (see **Section 4.2**), and the land comprising Ravensworth Estate, a potential focus for such conflict, is located within the Additional Disturbance Area. However, while material evidence of conflict in the Additional Disturbance Area cannot be discounted, it is difficult to identify precisely where such events may be located. As such, this aspect of the site recording would need to be borne in mind and responded to at such time when any such evidence comes to light.

4.4.2 Previous archaeological investigations within or overlapping the Additional Disturbance Area

There have been numerous archaeological investigations in the local area and a number within the Additional Disturbance Area itself. The results of these investigations provide an archaeological context for the current assessment and were used in the preparation of a predictive model of Aboriginal site location (Section 4.5). The following sections (4.4.2.1 to 4.4.2.2) refer to archaeological investigations that were entirely or partially within the Additional Disturbance Area and review the salvage programs that have taken place at the MOC.

4.4.2.1 Archaeological survey

Glendell Mining Lease Area (Brayshaw 1982)

The first survey to interact with the Additional Disturbance Area was by Helen Brayshaw in 1982 (Brayshaw 1982). Brayshaw's survey area included areas within the southern portions of the Additional Disturbance Area including the southern 6 km of Bettys Creek and 5 km of Bowmans Creek. Because of this assessment, three open sites and two isolated artefacts were recorded. The three open sites (artefact scatters) were recorded as follows:

- Site A: Artefact Scatter. 30 m west of Bettys Creek, principally on the southern bank of a tributary. 43 artefacts were recorded, occurring at an average density of 1/17 square metres (m²). Raw materials present included indurated mudstone 75%, siltstone 2.5%, quartz 2.5% and silcrete 20%;
- Site B. Artefact scatter. On the western bank of Bettys Creek, about 300 m north of the main northern railway. Four flakes were found here at an average density of 1/30 m²; and
- Site C. Artefact scatter. East of a tributary of Bettys Creek about 200 m north of the confluence. Five artefacts recorded, occurring at an average density of 1/24 m².

A Preliminary Assessment of Aboriginal Relics on the area of Foybrook Power Station Project (Dyall 1982)

To the northwest of the Additional Disturbance Area, along the northern reaches of Bowmans Creek, Len Dyall (1982) recorded 18 artefact scatters and two grinding groove sites. The artefact scatters were small except for one that contained over 150 artefacts. One grinding groove site was suggestive of a seed processing location rather than for axe grinding. Both grinding groove sites are outside of the Project Area.

Archaeological Survey of Pikes Gully Colliery Area, Liddell, NSW (Haglund 1982)

In the same area of Bowmans Creek and to the northwest of the Additional Disturbance Area, Laila Haglund (1982) recorded two artefact scatters:

- Site 1: Aboriginal stone artefacts were noted in several exposures within, and along, the edge
 of a river terrace west of Bowmans Creek. It was noted that the artefacts recorded varied in
 type, size range and density between the exposures. Small thin flakes and small, well-made
 artefacts such as bondi points were noted only close to the southern end. Artefact density
 appeared greater in this part. These observations may reflect real distribution trends, but
 may also result from the smaller and more shallow areas of exposure further north; and
- Site 2: Aboriginal stone artefacts were noted in two exposures along the northeast bank of Bowmans Creek, northwest of its junction with Stringybark Creek, and within a minor erosion gully on the slope above.

Aboriginal Archaeological Assessment - Glendell Open Cut Mine (Umwelt 2004)

Umwelt conducted an Aboriginal Archaeological Assessment for the Glendell Open Cut Mine survey area involving survey during September, October and December 2001, as well as geomorphic investigations during May 2002.

The Glendell survey area incorporated sections of Bowmans Creek, Swamp Creek and Bettys Creek and included the southern portion of the Additional Disturbance Area. As part of the archaeological brief, a desk-top study and an in-field reconnaissance were undertaken with the aim of identifying areas within the Glendell survey area that contained Aboriginal resources. The resources sought for identification within the Glendell survey area included fresh water supplies, food and medicine plants, faunal prey species, stone suitable for implement manufacture, areas suitable for camping, areas that provided an extensive outlook, areas with major and minor creek confluences that had often been found to have Aboriginal camp sites and the terrain units that may have acted as pathways between resource locations.

The information compiled was then used to assist in the preparation of a predictive model related to the location and nature of sites within the then Glendell survey area. In addition, past land-use practices and geomorphic studies were used to determine areas where artefactual material may remain in a relatively undisturbed context. Geomorphic studies were also used to investigate a buried soil profile within the shared Bowmans Creek/Swamp Creek floodplain and to determine the

likelihood of this soil profile containing artefactual material from the late Pleistocene to early Holocene periods.

Because of the research it was concluded that the entire Glendell survey area would have supplied adequate resources for small groups of hunter-gatherers living a mobile lifestyle. Bowmans Creek was highlighted as an area that could have formed the focus of camping activities of longer duration, possibly by larger numbers of people, due to an increased abundance and reliability of the resource base.

Other areas, such as the lower western slopes adjacent to Bettys Creek were assessed as having attracted groups of people for short-term visits to harvest abundant seasonal foods. Bowmans Creek was therefore cited as likely to have the largest sites in terms of spatial extent and numbers of artefacts.

Such sites were predicted as likely to be found on the lower slopes, terraces and floodplains along Bowmans Creek, spreading further across the Bowmans Creek/Swamp Creek floodplain. Bettys Creek and Swamp Creek were listed as likely to have evidence of more sporadic and short-term use as overnight camping locations.

A pattern of site distribution was evident from the previously recorded sites in the locale with most sites located along the watercourses (58%). More of these were associated with ephemeral tributaries (30%) than major creek lines and their associated floodplains and terraces (30%). A little more than half (54%) of the sites were within 30 m of the closest watercourse and 66% within 100 m. In relation to the slopes, sites were more commonly located on the foot slopes/lower slopes (19%), than the crest/upper slopes (17%) and mid slopes (8%).

A total of 37 previously unrecorded sites were located during the 2001 fieldwork survey of the Glendell survey area. The sites consisted of 30 artefact scatters, including one small quarry site with an associated artefact scatter, one scatter in an area with a buried soil profile and seven isolated finds. The Bowmans Creek 5 quarry site was recorded as having an associated artefact scatter as most of the artefacts in the site were manufactured from mudstone and silcrete rather than the quartz and quartzite materials available at the site.

The artefact scatter in the area with the buried soil profile (Bowmans Creek/Swamp Creek Trench 1) was located on the shared floodplain between Bowmans Creek and Swamp Creek. In this area a trench approximately 300 m in length was constructed during the 1980s to divert Swamp Creek into Bowmans Creek. At the time of the 2001 survey the trench was not connected to the creeks and it currently remains unconnected. The artefact scatter eroding from the A-Horizon of the floodplain was observed to be approximately one metre above the buried soil profile. This profile was later determined through geomorphic investigation to be of early Pleistocene to Tertiary age and did not contain any artefactual material (Mitchell 2002).

Artefact analysis of the salvage assemblage recorded:

- Flakes and broken flakes dominated the assemblage (78%), followed by flaked pieces (15%) and cores (3%). Within the flake category, 4% were retouched and half of the retouched flakes were backed. Heat shatter accounted for 3% of the artefacts;
- The mudstone and silcrete flakes were of similar size. Volcanic flakes were generally larger and heavier than flakes composed of other raw materials;
- Volcanic flakes had a significantly higher percentage of cortex than silcrete or mudstone, and mudstone artefacts had a higher percentage of cortex than silcrete;
- Silcrete artefacts had a higher overall rate of retouch than mudstone artefacts (8.2% and 6.3% respectively), and silcrete retouched artefacts were more likely to be backed than retouched mudstone artefacts; and
- Several artefacts relating to colonial occupation of the area were also recovered, including fragments of glass and pottery. The location of this material closely correlated with concentrations of Aboriginal stone artefacts. Additionally, at least one Aboriginal artefact manufactured from glass was salvaged, suggesting that the area was used by Aboriginal people in the post-contact period.

Environmental Assessment for Modification of Glendell Mine Operations (Umwelt 2007)

In 2007 an Environmental Assessment was undertaken to modify the Glendell Mine Development Consent (DA 80/952) to enable the integration of Glendell Mine operations with the approved MOC operations and the implementation of a revised mine plan.

The assessment noted that a range of surveys of the Glendell Mine site had been undertaken to identify areas and sites of significance in relation to Aboriginal archaeology. Appendix 10 of the Environmental Assessment lists several sites that had been previously identified at the Glendell Mine site and have been salvaged in accordance with a permit from the then Department of Environment and Conservation. The assessment stated that the remaining sites within the Glendell Mine site will be protected and managed in accordance with an Aboriginal Heritage Management Plan developed for the site.

Aboriginal Archaeological Values Assessment: Mount Owen Continued Operations (OzArk 2013)

The assessment area for the Mount Owen Continued Operations (MOCO) Project disturbance area covered approximately 500 ha with portions of the assessment area encompassing part of the southern portion of the Additional Disturbance Area.

ACHM was engaged by Mt Owen Pty Ltd to undertake Aboriginal community consultation for the MOCO Project and to author the ACHAR to which OzArk 2013 contributed (ACHM 2013). The ACHM report appeared as Appendix 13a (Parts 1 and 2) of the MOCO Project *Environmental Impact Statement* (EIS) (Umwelt 2015). ACHM 2013 contains the cultural, aesthetic and historic values of the area, while OzArk 2013 contains an examination of the scientific values of the area.

Cultural values

ACHM 2013: 114 summarises the cultural values of the area in which the Additional Disturbance Area is located. What follows is an edited excerpt of the MOCO Project Statement of Significance (ACHM 2013: Section 5:10):

It is noted that the numerous Aboriginal stakeholders who participated in this cultural values assessment process hold values which relate to the wider Hunter Valley region generally, and less directly to the MOCO area specifically. However, one of the Knowledge Holder groups holds very strong values over the MOCO area. Other than the one group expressing strong connection to the MOCO area, there was very little other information presented in the disclosed material or values workshops which relates specifically to the MOCO area.

A common theme in many Aboriginal cultural heritage assessments is the proprietary interest members of the relevant Aboriginal communities hold in regard to the wider cultural landscape including archaeological sites or places within any given area. The project is no exception in this regard. Within the context of the current assessment, there are strong on-going connections to places created and used by ancestors alongside demonstrably strong interests in the manner in which those places are managed or harmed as a result of this project. These sentiments are not unique, and must certainly be considered in the overall assessment of the significance of the places in question. The connection to these places is noted as often being relatively unspecific and generally do not appear to relate to any surviving traditional knowledge or customary cultural practices, apart from one of the Knowledge Holder groups who express a strong connection to on-going cultural knowledge and customary lore in this location.

The cultural values expressed by the participants in this assessment have been consistent in voicing an over-arching concern for the wider landscape and criticism of the negative impact of mining on that landscape. Consistent in the material disclosed is a sense of 'outrage' and grief at the treatment of Aboriginal people since First Settlement (dispossession and genocide are mentioned repeatedly) through to more contemporary experiences (i.e. the Stolen Generation).

ACHM 2013: Section 5:10 concludes:

There is little doubt that the wider cultural landscape surrounding (and encompassing) the MOCO area is of high cultural and historical significance to Wonnarua people. The historical associations with early settlement, conflict, dispossession and survival are important, and the nature of the area as a surviving cultural landscape of significance to numerous members of the Wonnarua people makes this an area of regional and national significance. The regional archaeological record is also of high regional significance.

Overall, the cultural significance of the wider region is considered to be high and requires considerable additional research to fully understand.

Scientific values

The archaeological survey for the MOCO Project took place over two weeks from 26 November 2012 to 7 December 2012. The archaeological test excavation program for the MOCO Project took place over one week from 11 March 2013 to 15 March 2013. In 2014, the proposed disturbance area for the MOCO Project was expanded slightly necessitating a further one day of survey that took place on 29 April 2014. The results of these investigations are detailed in OzArk 2014 and contained in Appendix 13b of the MOCO Project EIS (Umwelt 2015).

Large portions of the MOCO Project (223 ha) had been subject to previous AHIPs with extensive areas having already undergone archaeological assessment and salvage. Within the disturbance area, 18 sites had already been salvaged by manual excavation and more expansive additional areas have been subject to grader scrapes to salvage subsurface artefacts. Over the years, both from within the disturbance area and from adjacent landforms, over 11,000 artefacts had already been recovered because of these programs.

Because of the scientific values assessment for the MOCO Project, 39 Aboriginal sites were recorded; consisting of:

- 11 artefact scatters (37-3-1189 to 37-3-1199);
- 25 isolated finds (37-3-1170 to 37-3-1188 and 37-3-1212 to 37-3-1216); and
- Three extensions to previously recorded sites (Extension to site 37-3-0649, Extension to site 37-3-0611 and Extension to site 37-3-0600).

In addition, the disturbance area contained three previously recorded sites, 37-3-0611, 37-3-0985 (low density artefact scatters) and 37-3-0527 (isolated artefact). Thus, 42 sites were known to exist within or close to the disturbance area.

At two locations within the disturbance area, test excavations were carried out under the Code of Practice. At one location (37-3-1191), no artefacts were recorded during the test excavations, while at the second location (37-3-1192), 114 artefacts were recorded, with over 80% coming from one discrete concentration. As a result, it was determined that 37-3-1191 is a displaced site with no associated archaeological deposits, while 37-3-1192 is a low-density artefact scatter along the banks of the 'eastern drainage' line with one known concentration of artefacts.

Two sites recorded during the survey, 37-3-1194 and 37-3-1198, remain partially extant in the Additional Disturbance Area.

Conclusion

Those archaeological sites in the MOCO Project disturbance area investigated revealed relatively sparse artefact concentrations in shallow and disturbed contexts. Archaeologically, all the places located and/or identified conform to the Australian Small Tool Tradition⁵, and most likely date to no more than 2,000–3,000 BP.

Most of the disturbance area had been subjected to varying degrees of land clearing and mining since first settlement, destroying the primary context of much of the physical cultural material present, and irretrievably altering the landscape itself.

Given the nature and extent of the archaeological sites identified, there was little additional knowledge which could be added to the archaeological record from any further investigation of this material. There is little probability for the presence of undisturbed and deeply stratified archaeological sites within the disturbance area.

In general, the archaeological sites in the MOCO disturbance area offered:

- Limited research potential regarding regional and/or localised subsistence and resource procurement activities;
- Limited research potential to address questions on stone tool technologies in the region;
- Limited potential for radiometric dating methods to be applied to the sites;
- Limited research potential to address questions about the timing of the first occupation of this region of the Hunter Valley;
- Limited research potential to address questions about the timing of the Aboriginal settlement history of the Hunter Valley; and
- Limited potential to reveal further unique spatiotemporal patterning which would add to the archaeological record.

Glendell Mine Proposed Light Vehicle Access Track (OzArk 2015a)

In 2015, OzArk completed an archaeological assessment for the construction of a 7 km road within the Glendell Mine lease area. The field survey was completed on 2 September 2015. The assessed study area was parallel and to the east of Swamp Creek; however, it also crosses Swamp Creek at one location. No new recordings were made of Aboriginal sites or archaeologically sensitive landforms within the study area during the visual inspection. Several likely landforms such as the banks of Swamp creek and the lower slopes overlooking the creek were identified during the inspection and were made a focus of the assessment. However, these landforms were not assessed as archaeologically sensitive in the portions encompassed by the study area. One previously

⁵ The Australian Small Tool Tradition (also sometimes referred to as 'Bondaian') is a term applied to the Holocene period Aboriginal tool kit; distinguishing it from the earlier Australian Core Tool and Scraper Tradition generally dated to the Pleistocene period.

recorded site (37-3-1199; MOCO OS-11) was revisited during the survey. No artefacts related to MOCO OS-11 were visible during the field inspection at the location where MOCO OS-11 intersects the study area. The field inspection found that the proposed road would not have an impact to 37-3-1199.

<u>Alluvium and Biophysical Strategic Agricultural Land Verification and Mapping, Groundwater</u> <u>Monitoring Boreholes Due Diligence Assessments (OzArk 2017b, c & d and OzArk 2018a & b)</u>

In mid to late 2017 and early 2018, OzArk completed five archaeological due diligence assessments of over 100 soil test pit and groundwater monitoring bore locations surrounding Bowmans, Swamp and Yorks Creek for alluvium and Biophysical Strategic Agricultural Land verification and mapping assessments within the Project Area (OzArk 2017b, c & d). Over the five assessments, two new Aboriginal sites (Bowmans Creek 6 and Yorks Creek 19) were recorded and the extent of one previously recorded artefact scatter was updated (#37-3-0748; York Creek 5).

Bowmans Creek 6 is located on a lower slope landform adjacent to a tributary of Bowmans Creek. A total of 12 artefacts were identified, consisting largely of unmodified flakes, with one end scraper and core also recorded. Yorks Creek 19 consists of two flakes recorded on an upper terrace landform near the confluence of Bowmans and Yorks Creeks. In addition to this, one complete flake was recorded along a grazing track near #37-3-0748. Given its location on the same upper terrace landform, the artefact was assessed as being an extension to site #37-3-0748, as were an additional seven artefacts recorded eroding from the edge of the upper terrace. Site #37-3-0748 was also initially recorded as having potential archaeological deposit (PAD), although it was considered likely to be disturbed by cultivation. Recorded materials across the three sites were consistent with the predominate materials of the region being mudstone and silcrete, with a volcanic flake also recorded at Yorks Creek 19.

<u>Mt Owen Complex Aboriginal cultural heritage due diligence site inspection results - EL6594,</u> <u>EL8184, ML1629 and ML1415 (EMM 2017)</u>

EMM Consulting Pty Limited (EMM) was engaged to prepare an Aboriginal cultural heritage due diligence assessment for the proposed exploration program across the Additional Disturbance Area. As part of this exploration program, a total of 20 drill holes were proposed.

A field survey of proposed drill locations was undertaken by EMM on 23 May 2017 and no artefacts were identified within the areas of proposed exploration disturbance. In addition, the proposed locations are considered to have low archaeological potential. No additional measures were recommended in relation to heritage management for the proposed drilling program.

EMM 2018

EMM completed a Due Diligence inspection for an additional six drill holes across the Additional Disturbance Area; two in EL6594, three in EL8184 and one in ML1415. No sites were identified

during the visual inspection nor were any areas of archaeological potential. This was attributed to the little raw material at the drill hole locations and the previous high levels of disturbance.

4.4.2.2 Archaeological salvage

Ravensworth East Archaeological Investigation (ERM 2002)

In 2002 ERM conducted archaeological excavations and salvage grader scrapes over areas of the Ravensworth East Mine under Permit SZ323. These investigates were in the north-eastern portion of the Project Area, in areas along the former course of Swamp Creek (ERM 2002). **Table 4-4** lists the six sites salvaged within the Project Area under the 2002 ERM program. These sites are shown on **Figure 4-3**.

AHIMS #	Site name		
37-3-0399	Ravensworth 10		
37-3-0398	Ravensworth 09		
37-3-0400	Ravensworth 11		
37-3-0401	Ravensworth 12		
37-3-0402	Ravensworth 13		
37-3-0403	Ravensworth 14		

Table 4-4. Sites salvaged within the Project Area under Permit SZ323.

The combined geomorphological investigations undertaken by ERM highlighted the Swamp Creek valley as the key area likely to yield archaeological evidence of Aboriginal occupation within the ERM study area. However, these studies also showed that although buried land surfaces were apparent within the valley, evidence of Pleistocene Aboriginal occupation was unlikely to be recovered. Archaeological sampling of soil from these land surfaces failed to yield any archaeological material, confirming this view. Considering this, no further pursuit of Pleistocene archaeological deposits was undertaken within the scope of the excavation program.

The initial archaeological component of ERM's investigation, which included grader scrapes spread over three different landscapes across the valley, at varying distances from water sources, yielded little archaeological evidence. Of the three grader scrapes, three artefacts were recovered over a total area of 560 m².

A low rise adjacent to the swampy meadow channel west of Swamp Creek near surface sites RE 12–14, revealed substantial archaeological material with several artefact concentrations located approximately 40 m to 60 m away from the channel. Test pit excavation yielded an artefact spread up-slope of the channel from approximately 10 m from the current channel edge, extending across the rise in all directions. A total of 87 artefacts were recovered from the 11 test pits. Over a combined excavated area of 11 m², this represents an artefact density of 7.9 artefacts/m². The largest artefact concentration (44 pieces or 50.57% of the total assemblage) was excavated from Test Pit 4 located on the peak of the rise. Without the Test Pit 4 artefact concentration, artefact density would have

been substantially lower, at 4.3 artefacts/m², as most test pits contained five artefacts or less. 82.75% of the assemblage was mudstone and 17.25% was silcrete.

Open excavation of the site complex RE 12–14 recovered a concentrated artefact scatter across the peak of the rise within the very shallow A-Horizon soil. Open excavation on this rise was proposed by Margrit Koettig (then at the NSW Department of Environment and Climate Change) to define the apparent spread of artefacts from TP4, and to further establish the nature of this subsurface deposit, specifically to investigate whether it contained hearths and identifiable activity areas. The open area excavation of 86 m² (including TP4) was conducted in July–August 2001 by ERM. 1,168 artefacts were excavated in the open excavation and the investigations revealed a continuation of artefacts over the low rise, rather than what was originally recorded as three individual surface sites. Within this scatter, several distinct areas of artefact concentration were recorded, all with quantities of associated charcoal and burnt earth. The assemblage comprised backed artefacts and associated manufacturing debitage, mostly of mudstone.

Seven raw materials were represented in the open excavation. Mudstone was the dominant raw material observed, accounting for almost 80% of the total artefact numbers. This mirrored the initial trend set in testing phase. Silcrete was the next most common material and comprised nearly 20% of the assemblage. The remainder of the artefacts (less than 2%) was produced from six other raw material types.

Five artefact types were identified in the assemblage. Most artefacts were whole flakes accounting for more than 50% of the assemblage with broken flakes (almost 30%) and flaked pieces (approximately 15%) making up much of the remaining assemblage numbers. All modified artefacts, consisting of cores and retouched flakes, made up just under 2% of the assemblage.

Glendell Project Area (Umwelt 2013)

Salvage of the Glendell project area was undertaken under National Parks and Wildlife Services (NPWS) section 90 Consent #2267 and formed Part 4 of the salvage program for the Bettys Creek valley. This archaeological salvage within the Glendell project area was conducted by Umwelt and the Aboriginal community between November 2005 and February 2006. **Table 4-5** lists those sites within the Project Area that were salvaged under Consent #2267. These sites are shown on **Figure 4-3**.

AHIMS	site name	Salvage methodology	
37-3-0599	Bettys Creek 9	Surface Collection with Subsurface Investigation (manual excavation)	
37-3-0601	Bettys Creek 11	Surface Collection with Subsurface Investigation (grader scrapes)	
37-3-0602	Bettys Creek 12	Surface Collection with Subsurface Investigation (grader scrapes)	
37-3-0604	Bettys Creek 14	Surface Collection with Subsurface Investigation (grader scrapes)	
37-3-0605	Bettys Creek 15	Surface Collection with Subsurface Investigation (grader scrapes)	
37-3-0606	Bettys Creek 16	Surface Collection with Subsurface Investigation (grader scrapes)	

Table 4-5	Sites	within t	ne Project	Area	salvaged	under	Consent	#2267.
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AHIMS	site name	Salvage methodology
37-3-0607	Bettys Creek 17	Surface Collection with Subsurface Investigation (grader scrapes)
37-3-0608	Bettys Creek 18	Surface Collection with Subsurface Investigation (grader scrapes)
37-3-0609	Bettys Creek 19	Surface Collection
37-3-0610	Bettys Creek 20	Surface Collection
37-3-0617	Bowmans Creek 5	Surface Collection
37-3-0618	Swamp Creek 1	Surface Collection
37-3-0619	Swamp Creek 2	Surface Collection
37-3-0620	Swamp Creek 3	Surface Collection with Subsurface Investigation (grader scrapes)
37-3-0621	Swamp Creek 4	Surface Collection with Subsurface Investigation (grader scrapes)
37-3-0622	Swamp Creek 5	Surface Collection
37-3-0623	Swamp Creek 6	Surface Collection
37-3-0624	Swamp Creek 7	Surface Collection
37-3-0026	Glennies Creek Site B / Bettys Creek - B	Surface Collection with Subsurface Investigation (grader scrapes)
37-3-0625	Swamp Creek 8	Surface Collection
37-3-0027	Glennies Creek Site C / Bettys Creek - C	Surface Collection with Subsurface Investigation (grader scrapes)
37-3-0626	Swamp Creek 12	Surface Collection
37-3-0592	Bettys Creek 1	Surface Collection with Subsurface Investigation (grader scrapes)
37-3-0627	Swamp Creek 13	Surface Collection with Subsurface Investigation (grader scrapes)
37-3-0593	Bettys Creek 3	Surface Collection with Subsurface Investigation (grader scrapes)
37-3-0594	Bettys Creek 4	Surface Collection with Subsurface Investigation (grader scrapes)
37-3-0595	Bettys Creek 5	Surface Collection with Subsurface Investigation (grader scrapes)
37-3-0596	Bettys Creek 6	Surface Collection with Subsurface Investigation (grader scrapes)
37-3-0597	Bettys Creek 7	Surface Collection with Subsurface Investigation (grader scrapes)
37-3-0598	Bettys Creek 8	Surface Collection with Subsurface Investigation (grader scrapes)

A total of 2,713 artefacts were recovered from the Glendell project area salvage including 824 (30.6%) from the surface collection, 274 (10.1%) from Excavation 1 (Bettys Creek 10), 19 (0.7%) from Excavation 2 (Bettys Creek 9), 1,414 (52.1%) from Excavation 3 (Bettys Creek 2) and 177 (6.5%) from the grader scrapes. A total of 2,604 (96%) of the artefacts were recovered from the Bettys Creek catchment, 52 (1.9%) from the Bowmans Creek catchment and 57 (2.1%) from the Swamp Creek catchment.

Observations made from the surface collection assemblage are as follows:

- The highest number of artefacts were collected from Bettys Creek 14 (26.7% of the surface collection assemblage), followed by Bettys Creek 10 (19.5% of the assemblage);
- 60.6% of the artefacts were collected from lower slopes and floodplains associated with creek lines (56.7% from Bettys Creek; 3.3% from Swamp Creek and 0.7% from Bowmans Creek);
- Sites on low but elevated spurs in tributary confluences comprised 22.2% of the assemblage; ridge crests (7.5%); sites on lower slopes on tributary channels more than 150 m from the main creek channel (7.5%); mid slope sites (1.3%) and upper slopes (0.6%);

- The dominant artefact type was broken flakes (45%); followed by flakes (26.7%); flaked pieces (10.9%); retouched flakes (10%), cores (3.7%), heat shatter (3.4%) and grindstones (0.4%);
- A total of 31 cores were recovered from the surface collection. Of these, 21 were recovered from the Bettys Creek sites (17 from areas with tributary confluences with Bettys Creek); and
- Mudstone was dominant within the assemblage making up 58.5% of the artefacts, followed by silcrete (31.9%) with the remaining raw materials making up 9.6% of the total assemblage.

Excavation was targeted at Bettys Creek 2, Bettys Creek 9 and Bettys Creek 10 indicated the following:

- Bettys Creek 10 and Bettys Creek 2 retained a level of spatial integrity reflected by knapping events and raw material distribution patterns;
- Bettys Creek 9 contained artefacts in a secondary context;
- All three locations contained backed flakes;
- A ground oven identified at Bettys Creek 2 had an absolute date of 2188+/-39 BP;
- It was possible to obtain one radiocarbon date of 3077±40 BP (calibrated-Wk-20912) from Square K Spit 3 of Excavation 3 within the Mount Owen Extension Area. The date was relative in nature as it belonged to a large piece of burnt wood that was associated with artefacts both above and below it. Thus, the artefacts above it must be dated to later than 3077±40 BP and those below it to earlier;
- Broken flakes (45.7%) dominated the artefact assemblage, followed by flakes (38.7%);
- Bettys Creek 10 and Bettys Creek 2 were dominated by mudstone while Bettys Creek 9 was dominated by silcrete. Overall, mudstone was dominate (55.7%) over silcrete (32.3%);
- A small knapping event was evident at Bettys Creek 10, with greater amounts of knapping noted at Bettys Creek 2; and
- Core to flake ratios for Bettys Creek 10 were 1:28.7 and for Bettys Creek 2 were 1:27.4 suggesting knapping on site.

Because of the Umwelt investigations outlined above, today's archaeological landscape, particularly along Bettys Creek, but also along Swamp Creek and Bowmans Creek near the Additional Disturbance Area, has been extensively studied.

Archaeological Salvage. Liddell Coal Operations Development Modification 5 (OzArk 2015b)

OzArk was engaged by Liddell Coal Operations (LCO) to undertake the salvage of 15 Aboriginal archaeological sites for Modification 5 of DA 305-11-01 and was approved under AHIP #C0000623. The salvage of the sites was undertaken on 28 January 2015 and 24 to 25 February 2015.

Artefacts were retrieved from seven of the 15 sites. A total of 46 artefacts were salvaged across all sites. The majority of the 46 artefacts recovered from the salvage were flakes (73.9%). Other artefact

types included cores, flaked pieces, debitage, blades and a core fragment. Almost all artefacts were made from mudstone (56.5%) and silcrete (39.1%). Quartz and basalt artefacts were also present. Most artefacts were at a tertiary (65.2%) stage of reduction, with the rest secondary (34.8%). There were no artefacts at the primary stage of reduction.

The artefacts that were salvaged closely correspond to the regional context. The low proportion of formal tools (just one in 46) and the high percentage of flakes and debitage (76%) in the salvaged assemblage are typical of the region, but this is probably true in most sites across Australia. Mudstone has been recorded to be the most common raw material in the region, which was the case for the salvaged artefacts, and the other materials salvaged are also common.

Details of the two sites in this program that are within the Project Area are listed in **Table 4-6** and shown on **Figure 4-3**.

AHIMS #	Site name	Artefacts salvaged	Notes
37-3-0419	Rav 24 East	12	This site was salvaged by surface collection and grader-scrape salvage. The ground surface visibility (GSV) of 15% is based on pre-grader-scrape visibility. The grader-scrapes added an additional 20% GSV.
37-3-1152	LID 36	1	Rakes were used to remove wood chips from the ground and improve GSV.

Table 4-6. Details of sites within the Project Area salvaged under AHIP C0000623.

Mount Owen Continued Operations Project Salvage Program (OzArk 2017e)

In early 2017 the MOCO salvage program took place under the authority of the 2016 Mount Owen Complex ACHMP (XMO SD PLN 0060). This program was completed in the approved disturbance areas associated with the MOCO Project (SSD-5850) (see **Section 4.4.2.1** for details of the survey associated with the MOCO Project).

This program included the collection of surface artefacts at 26 sites resulting in 163 artefacts being recorded. Included in the tally of 26 sites, were two sites where limited archaeological excavation took place resulting in a further 187 artefacts being recorded. An additional area on the east bank of Bowmans Creek proposed for impact by the new Hebden Road bridge was also subject to archaeological investigation by manual excavation but the area proved to be highly disturbed and no artefacts were recorded.

In addition, there were three sites that were unable to be salvaged, one as it was on land not owned by Mount Owen, and the remaining because the area of the sites had previously been unintentionally impacted by mining activity⁶. These unintentional impacts were self-reported to the OEH (now BCD) who issued an official caution to Mount Owen on 17 March 2016. Sites salvaged within the Project Area under SSD-5850 are listed in **Table 4-7** and shown on **Figure 4-3**.

⁶ In addition, MOCO OS-3 was unintentionally partially impacted by mining activities and the remainder of this site was salvaged during the salvage program.

Site ID	Site Name	Site Type	Number of Artefacts Salvaged	Salvage methodology
37-3-0611	Extension to Bettys Creek 21	Artefact Scatter	4	Surface collection only
37-3-1174	MOCO IF-5	Isolated Find	1	Surface collection only
37-3-1195	MOCO OS-7	Artefact Scatter	0	Surface collection only
37-3-1199	MOCO OS-11	Artefact Scatter	7	Surface collection only
37-3-1211	MOCO IF-18	Isolated Find	0	Surface collection only
	Bowmans Creek East Bank (Hebden Road)	PAD	0	Manual excavation.

Table 4-7. Sites salvaged within the Project Area under SSD-5850.

Of all the sites investigated in the 2017 salvage program, 37-3-1192 recorded the highest artefact density with 71 surface artefacts (43.5% of all surface artefacts recorded during the salvage program) and 186 artefacts recorded in the excavation component of the program (constituting almost all the artefacts recorded in the excavation component of the program). 37-3-1192 was located on an unnamed watercourse (termed the 'eastern drainage') approximately 2.5 km east of the Project Area. 37-3-1192 was in area heavily affected by erosion and the investigation showed that while one concentration of artefacts remained *in situ*, most of the site had been displaced by the erosion.

Other sites that recorded more than 10 artefacts during the salvage program were 37-3-1191, 37-3-1197 and 37-3-1198. 37-3-1198 remains partially extant within the Additional Disturbance Area. All other sites recorded very low artefact numbers supporting the conclusion reached in OzArk 2014 that the remaining archaeological values at MOC consist of low density, often displaced, artefact scatters.

The recording of these sites affords with the general picture emerging that sites located away from permanent water are likely to have a low artefact density and low site complexity.




4.4.2.3 Archaeological context: Conclusion

The extensive and long running archaeological investigations within and near the Additional Disturbance Area indicate that:

- Stone artefact sites (isolated finds and artefact scatters) are the most commonly recorded site types in the area and that other site types, such as culturally modified trees, are very rare or non-existent;
- At the current state of knowledge, only stone artefact sites will be impacted by the Project. Other site types such as grinding grooves or the Bowmans Creek engraving site (Bowmans Ck 16, 37-3-0772) are located outside of the Project Area. In addition, the Yorks Creek VCA is located outside of the Project Area. No sites have been found showing evidence of conflict between Aboriginal people and colonial settlers;
- Artefacts tend to be associated only with the A-Horizon soil layers indicating a date in the Holocene period (i.e. 12,000 BP to the present);
- The predominant raw materials used for stone artefact manufacture are locally sourced mudstone and silcrete;
- Excavations generally reveal a low artefact density, but some spatial patterning has been observed: principally concentrations of artefacts interpreted as 'knapping areas'. Other archaeological features such as hearths are rare;
- Sites tend to be associated with waterways and a discernible pattern has been observed whereby larger sites are associated with larger waterways offering permanent water supplies; and
- While all waterways have been equally studied, Yorks and Bettys Creeks appear to have attracted past Aboriginal occupation more often than Swamp Creek. Bowmans Creek would have been a major focus of past occupation but much of the evidence of this occupation has been removed by major channel migrations or intensive historical land use disturbances such as cultivation.

4.4.3 Previously recorded sites within the Additional Disturbance Area

Because of these previous assessments, there are 39 valid Aboriginal sites that have been recorded within the Additional Disturbance Area at the time of the survey. **Table 4-8** displays the site characteristics of these previously recorded sites.

Table 4-8.	Site types o	f valid, previ	ously recorde	ed sites within	n the Additiona	al Disturbance A	rea.
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Site type	Frequency
Artefact scatter	24
Isolated find	15
Total	39

Of the 39 sites, 41% (16) occur within 50 m of a watercourse. These sites are typically artefacts identified on eroding creek banks and spurs and elevated flat areas overlooking watercourses. There is a significant drop-off in site frequency between 50 m and 100 m from watercourses with only four

sites identified within this zone. At distances greater than 200 m of watercourses there are five sites; three artefact scatters and two isolated finds. This constitutes 13% of the 39 sites in the Additional Disturbance Area. This is a low proportion and may be indicative of the historical disturbances that have occurred in the Additional Disturbance Area that may have moved artefacts within the landscape away from locations closer to waterways.

Figure 4-4 illustrates the location of the 39 previously recorded sites at the time of the survey within the Additional Disturbance Area and **Table 4-9** lists the sites.

ld	AHIMS #	Site name	GDA Zone 56 East	GDA Zone 56 North	Site status	Site type	Notes
1	37-3-0294	Site 2; (MORL2)	321168	6410327	Valid	Artefact scatter	
2	37-3-0469	Bowmans/Swamp Creek Trench 1	318072	6409137	Partially destroyed	Artefact scatter	Permit 2267
3	37-3-0689	G11 Glendell	319223	6410211	Valid	Artefact scatter	
4	37-3-0744	York Creek 1	317440	6411356	Valid	Artefact scatter	
5	37-3-0745	York Creek 2	317577	6411112	Valid	Artefact scatter	
6	37-3-0746	York Creek 3	317745	6411008	Valid	Artefact scatter	
7	37-3-0747	York Creek 4	317373	6411322	Valid	Artefact scatter	
8	37-3-0748	York Creek 5	317365	6411471	Valid	Artefact scatter	
9	37-3-0749	York Creek 6	317501	6411814	Valid	Artefact scatter	
10	37-3-0750	York Creek 7	317483	6411169	Valid	Artefact scatter	
11	37-3-0751	York Creek 8	317496	6412805	Valid	Isolated find	
12	37-3-0752	York Creek 9	317685	6411312	Valid	Artefact scatter	
13	37-3-0753	York Creek 10	317865	6412266	Valid	Artefact scatter	
14	37-3-0754	York Creek 11	317782	6412443	Valid	Artefact scatter	
15	37-3-0755	York Creek 12	317870	6412581	Valid	Artefact scatter	
16	37-3-0756	York Creek 13	318352	6411400	Valid	Artefact scatter	
17	37-3-0757	York Creek 14	318417	6411813	Valid	Isolated find	
18	37-3-0758	York Creek 15	317849	6411202	Valid	Artefact scatter	
19	37-3-0759	York Creek 16	317827	6411497	Valid	Artefact scatter	
20	37-3-0760	York Creek 17	317626	6412595	Valid	Isolated find	
21	37-3-0761	York Creek 18	317712	6412158	Valid	Isolated find	
22	37-3-0762	Bowmans Ck 6	317657	6410790	Valid	Isolated find	
23	37-3-0763	Bowmans Ck 7	316542	6413142	Valid	Artefact scatter	

Table 4-9: Previously recorded sites within the Additional Disturbance Area.

ld	AHIMS #	Site name	GDA Zone 56 East	GDA Zone 56 North	Site status	Site type	Notes
24	37-3-0764	Bowmans Ck 8	317205	6412329	Valid	Artefact scatter	
25	37-3-0765	Bowmans Ck 9	316878	6412410	Valid	Artefact scatter	
26	37-3-0766	Bowmans Ck 10	316833	6412566	Valid	Artefact scatter	
27	37-3-1198	MOCO OS-10	317840	6409364	Partially destroyed	Artefact scatter	Permit: SSD- 5850
28	37-3-0773	Swamp Ck 10	319006	6411169	Valid	Isolated find	
29	37-3-1155	MT OWEN ISOLATED FIND2	317854	6411236	Valid	Isolated find	
30	37-3-1156	MT OWEN ISOLATED FIND1	318001	6410455	Valid	Isolated find	
31	37-3-1158	RPS DLW IF1	317148	6412677	Valid	Isolated find	
32	37-3-1490	Swamp Creek IF-4	318805	6407340	Valid	Isolated find	
33	37-3-1492	Swamp Creek IF-2	318807	6407327	Valid	Isolated find	
34	37-3-1493	Swamp Creek IF-3	318805	6407330	Valid	Isolated find	
35	37-3-1494	Swamp Creek IF-1	318640	6407727	Valid	Isolated find	
36	37-3-1499	Swamp Creek-OS1	318819	6407299	Valid	Artefact scatter	
37	37-3-0521	MO-IF1	319123	6410319	Valid	Isolated find	
38	37-3-1503	Yorks Creek 19	317369	6411237	Valid	Artefact scatter	
39	37-3-0612	Bettys Creek 22	321138	6410296	Valid	Isolated find	





4.5 PREDICTIVE MODEL FOR SITE LOCATION

Across Australia, numerous archaeological studies in widely varying environmental zones and contexts have demonstrated a high correlation between the permanence of a water source and the permanence and/or complexity of Aboriginal occupation. Site location is also affected by the availability of and/or accessibility to a range of other natural resources including: plant and animal foods; stone and ochre resources and rockshelters; as well as by their general proximity to other sites/places of cultural/mythological significance. Consequently, sites tend to be found along permanent and ephemeral water sources, along access or trade routes or in areas that have good flora/fauna resources and appropriate shelter.

In formulating a predictive model for Aboriginal archaeological site location within any landscape it is also necessary to consider post-depositional influences on Aboriginal material culture. In all but the best preservation conditions, very little of the organic material culture remains of ancestral Aboriginal communities survives to the present. Generally, it is the more durable materials such as stone artefacts, stone hearths, shell, and some bones that remain preserved in the current landscape. Even these however may not be found in their original depositional context since these may be subject to either (a) the effects of wind and water erosion/transport—both over short and long-time scales—or (b) the historical impacts associated with the introduction of European farming practices. Scarred trees, by their nature, may survive for up to several hundred years but rarely beyond.

4.5.1 Settlement strategies

The large number of archaeological studies undertaken within the vicinity of the Additional Disturbance Area provides information to obtain a sound understanding of the nature and distribution of archaeological sites within the area. Although there is some conjecture about the relationship between stream order, site numbers and densities, the general pattern is that most sites are present within 30 m of watercourses (Dean-Jones 1992: 26–27; AMBS 1997: 29). Although sites are present at locations at a greater distance from water, these sites are limited in terms of both number and size, constituting a lower density scatter than is found along the creek lines (Dean-Jones 1992: 24; ERM 1999: 22–23). Most of these sites distant to water are spatially small, with larger sites typically found in association with permanent watercourses. Reduced visibility has been proffered as an explanation for the higher number of sites and artefacts present along the more heavily eroded and less vegetated minor watercourses as compared to major creeks (Umwelt 2004: 7.7; ERM 1999: 84).

Figure 4-5 maps the previously recorded sites within the Additional Disturbance Area in relation to the area's drainage lines with major drainage lines having a 100 m buffer and minor drainage lines having a 50 m buffer. As can be seen, most of previously recorded sites fall into these zones, with a clear majority being associated with the named waterway buffer. Sites located outside of these

zones are often isolated finds. This would indicate that the settlement strategies noted elsewhere within the Hunter Valley are also valid for the Additional Disturbance Area in that most sites will be in association with water sources.





4.5.2 Past land use

Crucial for the preservation of archaeological deposits is the history of past land use in an area. In particular, the colonial history of the Hunter Valley lowlands, where the Additional Disturbance Area is located, is a stark example of historic land mismanagement leading to wide-spread erosion as the dispersible soils were exposed to rain and broken apart by stock. On **Figure 4-6**, for example, the wide-spread sheet wash erosion is noticeable; particularly on the slopes to the southeast of the Additional Disturbance Area where the Glendell Mine is now located. While this portion of the Project Area contained more-sloping landforms compared to other areas, it remains indicative of the soil loss that has occurred across the Project Area.

An analysis of aerial photography of the Additional Disturbance Area 60 years ago in 1958 (**Figure 4-6**) shows that there is very little tree cover within the Additional Disturbance Area and evidence of sheet wash erosion, with the much of the area impacted either by degrading or aggrading factors. The 1958 image shows largely de-vegetated creek lines with noticeable gully erosion within the channel (channelisation) and, in places, extensive sheet wash erosion at their margins.

Such widespread impacts have undoubtedly affected the archaeological landscape in that many tens of centimetres of soils have been removed from many areas within the Additional Disturbance Area, along with any archaeological deposits they may have contained. With such widespread soil movement, it is also important to remember that accumulations of artefacts that may be termed a 'site' today may have, in fact, been washed into that location during the historic period and bear no relationship to past Aboriginal occupation patterns in the area.

When previously recorded sites are overlain on the 1958 aerial image (**Figure 4-6**), several observations can be made:

- The landforms in the east and central-northern portions of the study area appear to be degrading toward the major north/south orientated drainage lines. Particularly, the low gradient hills in the centre of the Additional Disturbance Area are devoid of previously recorded sites probably due to the soil loss in these landforms;
- The areas of cultivation on the east bank of Bowmans Creek are also devoid of previously recorded sites, probably because of repeated disturbances arising from long-term cultivation;
- Cultivation in the flat landforms between Swamp and Bowmans Creeks in the south of the Additional Disturbance Area probably also explains the small number of previously recorded sites in this area. This is especially marked when it is noted that this southern area of the Additional Disturbance Area has been subject to a greater number of assessments when compared to the northern portions;
- Site density is greatest at the confluence on Yorks Creek with Bowmans Creek. This likely
 reflects the high suitability of this area for Aboriginal occupation due to the proximity of two
 significant water sources and the convergence of associated trails and resource zones. It is
 possible, however, that this partly also reflects the aggrading nature of landforms in this area,

where artefacts may have accumulated during secondary depositional event and formed new assemblages; and

• In general, with a few exceptions, artefact scatters are associated with the drainage lines of the Additional Disturbance Area while isolated finds tend to be recorded in landforms that have been stripped of the topsoil.





4.5.3 Previously recorded sites

Due to the history of archaeological investigation near the Additional Disturbance Area, there have been several sites recorded either within the Additional Disturbance Area, or nearby. 39 valid sites remain extant within the Additional Disturbance Area or within close proximity (**Figure 4-4**).

As discussed in **Section 4.4.2** and below in **Section 4.5.5**, the results of previous investigations would suggest that:

- The most common site type will be stone artefact sites; either low density artefact scatters or isolated finds;
- Culturally modified trees will be extremely rare due to the level of historical clearing and the fact that they are a regionally rare site type;
- Grinding grooves will be unlikely to occur in the Additional Disturbance Area as the major creek lines have been subject to previous assessment and it would be expected that these site types would have already been recorded; and
- Other site types such as burials or stone arrangements will be very rare due to the long-term agricultural disturbances that have occurred in the Additional Disturbance Area.

4.5.4 Landform modelling

The Additional Disturbance Area is entirely contained within landforms between 80 m and 140 m in altitude (**Section 3.1**). Generally, the land is sloping towards the southwest and is within the Bowmans, Yorks, Swamp, and Bettys Creek catchments. In the eastern and central-northern portions of the Additional Disturbance Area there are localised rises with some associated steeper slopes, however, generally the Additional Disturbance Area has a gentle undulating gradient.

The primary hydrological resource in the Additional Disturbance Area is Bowmans Creek, fed by the Yorks, Swamp, and Bettys Creeks and their ephemeral tributaries.

As such there are a variety of topographic features within the Additional Disturbance Area that would have encouraged past Aboriginal occupation; namely:

- The landforms adjacent to the Bowmans, Yorks, Swamp, and Bettys Creeks have the capability of providing elevated landforms adjacent to water: landforms recognised in the area as having archaeological sensitivity;
- The rises in the centre of the Additional Disturbance Area could well have afforded vantage points and could have been periodically used as observation posts; and
- The landforms at the confluences of Yorks, Swamp, and Bettys Creeks with Bowmans Creek have especial suitability for Aboriginal occupation due to the proximity of multiple significant water sources and the convergence of associated trails and resource zones.

When previously recorded sites are mapped against the major landform types of the Additional Disturbance Area (**Figure 4-7**), there is a strong correlation between site location and landform type

as a clear majority of sites are associated with flat/floodplain landforms. There is a marked lack of sites associated with slopes, and very few sites associated with ridges. Possible reasons for this observed dichotomy are that drainage lines are associated with flat/floodplain landforms, and as shown in **Section 4.5.1**, sites tend to be associated with drainage lines. However, it also may be a product of the degradation noted in **Section 4.5.2** that has seen soils, and accompanying archaeological deposits, stripped from hillslopes due to land mismanagement during the agricultural phase of land use.





Aboriginal Archaeology Impact Assessment: Glendell Continued Operations Project.

4.5.5 Previous studies

Upper Hunter Valley Aboriginal Heritage Baseline Study (ERM 2004)

ERM (2004) undertook a review of the archaeology in the upper Hunter Valley on behalf of Upper Hunter Aboriginal Heritage Trust. Following is several of ERM's conclusions about archaeological sites in the upper Hunter Valley of relevance to this assessment:

- Artefact assemblages will typically be comprised of flaked stone with a component associated with the manufacture of backed artefacts. Backed artefacts typically make up less than 2 per cent (and up to 5 per cent in rare cases) of an assemblage;
- Evidence of backed artefacts is generally found wherever large numbers of artefacts have been recorded;
- Cores and flakes associated with backed artefact manufacture typically show evidence of platform modification to increase platform angles. This modification is sometimes referred to as faceting, and is typical of open site assemblages between Singleton and Muswellbrook;
- The backed artefact component may typically include a larger proportion of asymmetric, elongate (bondi point) forms and a smaller proportion of symmetric (geometric microlith) forms in the same assemblage;
- Eloueras occur occasionally and sometimes exhibit use-wear chipping and polishing along the chord;
- Artefact assemblages have, on rare occasions, included small grindstones or fragments thereof, and ground-edge hatchet heads made on flat ovate water rolled small cobbles;
- Hearths, comprising tight concentrations of heat-retainer stones clearly distinguishable from the natural environment are rare;
- Sites along creek lines have potential for subsurface archaeological deposit. Topsoil is often quite deep, commonly between 100 and 300 mm;
- The small numbers of artefacts found on slopes and ridge crests generally do not allow identification of particular activities, but do provide evidence for occupation of these areas and at the very least transient movement over, and use of, all parts of the landscape;
- In areas close to the Hunter River (very likely to have been the major foci of occupation) alluvial deposits may have buried sites, or periods of flooding may have eroded and displaced archaeological material. Nevertheless, excavations at a number of sites indicate that high density subsurface assemblages may occur in this context;
- Sites on or within colluvial deposits are also rare, however, they do occur and may represent stratified cultural deposits providing evidence of chronological change;
- Archaeological sites other than artefact scatters or isolated artefacts are not common;
- Quarry sites have been identified where silcrete outcrops occur; however, most of the raw material used in the manufacture of stone artefacts would have been derived (quarried/collected) from the Hunter River;

- Axe-grinding grooves often occur where suitable sandstone is in association with water or a creek line;
- Scarred trees are rare, presumably because most trees that may be old enough to have been scarred have been cleared or died naturally (and rotted away or been burnt in fires); and
- Art sites, ceremonial sites or Bora grounds are also rare and are either deteriorating or can no longer be located.

4.5.6 Conclusion

Utilising knowledge of the environmental contexts of the Additional Disturbance Area and a desktop review of the known local and regional archaeological record, the following predictions are made concerning the probability of those site types being recorded within the Additional Disturbance Area:

- <u>Isolated finds</u> may be indicative of: random loss or deliberate discard of a single artefact, the remnant of a now dispersed and disturbed artefact scatter, or an otherwise obscured or subsurface artefact scatter. They may occur anywhere within the landscape but are more likely to occur in topographies where open artefact scatters typically occur.
 - As isolated finds can occur anywhere, particularly within disturbed contexts, it is predicted that this site type could be recorded within the Additional Disturbance Area. It is noted in **Section 4.4** that isolated finds are commonly recorded near the Additional Disturbance Area.
- Open artefact scatters are here defined as two or more artefacts, not located within a rock shelter, and located no more than 50 m away from any other constituent artefact. This site type may occur almost anywhere that Aboriginal people have travelled and may be associated with hunting and gathering activities, short- or long-term camps, and the manufacture and maintenance of stone tools. Artefact scatters typically consist of surface scatters or subsurface distributions of flaked stone discarded during the manufacture of tools but may also include other artefactual rock types such as hearth and anvil stones. Less commonly, artefact scatters may include archaeological stratigraphic features such as hearths and artefact concentrations which relate to activity areas. Artefact density can vary considerably between and across individual sites. Small ground exposures revealing low density scatters may be indicative of background scatter rather than a spatially or temporally distinct artefact assemblage. These sites are classed as 'open', that is, occurring on the land surface unprotected by rock overhangs, and are sometimes referred to as 'open camp sites'.

Artefact scatters are most likely to occur on level or low gradient contexts, along the crests of ridgelines and spurs, and elevated areas fringing watercourses or wetlands. Larger sites may be expected in association with permanent water sources.

Topographies which afford effective through-access across, and relative to, the surrounding landscape, such as the open basal valley slopes and the valleys of creeks, will tend to contain more and larger sites, mostly camp sites evidenced by open artefact scatters.

 This site type is likely to be located within landforms of a gentle gradient associated with the main channels of Bowmans, Swamp, Yorks and Bettys Creeks as these are likely to have been attractive camping areas. Smaller sites containing low density and low complexity assemblages are predicted near semi-permanent watercourses (Swamp, Yorks and Bettys Creeks), while the more permanent nature of Bowmans Creek suggests that this creek may have been the focus of more intensive (longer duration) camping which would have produced larger sites with higher density and more complex assemblages. Moderate to steeply sloping landforms are unlikely to have been utilised with lower gradient ridges and spurs being more attractive for camping. The lack of water in these elevated landforms would suggest, however, that camping would have been short-term and that sites would be smaller and contain low complexity assemblages. The review of environmental and anthropomorphic factors discussed in **Sections 4.5.1** to **4.5.5** would indicate:

- Most sites will be located within 100 m of waterways. This is either due to the desirability of these locations for Aboriginal occupation, a result of larger exposures in these areas due to bank and sheet wash erosion and due to the fact that artefacts have been washed into these areas in the historical period.
- The high degree of impact from past agricultural practices along the floodplains, i.e. cultivation, in the Additional Disturbance Area will probably mean that surface scatters and archaeological deposits are likely to have become displaced. There has been a noted lack of previous recordings in these landforms due to this very reason.
- It is noted that the Additional Disturbance Area already has a number of artefact scatters recorded by investigations over the years. This suggests that many of the larger sites have probably been previously recorded and that the Additional Disturbance Area will probably not record many more large sites.
- There is a bias in site distribution to flat/floodplain landforms with very few sites recorded in slope or ridge landforms. This is likely due to the high degree of soil loss from these landforms.
- It would be expected that most sites located would date to the late Holocene (i.e. less than 4,000 BP), the age attributed to the A-Horizon artefact bearing deposits. Although Pleistocene sites contained within B-Horizon sediments may also occur, there have been only one or two instances of Pleistocene deposits being identified in the district and this must be considered a rare eventuality.
- Aboriginal scarred trees contain evidence of the removal of bark (and sometimes wood) in the past by Aboriginal people, in the form of a scar. Bark was removed from trees for a wide range of reasons. It was a raw material used in the manufacture of various tools, vessels and commodities such as string, water containers, roofing for shelters, shields and canoes. Bark was also removed because of gathering food, such as collecting wood boring grubs or creating footholds to climb a tree for possum hunting. Due to the multiplicity of uses and the continuous process of occlusion (or healing) following removal, it is difficult to accurately determine the intended purpose for any particular example of bark removal. Scarred trees may occur anywhere old growth trees survive. The identification of scars as Aboriginal cultural heritage items can be problematical because some forms of natural trauma and early colonial bark extraction create similar scars. Many remaining scarred trees probably date to the historic period when bark was removed by Aboriginal people for both their own purposes and for roofing on early colonial houses. Consequently, the distinction between colonial and Aboriginal scarred trees may not be clear.

- Due to the near-total clearance of trees from within the Additional Disturbance Area (see Figure 3-6), this site type is not predicted likely to occur. It is also noted that this site type is very rare at a regional level due to historical tree clearance.
- <u>Quarry sites and stone procurement sites</u> typically consist of exposures of stone material where evidence for human collection, extraction and/or preliminary processing has survived. Typically, these involve the extraction of siliceous or fine grained igneous and metasedimentary rock types for the manufacture of artefacts. The presence of quarry/extraction sites is dependent on the availability of suitable rock formations.
 - This site type could be recorded within the Additional Disturbance Area should suitable rock outcroppings be available. One quarry site, Bowmans Creek 5, was located within the Additional Disturbance Area to the north of Swamp Creek (Figure 4-2).
- <u>Burials</u> are generally found in soft sediments such as aeolian sand, alluvial silts and rock shelter deposits. In valley floor and plains contexts, burials may occur in locally elevated topographies rather than poorly drained sedimentary contexts. Burials are also known to have occurred on rocky hilltops in some limited areas. Burials are generally only visible where there has been some disturbance of subsurface sediments or where some erosional process has exposed them.
 - Although it is possible that this site type could be found within the Additional Disturbance Area in the alluvial landforms, it is considered a rare site type especially given the disturbance that has occurred within the Additional Disturbance Area. It is noted that the Additional Disturbance Area may have been the location of conflict between Aboriginal people and colonial settlers and had deaths resulted from this conflict then it is not known whether these people were formerly buried. It is noted that the landforms within the Additional Disturbance Area are unlikely to preserve any such burials had they existed.
- <u>Conflict sites</u> are common across Australia due to the frontier war waged between colonial settlers and the Aboriginal occupants of an area. As demonstrated in the Sydney Basin (Gapps 2018), conflict was widespread, organised and long-running resulting in considerable death and destruction of property on both sides of the conflict. While contact sites are likely to leave an identifiable archaeological signature, conflict sites are much less likely to be preserved in the archaeological record.
 - As the Additional Disturbance Area is situated within Ravensworth Estate, one of the earliest settlements in the upper Hunter Valley, conflict sites could be in the Additional Disturbance Area. However, as such sites are unlikely to have a physical manifestation, it is unlikely this site type will be recorded.
- <u>Aboriginal resource sites</u> can be located anywhere in the landscape as resources, in the form
 of both plants and animals, were a major determinant in Aboriginal site distribution. Given
 the changes to the morphology of Australian rivers and creeks, it is often difficult to appreciate
 the former chain-of-ponds morphology that characterised these waterways prior to colonial
 mismanagement of the land. However, the distribution of sites along a waterway may be a
 way of indicating where former ponds were located. Similarly, changes in the hydrology in
 many parts of Australia has modified the water table and the former location of springs. The
 location of sites, often in ridge landforms, in areas where there is no obvious reason for their

location, could be an indication of a former spring that is no longer in evidence. Likewise, the location of a site away from obvious landforms attractive for occupation could be an indication of the location of former resource plants.

 While the survey is not equipped to catalogue existing Aboriginal resource plants and animals in the Additional Disturbance Area, it is likely that these have been highly modified and disturbed due to the long-term and intensive agricultural activity within the area. As there are no areas of lower disturbance within the Additional Disturbance Area, it is likely that many of the former resources will have been removed entirely. While any remaining resources will not be mapped as part of the archaeological investigation, the role of resources will be considered when discussing site distribution patterning.

An examination of the landforms within the Additional Disturbance Area (**Section 3**) indicate that the northern portions of the Additional Disturbance Area is in a degrading environment where soils have been moved from the slopes towards the creek systems where aggrading landforms are evident. This would have the effect of displacing or impacting archaeological deposits had they existed in the north of the Additional Disturbance Area. Landforms adjacent to Bowmans Creek, in particular, are in an aggrading environment. This may mean that archaeological deposits may have become buried or mixed with artefacts that have washed down from adjoining slopes.

5 RESULTS OF ABORIGINAL ARCHAEOLOGICAL ASSESSMENT

This section refers to the survey area which is a larger area from the current Additional Disturbance Area (see **Section 1.4**). Thus, sites discussed here are within the survey area and some are outside of the Additional Disturbance Area. The survey area encompasses all the Additional Disturbance Area.

5.1 SAMPLING STRATEGY AND FIELD METHODS

Standard archaeological field survey and recording methods were employed in this study (Burke & Smith 2004). Visual inspection of the survey area was conducted systematically according to predetermined parallel transects spaced 100 m apart. Surveyors walked at even spacing sufficient to sample the entirety of each transect. RAPs, or their representatives, assisted the field effort by identifying objects/features of cultural interest and by placing flags at artefact locations to assist with the recording of artefact sites. Vehicles were only used for access between transects. The survey area was divided into three landform units for recording purposes (**Section 3.1**), with ground surface exposure (GSE) and ground surface visibility (GSV) noted for each, however, transects were not confined to these landform units but were organised spatially so that one transect could sample two or even three landscape units where applicable. GSE and GSV are further examined in **Section 5.3**.

It should be noted that the aim of any archaeological survey is not to locate each artefact in a landscape but to undertake investigations so that the archaeological potential and archaeological characteristics of all landforms within the survey area are known. Therefore, the aims of the survey were to:

- Reinspect the location of all 55⁷ previously recorded sites within the survey area so that their current condition and scientific heritage values could be assessed;
- Conduct pedestrian transects across all landforms in the survey area so that their archaeological potential could be determined;
- Evaluate whether the predictive model set out in Section 4.5 is valid;
- Determine if any portions of the survey area require test excavation to understand the archaeological potential at a particular location; and
- Determine whether any previously recorded sites within 100 m of the survey area extend into areas where proposed impacts are to occur.

The entirety of the survey area was subjected to full pedestrian survey as set out in the survey methodology (**Appendix 1**). The survey methodology also describes the zoning of the survey area into three zones that predicated the methodology of the survey, namely:

⁷ While there are 39 previously recorded sites in the Additional Disturbance Area, the survey area covered a larger area of land. See **Section 1.4**.

Aboriginal Archaeology Impact Assessment: Glendell Continued Operations Project.

- High survey priority: The assessment included approximately 1,085 ha that was classified as 'high survey priority'. This constituted approximately 34 per cent of the project area as it was at the time of the survey. In this area the major Project components such as the Glendell Pit Extension, the Hebden Road realignment, the new Mine Infrastructure Area (MIA), the heavy vehicle access road to the new MIA or the then proposed option to use the Liddell MIA, and the realignment of Yorks Creek will be located. Although a significant part of the high survey priority area had been subject to survey (over 10 years ago), much of this area was outside of land that had been systematically surveyed in the recent past. This area included approximately 2.5 km of Bowmans Creek, 3.5 km of Yorks Creek and 3.9 km of Swamp Creek; all drainage systems with known Aboriginal cultural heritage values;
- <u>Low survey priority</u>: This 208 ha area contains generally flat landforms surrounding Bettys Creek. This area constitutes approximately 7 per cent of the project area as it was at the time of the survey. This area had been extensively surveyed in the recent past, including most recently for the MOCO Project. As this area had been extensively surveyed, the archaeological characteristics of this area were largely known; and
- <u>Area of modified landforms</u>: This 1,607 ha area has been highly modified by approved mining activities and includes open cut pits, waste emplacements, dams, buildings and other surface infrastructure. This constituted approximately 55 per cent of the project area as it was at the time of the survey. Due to the highly modified nature of these landforms, they are extremely unlikely to contain archaeological sites and no survey took place in this area.

See figure 4.1 in the survey methodology (Appendix 1) for a map of the location of these zones.

Figure 5-1 shows the Additional Disturbance Area that was surveyed by pedestrian transects by OzArk archaeologists and members of the Aboriginal community. The survey effort illustrated on **Figure 5-1** is the data taken on a GPS device operated by one of the archaeologists in each team. It therefore does not take into account the other five surveyors in each team that 'filled in' the spaces between the transects shown.

Portions of the Additional Disturbance Area shown on **Figure 5-1** without survey transects are in the 'area of modified landforms' where no survey was necessary.





5.2 **PROJECT CONSTRAINTS**

There were no access issues in any region of the survey area that prevented the archaeological assessment from being carried out. The weather was mostly dry with warm to hot temperatures that did not inhibit the progress of the survey team. The survey area also consists of landforms with gentle gradients that were able to be easily traversed and there were few areas of dense vegetation.

There were no other constraints that hindered the successful completion of the archaeological assessment apart from the usual archaeological constraint: variable GSV (**Section 5.3**).

5.3 EFFECTIVE SURVEY COVERAGE

Two of the key factors influencing the effectiveness of archaeological survey are GSV and GSE. These factors are quantified to ensure that the survey data provides adequate evidence for the evaluation of the archaeological materials across the landscape. For the purposes of the current assessment, these terms are used in accordance with the definitions provided in the Code of Practice (DECCW 2010).

GSV is defined as:

... the amount of bare ground (or visibility) on the exposures which might reveal artefacts or other archaeological materials. It is important to note that visibility, on its own, is not a reliable indicator of the detectability of buried archaeological material. Things like vegetation, plant or leaf litter, loose sand, stone ground or introduced materials will affect the visibility. Put another way, visibility refers to 'what conceals' (DECCW 2010: 39).

GSE is defined as:

... different to visibility because it estimates the area with a likelihood of revealing buried artefacts or deposits rather than just being an observation of the amount of bare ground. It is the percentage of land for which erosion and exposure was sufficient to reveal archaeological evidence on the surface of the ground. Put another way, exposure refers to 'what reveals' (DECCW 2010: 37).

The landscape was dry at the time of assessment and significant die-back of vegetative ground cover had occurred. As such, in the majority of instances, GSE was moderate allowing for adequate investigation of the ground surface within the Additional Disturbance Area (**Table 5-1**).

In general, **Table 5-1** and **Table 5-2** present an approximation of the amount of ground surface able to be seen at any location within the particular landform units. For example, at any one location within the flat landforms of the Additional Disturbance Area approximately 14% of the ground surface could be seen. Exposures in these landforms were generally confined to the edges of drainage lines. The amount of visible ground increased across the slopes and ridges as these were generally cleared with less ground cover than the flat landforms. Visibility within these landforms was

hampered by leaf litter and gravels from weathered bedrock. Crest landforms often contained sizeable exposures where the soils had been depleted by erosion (**Figure 5-2**).

Figure 5-1 shows pedestrian coverage across the three landform units present within the survey area (1011 ha). 116 sites, both previously recorded (n=52) and newly recorded (n=64), have been recorded in the survey area. Eight sites, both previously recorded (n=3) and newly recorded (n=5), are recorded in the buffer area around the survey area. A total of 124 sites are subject to the discussion below.

Table 5-2 demonstrates that although the survey efficacy within flat/floodplain landforms was the lowest at 14 per cent, this did not hamper the recording of sites; generally, because the available exposures were in the most archaeologically sensitive areas (i.e. along the banks of waterways). As has been noted previously (**Section 4.5.4**), many more sites are recorded in flat/floodplain landforms when compared to slope/ridge landforms; primarily due to the soil loss in these landforms along with the loss of associated archaeological deposits. Therefore, as seen in **Table 5-2**, although survey efficacy was higher in these landforms, this still did not result in an increase in site recordings.

Survey Unit	Landform	Survey Unit Area (sq m)	Visibility %	Exposure %	Effective Coverage Area (sq m) (= Survey Unit Area x Visibility % x Exposure %)	Effective Coverage % (= Effective Coverage Area / Survey Unit Area x 100)
1	Flats and floodplains	6 225 000	70	20	871 500	14%
2	Slopes	3 500 000	50	35	612 500	17.5%
3	Ridges	385 000	60	30	69 300	18%

 Table 5-1: Survey coverage data for the survey area.

Table 5-2: Landform summary and recorded sites within the survey area.

Landform	Landform area (sq m)	Area Effectively Surveyed (sq m) (= Effective Coverage Area)	% of Landform Effectively Surveyed (= Area Effectively Surveyed / Landform x 100)	Number of Sites
1	Flats and floodplains	871 500	14%	89
2	Slopes	612 500	17.5%	29
3	Ridges	69 300	18%	6



Figure 5-2: Examples of GSE/GSV within the survey area.

5.4 ABORIGINAL SITES RECORDED

69 Aboriginal cultural heritage sites within the survey area and its immediate buffer were identified during the survey and test excavation program (**Figure 5-3** to **Figure 5-5**). Most sites were artefact sites; either artefact scatters (n=39) or isolated finds (n=29), except for one scarred tree (n=1). Further details including the GPS locations, site features and landform have been recorded for each site (**Table 5-3**). The significance assessment and impact assessment for the new sites, and previously recorded sites, has been undertaken in **Section 8**.

The nomenclature of all site recordings uses the term 'Glendell North' to signify that these recordings are generally north of the current operations of the Glendell Mine. 'Glendell North' is abbreviated to 'GN' for brevity. The site names also use the term 'IF' (isolated find), 'ST' (scarred tree) and 'OS' (for artefact scatter). 'OS' is an abbreviation of 'open site' and here refers to artefact scatters which are obviously only one type of open site.

ID	AHIMS ID	Site name	GDA Zone 56 Easting	GDA Zone 56 Northing	Feature(s)	Landform
			Artefact so	catters		·
1	37-3-1560	Glendell North OS1	316820	6413702	Artefacts: 6	Flats and floodplains
2	37-3-1559	Glendell North OS2	317930	6413515	Artefacts: 7	Flats and floodplains
3	37-3-1558	Glendell North OS3	317792	6413230	Artefacts: 3	Flats and floodplains
4	37-3-1557	Glendell North OS4	317761	6413127	Artefacts: 5	Flats and floodplains
5	37-3-1569	Glendell North OS5	316619	6413304	Artefacts: 5; PAD	Flats and floodplains
6	37-3-1571	Glendell North OS6	316443	6413081	Artefacts: 14; PAD	Flats and floodplains
7	37-3-1536	Glendell North OS7	316412	6413195	Artefacts: 3	Flats and floodplains
8	37-3-1549	Glendell North OS8	316386	6412999	Artefacts: 2	Flats and floodplains
9	37-3-1556	Glendell North OS9	315698	6412992	Artefacts: 3	Slopes
10	37-3-1555	Glendell North OS10	315557	6412542	Artefacts: 6	Slopes
11	37-3-1554	Glendell North OS11	318126	6412284	Artefacts: 3	Flats and floodplains
12	37-3-1553	Glendell North OS12	316810	6412250	Artefacts: 2	Flats and floodplains
13	37-3-1552	Glendell North OS13	317915	6411844	Artefacts: 7	Flats and floodplains
14	37-3-1551	Glendell North OS14	317705	6411820	Artefacts: 5	Flats and floodplains
15	37-3-1550	Glendell North OS15	317055	6412013	Artefacts: 6	Slopes
16	37-3-1573	Glendell North OS16	317599	6410970	Artefacts: 9; PAD	Flats and floodplains
17	37-3-1542	Glendell North OS17	317850	6410521	Artefacts: 4	Flats and floodplains

Table 5-3: Newly recorded sites noted during the survey.

ID	AHIMS ID	Site name	GDA Zone 56 Easting	GDA Zone 56 Northing	Feature(s)	Landform
18	37-3-1541	Glendell North OS18	317852	6410274	Artefacts: 2	Flats and floodplains
19	37-3-1572	Glendell North OS19	317790	6410020	Artefacts: 19; PAD	Flats and floodplains
20	37-3-1540	Glendell North OS20	317856	6409957	Artefacts: 5	Flats and floodplains
21	37-3-1539	Glendell North OS21	318418	6410236	Artefacts: 2	Slopes
22	37-3-1538	Glendell North OS22	319293	6410281	Artefacts: 3	Flats and floodplains
23	37-3-1537	Glendell North OS23	318500	6410083	Artefacts: 3	Slopes
24	37-3-1510	Glendell North OS24	318346	6409339	Artefacts: 7	Flats and floodplains
25	37-3-1570	Glendell North OS25	318367	6408758	Artefacts: 2; PAD	Flats and floodplains
26	37-3-1548	Glendell North OS26	318224	6410798	Artefacts: 2	Slopes
27	37-3-1509	Glendell North OS27	318588	6408562	Artefacts: 2	Slopes
28	37-3-1508	Glendell North OS28	318611	6408397	Artefacts: 3	Slopes
29	37-3-1547	Glendell North OS29	318291	6408381	Artefacts: 4	Flats and floodplains
30	37-3-1546	Glendell North OS30	318530	6408206	Artefacts: 3	Flats and floodplains
31	37-3-1545	Glendell North OS31	318827	6407525	Artefacts: 15	Slopes
32	37-3-1544	Glendell North OS32	317951	6407475	Artefacts: 2	Flats and floodplains
33	37-3-1543	Glendell North OS33	319166	6407069	Artefacts: 12	Flats and floodplains
34	37-3-1574	Glendell North OS34	317447	6411053	Artefacts: 29; PAD	Flats and floodplains
35	37-3-1567	Glendell North OS35	317371	6411106	Artefacts: 18; PAD	Flats and floodplains
36	37-3-1568	Glendell North OS36	316670	6413398	Artefacts: 3; PAD	Flats and floodplains
37	37-3-1562	Glendell North OS37	317843	6412369	Artefacts; 5	Flats and floodplains
38	37-3-1565	Glendell North OS38	317557	6411704	Artefacts; 2	Flats and floodplains
39	37-3-1576	Glendell North OS39	318028	6409888	Artefacts; 6	Flats and floodplains
			Isolated	finds		
40	37-3-1535	Glendell North IF1	318189	6414948	Isolated find	Slopes
41	37-3-1534	Glendell North IF2	317146	6413503	Isolated find	Ridges
42	37-3-1533	Glendell North IF3	317120	6413414	Isolated find	Ridges
43	37-3-1532	Glendell North IF4	316962	6412937	Isolated find	Slopes
44	37-3-1531	Glendell North IF5	318054	6412783	Isolated find	Slopes
45	37-3-1530	Glendell North IF6	315966	6412883	Isolated find	Flats and floodplains
46	37-3-1529	Glendell North IF7	315514	6412657	Isolated find	Slopes
47	37-3-1528	Glendell North IF8	316956	6412606	Isolated find	Slopes
48	37-3-1527	Glendell North IF9	316545	6411891	Isolated find	Flats and floodplains
49	37-3-1526	Glendell North IF10	318745	6411655	Isolated find	Slopes

ID	AHIMS ID	Site name	GDA Zone 56 Easting	GDA Zone 56 Northing	Feature(s)	Landform
50	37-3-1525	Glendell North IF11	317221	6411282	Isolated find	Flats and floodplains
51	37-3-1524	Glendell North IF12	317765	6410903	Isolated find	Slopes
52	37-3-1523	Glendell North IF13	317688	6410830	Isolated find	Slopes
53	37-3-1522	Glendell North IF14	317752	6410825	Isolated find	Slopes
54	37-3-1521	Glendell North IF15	317683	6410588	Isolated find	Flats and floodplains
55	37-3-1520	Glendell North IF16	319072	6410845	Isolated find	Slopes
56	37-3-1519	Glendell North IF17	317777	6409943	Isolated find	Flats and floodplains
57	37-3-1518	Glendell North IF18	317723	6409918	Isolated find	Flats and floodplains
58	37-3-1517	Glendell North IF19	318543	6410024	Isolated find	Flats and floodplains
59	37-3-1515	Glendell North IF20	318022	6409310	Isolated find	Flats and floodplains
60	37-3-1514	Glendell North IF21	318328	6408936	Isolated find	Flats and floodplains
61	37-3-1516	Glendell North IF22	317984	6410954	Isolated find	Slopes
62	37-3-1513	Glendell North IF23	318833	6407204	Isolated find	Slopes
63	37-3-1512	Glendell North IF24	318253	6411466	Isolated find	Flats and floodplains
64	37-3-1511	Glendell North IF25	318341	6409244	Isolated find	Flats and floodplains
65	37-3-1566	Glendell North IF26	318253	6408957	Isolated find; PAD	Flats and floodplains
66	37-3-1564	Glendell North IF27	317260	6411851	Isolated find	Ridges
67	37-3-1563	Glendell North IF28	317241	6411913	Isolated find	Ridges
68	37-3-1575	Glendell North IF29	317613	6411755	Isolated find	Flats and floodplains
			Scarred	tree		
69	37-3-1561	Glendell North ST1	316124	6412405	Modified tree (scarred): 1	Flats and floodplains













5.4.1 Artefact scatters

39 artefact scatters were recorded during the survey and test excavation program. Details on each site follow.

Glendell North OS1

Site Type: Open artefact scatter

<u>GPS Coordinates</u>: GDA Zone 56 E 316820 N 6413702

Location of Site: 900 m west of Hebden Road, 60 m north of the Liddell pipeline and conveyor route, and 90 m east of Bowmans Creek, Ravensworth (**Figure 5-4**).

The site is in eroded B-Horizon deposits on a gentle gradient mid-slope (Figure 5-6).

Description of Site: Glendell North OS1 is a low-density artefact scatter comprising six artefacts, including mudstone and silcrete flakes and a mudstone core (**Table 5-4**; **Figure 5-7**). The 20 by 10 m extent of the site was defined by the area of exposure. Surrounding vegetation represented regrowth ironbark woodland with scattered regrowth casuarinas. The GSE at the time of recording was high (80%) with a GSV of 90% within these exposures. Scattered gravel and pebbles were very frequent. Identified disturbances included erosion, grazing and clearing.

Potential for the presence of further subsurface archaeological deposits at Glendell North OS1 is assessed as negligible.



Figure 5-6: Aerial showing location and extent of Glendell North OS1.

Figure 5-7: Photographs showing an overview and details of Glendell North OS1.





	-				
Artefact type	Material	Integrity	Reduction	Size	Additional detail
Core	Mudstone	N/A	Tertiary	4cm	Multidirectional, reduced, 6 scars, no cortex
Flake	Mudstone	Complete	Tertiary	0-2cm	
Flake	Mudstone	Complete	Tertiary	0-2cm	
Flake	Silcrete	Proximal fragment	Tertiary	2-4cm	
Flake	Silcrete	Proximal fragment	Tertiary	0-2cm	
Flake	Mudstone	Complete	Secondary	2-4cm	

Table 5-4: Glendell North OS1. Artefact attributes.

Glendell North OS2

Site Type: Open artefact scatter

<u>GPS Coordinates</u>: GDA Zone 56 E 317930 N 6413515

Location of Site: 100 m east of Hebden Road and 1.5 km north of Ravensworth Homestead, Ravensworth on the west side of a property dam (**Figure 5-4**). The site is located on a lower slope landform, 75 m north of Yorks Creek (**Figure 5-8**).

Description of Site: Glendell North OS2 is a low-density artefact scatter comprising seven artefacts including flakes made from silcrete and mudstone and a silcrete core (**Table 5-5**; **Figure 5-9**). These artefacts are in an erosive scour adjacent to an artificial trough associated with the property dam. The 15 by 10 m extent of the site was defined by the area of exposure. Surrounding vegetation has been extensively previously cleared, currently representing grassy paddock fringed by regrowth casuarinas. The GSE at the time of recording was low (20%) with a GSV of 60% within these exposures. Scattered gravel and pebbles were frequent. Identified disturbances included cattle grazing, erosion, and the construction of the adjacent property dam and trough.

Potential for the presence of further subsurface archaeological deposits at Glendell North OS2 is assessed as negligible.



Figure 5-8: Aerial showing location and extent of Glendell North OS2.

Figure 5-9: Photographs showing an overview and details of Glendell North OS2.





Artefact type	Material	Integrity	Reduction	Size	Additional detail
Flake	Silcrete	Proximal fragment	Tertiary	2-4cm	
Flake	Silcrete	Longitudinal break	Tertiary	2-4cm	
Flake	Silcrete	Complete	Secondary	4-6cm	
Core	Silcrete	N/A	Secondary	5.1cm	Multidirectional, 7 scars, 15% cortex
Flake	Silcrete	Longitudinal break	Tertiary	0-2cm	
Flake	Mudstone	Complete	Secondary	2-4cm	
Flake	Mudstone	Proximal fragment	Secondary	2-4cm	

Table 5-5: Glendell North OS2. Artefact attributes.

Glendell North OS3

Site Type: Open artefact scatter

<u>GPS Coordinates</u>: GDA Zone 56 E 317792 N 6413230

Location of Site: 15 m east of Hebden Road and 1.2 km north of Ravensworth Homestead, Ravensworth, on an access track adjacent to a dam (**Figure 5-4**). The site is located on an artificial bund, 45 m to the east of Yorks Creek on a lower terrace (**Figure 5-10**).

Description of Site: Glendell North OS3 is a low-density artefact scatter comprising a mudstone flake, a mudstone blade, and a silcrete blade (**Table 5-6**; **Figure 5-11**). The 30 by 10 m extent of the site was defined by the area of exposure. Surrounding vegetation has been previously cleared and currently represents open weedy grassland and regrowth casuarina by the creek line. The GSE at the time of recording was moderate (55%) with a GSV of 70% within these exposures. Scattered conglomerate fragments were present. Identified disturbances included grazing, erosion, clearing, vehicle damage, and the construction of the adjacent dam.

Potential for the presence of further subsurface archaeological deposits at Glendell North OS3 is assessed as negligible.



Figure 5-10: Aerial showing location and extent of Glendell North OS3 and OS4.

Figure 5-11: Photographs showing an overview and details of Glendell North OS3.





Table 5-6: Glendell North OS3. Artefact attributes.

Artefact type	Material	Integrity	Reduction	Size
Flake	Mudstone	Complete	Tertiary	2-4cm
Blade	Silcrete	Distal fragment	Tertiary	0-2cm
Blade	Mudstone	Complete	Tertiary	2-4cm

Glendell North OS4

Site Type:

Open artefact scatter

GPS Coordinates: GDA Zone 56 E 317761 N 6413127

Location of Site: 20 m east of Hebden Road and 1.1 km north of Ravensworth Homestead, Ravensworth, on an access track (**Figure 5-4**). The site is located 25 m east of Yorks Creek on a lower terrace landform (**Figure 5-12**).

Description of Site: Glendell North OS4 is a low-density artefact scatter comprising five flakes and a side scraper made of mudstone (**Table 5-7**; **Figure 5-13**). The 25 by 6 m extent of the site was defined by the area of exposure. Surrounding vegetation has been previously cleared and currently represents regrowth casuarina along the riparian corridor. The GSE at the time of recording was moderate (60%) with a GSV of 90% within these exposures. Scattered gravel and pebbles were present. Identified disturbances included grazing, erosion, clearing, vehicle damage, and brick foundations from a historic building.

Potential for the presence of further subsurface archaeological deposits at Glendell North OS4 is assessed as negligible.



Figure 5-12: Photographs showing an overview and details of Glendell North OS4.

Table 5-7: Glendell North OS4. Artefact attributes.

Artefact type	Material	Integrity	Reduction	Size	Additional detail
Flake	Mudstone	Distal fragment	Tertiary	2-4cm	Marginal use wear
Flake	Mudstone	Complete	Tertiary	0-2cm	
Flake	Mudstone	Complete	Tertiary	0-2cm	Marginal use wear
Flake	Mudstone	Complete	Tertiary	0-2cm	
Side scraper	Mudstone	N/A	Tertiary	2-4cm	Steep, invasive, unifacial retouch on margin
Flake	Mudstone	Complete	Tertiary	2-4cm	

Glendell North OS5

Site Type:

Open artefact scatter; PAD

GPS Coordinates:

GDA Zone 56 E 316619 N 6413304

Location of Site: 1.1 km west of Hebden Road and 350 m south of the Liddell pipeline and conveyor route, Ravensworth, above the east bank of Bowmans Creek (**Figure 5-4**). The site is located eroding out of a spur above Bowmans Creek (**Figure 5-13**).

Description of Site: Glendell North OS5 is a low-density artefact scatter comprising four artefacts, including an end scraper, a core, and two flakes, made of chert and mudstone (**Table 5-8**; **Figure 5-14**). The 75 by 50 m extent of the site was defined by the results of later subsurface investigation (see **Section 6.4.2**). Surrounding vegetation at the site was grassy paddock fringed by isolated mature eucalypts. The GSE at the time of recording was very limited (5%) with a GSV of 50% within these exposures. Scattered gravel and pebbles were present. Identified disturbances included clearing, grazing, and erosion.

At the time of survey, potential for the presence of subsurface archaeological deposits at Glendell North OS5 was assessed as likely towards the east of the site across the spur landform where A-Horizon soils are present.






Figure 5-14: Photographs showing an overview and details of Glendell North OS5.

Table 5-8: Glendell North OS5. Surface artefact attributes.

Artefact type	Material	Integrity	Reduction	Size	Additional detail
End scraper	Silcrete	Complete	Secondary	6-8cm	Fine distal retouch
Core	Chert	Complete	Tertiary	8cm	Multidirectional, no cortex, 7 scars
Flake	Mudstone	Distal fragment	Secondary	4-6cm	
Flake	Chert	Proximal flake	Tertiary	2-4cm	

Glendell North OS6

Site Type: Open artefact scatter; PAD

GPS Coordinates: GDA Zone 56 E 316443 N 6413081

Location of Site: 1.2 km west of Hebden Road and 600 m south of the Liddell pipeline and conveyor route, Ravensworth, to the east of Bowmans Creek (**Figure 5-4**). The site is located eroding out of a spur above the floodplain of Bowmans Creek (**Figure 5-15**).

Description of Site: Glendell North OS6 is a low-density artefact scatter comprising 14 artefacts, including flakes, pieces of shatter, flaked pieces, and cores made of silcrete, chert and mudstone (**Table 5-9**; **Figure 5-13**). The 100 by 40 m extent of the site was defined by the results of later subsurface investigation (see **Section 6.4.2**). Surrounding vegetation at the site was grassy paddock fringed by isolated mature eucalypts. The GSE at the time of recording was very limited (5%) with a GSV of 50% within these exposures. Gravel and regular stones were prevalent. Identified disturbances included clearing, grazing, and erosion.

At the time of survey, potential for the presence of subsurface archaeological deposits at Glendell North OS6 was assessed as likely in the north east of the site extent across the spur landform where A-Horizon soils are present.



Figure 5-15: Photographs showing an overview and details of Glendell North OS6.

Artefact type	Material	Integrity	Reduction	Size	Additional detail
Flaked piece	Mudstone	Complete	Secondary	4-6cm	
Shatter	Mudstone	Complete	Tertiary	0-2cm	
Shatter	Mudstone	Complete	Tertiary	2-4cm	
Flake	Mudstone	Complete	Primary	0-2cm	
Flake	Mudstone	Complete	Tertiary	2-4cm	Steep unifacial marginal retouch
Shatter	Mudstone	Complete	Tertiary	0-2cm	
Flaked piece	Chert	Distal fragment	Tertiary	4-6cm	
Core	Chert	Complete	Tertiary	6cm	Multidirectional, 40% cortex, 6 scars
Flake	Mudstone	Longitudinal break	Secondary	2-4cm	
Flake	Chert	Complete	Tertiary	0-2cm	
Core	Silcrete	Complete	Secondary	6-8cm	Unidirectional, 15% cortex, 5 scars
Flaked piece	Mudstone	Longitudinal break	Secondary	4-6cm	
Flake	Mudstone	Complete	Secondary	4-6cm	
Flake	Silcrete	Distal fragment	Primary	2-4cm	

Table 5-9: Glendell North OS6. Surface artefact attributes.

Site Type: Open artefact scatter

GPS Coordinates: GDA Zone 56 E 316412 N 6413195

Location of Site: 1.2 km west of Hebden Road and 500 m south of the Liddell pipeline and conveyor route, on a lower terrace of Bowmans Creek to the west of the break of slope (**Figure 5-4**). The site is in the exposure of a vehicle track leading across the landform toward Bowmans Creek (**Figure 5-15**).

Description of Site: Glendell North OS7 is a low-density artefact scatter comprising three mudstone flakes a mudstone shatter piece (**Table 5-10**; **Figure 5-16**). The 20 by 12 m extent of the site was defined by the observed area of deposit associated with the terrace landform. Surrounding vegetation at the site has been subject to extensive clearing and currently represent grassy floodplain paddock fringed by casuarina regrowth and isolated mature eucalypts by the creek. The GSE at the time of recording was low (15%) with a GSV of 70% within these exposures. Gravel and regular stones were infrequent. Identified disturbances included clearing, grazing, erosion, and vehicle damage.

Potential for the presence of subsurface archaeological deposits at Glendell North OS7 is assessed as likely, with good A-Horizon soil depth observed.



Figure 5-16: Photographs showing an overview and details of Glendell North OS7.

 Table 5-10: Glendell North OS7. Artefact attributes.

Artefact type	Material	Integrity	Reduction	Size
Flake	Mudstone	Proximal fragment	Primary	2-4cm
Flake	Mudstone	Proximal fragment	Secondary	0-2cm
Shatter	Mudstone	N/A	Secondary	0-2cm
Flake	Mudstone	Complete	Secondary	4-6cm

Glendell North OS8

Site Type: Open artefact scatter

GPS Coordinates: GDA Zone 56 E 316386 N 6412999

Location of Site: 1.2 km west of Hebden Road and 700 m south of the Liddell pipeline and conveyor route, Ravensworth, above the east bank of Bowmans Creek (**Figure 5-4**). The site is located eroding out of a terrace above Bowmans Creek (**Figure 5-17**).

Description of Site: Glendell North OS8 is a low-density artefact scatter comprising a silcrete flake and a piece of mudstone shatter (**Table 5-11**; **Figure 5-18**). The 20 by 7 m extent of the site was defined by the area of exposure across the terrace landform. Surrounding vegetation at the site was grassy paddock fringed by isolated mature eucalypts. The GSE at the time of recording was very limited (5%) with a GSV of 50% within these exposures. Gravel and small regular stones were prevalent. Identified disturbances included clearing, grazing, and erosion.

Potential for the presence of subsurface archaeological deposits at Glendell North OS8 is assessed as low.



Figure 5-17: Aerial showing location and extent of Glendell North OS8.



Figure 5-18: Photographs showing an overview and details of Glendell North OS8.

 Table 5-11: Glendell North OS8. Artefact attributes.

Artefact type	Material	Integrity	Reduction	Size
Flake	Silcrete	Complete	Primary	0-2cm
Shatter	Mudstone	Complete	Tertiary	0-2cm

Site Type: Open artefact scatter

GPS Coordinates: GDA Zone 56 E 315698 N 6412992

Location of Site: 1.4 km north of the New England Highway and 100 m south of the Liddell pipeline and conveyor route, within an electricity easement (**Figure 5-4**). The site is located on the break of a gentle crest on an access track (**Figure 5-19**).

Description of Site: Glendell North OS9 is a low-density artefact scatter comprising three silcrete flakes (**Table 5-12**; **Figure 5-20**). The 20 by 10 m extent of the site was defined by the area of exposure across. Surrounding vegetation at the site has been previously cleared,

currently representing regrowth casuarina woodland fringed by grassy paddock. The GSE at the time of recording was moderate (50%) with a GSV of 80% within these exposures. Gravel and regular stones were infrequent. Identified disturbances included clearing, grazing, erosion, vehicle damage, and the establishment of the electricity easement.

Potential for the presence of subsurface archaeological deposits at Glendell North OS9 is assessed as negligible.







Figure 5-20: Photographs showing an overview and details of Glendell North OS9.

3. View of silcrete artefacts from GN OS9.

Table 5-12: Glendell North OS9. Artefact attributes.

Artefact type	Material	Integrity	Reduction	Size
Flake	Silcrete	Distal fragment	Tertiary	4-6cm
Flake	Silcrete	Complete	Tertiary	0-2cm
Flake	Silcrete	Proximal fragment	Secondary	0-2cm

Glendell North OS10

Site Type:

Open artefact scatter

<u>GPS Coordinates</u>: GDA Zone 56 E 315557 N 6412542

<u>Location of Site</u>: 900 m north of the New England Highway and 400 m south of the Liddell pipeline and conveyor route, Ravensworth, within an electricity easement (Figure 5-4). The site is located on a mid-slope landform on an access track (Figure 5-21).

Description of Site: Glendell North OS10 is a low-density artefact scatter comprising five flakes and a core made of mudstone (**Table 5-13**; **Figure 5-22**). The 15 by 10 m extent of

the site was defined by the area of exposure along the access track. Surrounding vegetation at the site has been extensively cleared, currently representing grassy paddock fringed by stands of regrowth casuarina. The GSE at the time of recording was low-moderate (30%) with a GSV of 65% within these exposures. Gravel and regular stones were prevalent. Identified disturbances included clearing, grazing, erosion, vehicle damage, and the establishment of the electricity easement.

Potential for the presence of subsurface archaeological deposits at Glendell North OS10 is assessed as negligible.



Figure 5-21: Aerial showing location and extent of Glendell North OS10.



Figure 5-22: Photographs showing an overview and details of Glendell North OS10.

Artefact type	Material	Integrity	Reduction	Size	Additional detail
Core	Mudstone	Complete	Secondary	5cm	Multidirectional, 10+ scars, <5% cortex
Flake	Mudstone	Complete	Tertiary	4-6cm	
Flake	Mudstone	Complete	Tertiary	4-6cm	Right lateral use wear
Flake	Mudstone	Distal fragment	Tertiary	0-2cm	
Flake	Mudstone	Distal fragment	Tertiary	0-2cm	
Flake	Mudstone	Complete	Tertiary	2-4cm	

Table 5-13: Glendell North OS10. Artefact attributes.

Glendell North OS11

Site Type: Open artefact scatter

GPS Coordinates: GDA Zone 56 E 318126 N 6412284

Location of Site: 450 m east of Hebden Road, 250 m north of Ravensworth Homestead and 345 m east of Yorks Creek, Ravensworth (**Figure 5-4**). The site is located on skeletal soils on the crest of hill (**Figure 5-23**).

Description of Site: Glendell North OS11 is a low-density artefact scatter comprising a porcellanite flake, a mudstone flake, and a mudstone core (**Table 5-14**; **Figure 5-24**). The 40 by 25 m extent of the site was defined by the area of exposure across the crest landform. Surrounding vegetation at the site had been extensively previously cleared, sparse-moderate grassy paddock fringed by isolated regrowth. The GSE at the time of recording was moderate (35%) with a GSV of 70% within these exposures. Gravel and regular stones were prevalent. Identified disturbances included clearing, grazing, and erosion.

Potential for the presence of subsurface archaeological deposits at Glendell North OS11 is assessed as negligible.



Figure 5-23: Aerial showing location and extent of Glendell North OS11.



Figure 5-24: Photographs showing an overview and details of Glendell North OS11.

 Table 5-14: Glendell North OS11. Artefact attributes.

Artefact Type	Material	Integrity	Reduction	Size
Flake	Porcellanite	Complete	Tertiary	2-4cm
Flake	Mudstone	Longitudinal break	Primary	4-6cm
Core	Mudstone	Complete	Secondary	4-6cm

Site Type:

Open artefact scatter

GPS Coordinates: GDA Zone 56 E 316810 N 6412250

Location of Site: 850 m west of Hebden Road and 500 m east of Bowmans Creek, Ravensworth, on the southern wall of a property dam (**Figure 5-4**). The site is located within a gently sloping landform (**Figure 5-25**).

Description of Site: Glendell North OS12 is a low-density artefact scatter comprising two mudstone flakes (**Table 5-15**; **Figure 5-26**). The 40 by 35 m extent of the site was defined

by the area of exposure across the wall of the dam. Surrounding vegetation has been intensively previously cleared and represents grassy paddock with shrubs. The GSE within the vicinity of the dam was moderate (40%) with a GSV of 90% within these exposures. Gravel and regular stones were prevalent. Identified disturbances included clearing, grazing, erosion, and the construction of the adjacent dam.

Potential for the presence of subsurface archaeological deposits at Glendell North OS12 is assessed as negligible.



Figure 5-25: Aerial showing location and extent of Glendell North OS12.



Figure 5-26: Photographs showing an overview and details of Glendell North OS12.

Table 5-15: Glendell North OS12. Artefact attributes.

Artefact type	Material	Integrity	Reduction	Size
Flake	Mudstone	Complete	Tertiary	0-2cm
Flake	Mudstone	Proximal fragment	Secondary	0-2cm

Glendell North OS13

Site Type:

Open artefact scatter

GPS Coordinates: GDA Zone 56 E 317915 N 6411844

Location of Site: 100 m east of Hebden Road and 80 m southwest of Ravensworth Homestead, Ravensworth, by a property dam (**Figure 5-4**). The site is located over two main exposures on either side of a drainage swale running downslope of the dam (**Figure 5-27**).

Description of Site: Glendell North OS12 is a low-density artefact scatter comprising seven artefacts including flakes and pieces of shatter made of silcrete and mudstone (**Table 5-16**; **Figure 5-28**). The 80 by 90 m extent of the site was defined by the area of exposures

across the wall of the dam. Surrounding vegetation has been intensively previously cleared and represents grassy paddock with shrubs. The GSE within the vicinity of the dam was low-moderate (25%) with a GSV of 70% within these exposures. Gravel and regular stones were infrequent. Identified disturbances included clearing, grazing, sheet wash erosion and scouring.

Prior to the construction of the nearby property dam and associated modification of local drainage, the area of the site may have represented a section of terrace above a tributary to Yorks Creek located 200 m to the west. For this reason, the potential for the presence of subsurface archaeological deposits at Glendell North OS13 to the north on the elevated, flat landforms was assessed as likely.



Figure 5-27: Aerial showing location and extent of Glendell North OS13.



Figure 5-28: Photographs showing an overview and details of Glendell North OS13.

Artefact type	Material	Integrity	Reduction	Size	Additional detail
Flake (A1)	Mudstone	Distal fragment	Tertiary	2-4cm	Refits A3 (distal portion)
Shatter	Mudstone	N/A	Secondary	4-6cm	
Flake (A3)	Mudstone	Proximal fragment	Tertiary	0-2cm	Refits A1 (proximal portion)
Flake	Silcrete	Complete	Tertiary	2-4cm	
Flake	Mudstone	Distal fragment	Tertiary	0-2cm	
Shatter	Mudstone	N/A	Tertiary	0-2cm	
Flake	Silcrete	Complete	Tertiary	0-2cm	

Table 5-16: Glendell North OS13. Artefact attributes.

<u>Site Type</u>: Open artefact scatter

GPS Coordinates: GDA Zone 56 E 317705 N 6411820

Location of Site: 15 m west of Hebden Road and 1.5 km northeast of the New England Highway, Ravensworth, with an erosion scour (**Figure 5-4**). The site is located on a lower terrace of Yorks Creek, eroding onto the floodplain (**Figure 5-29**).

Description of Site: Glendell North OS14 is a low-density artefact scatter comprising five flakes made of mudstone and silcrete (**Table 5-17**; **Figure 5-30**). The 100 by 10 m extent of the site was defined by the area of erosion over the landform. Surrounding vegetation has been intensively previously cleared and represents grassy paddock with low shrubs fringed by casuarina and exotics along the creek line. The GSE within the vicinity of the site was moderate (45%) with a GSV of 75% within these exposures. Gravel and regular stones were rare. Identified disturbances included clearing, grazing, ploughing, and erosion.

Potential for the presence of subsurface archaeological deposits at Glendell North OS14 is assessed as negligible.



Figure 5-29: Aerial showing location and extent of Glendell North OS14.



Figure 5-30: Photographs showing an overview and details of Glendell North OS14.

Table 5-17: Glendell North OS14. Artefact attributes.

Artefact type	Material	Integrity	Reduction	Size
Flake	Mudstone	Complete	Tertiary	0-2cm
Flake	Mudstone	Distal fragment	Tertiary	0-2cm
Flake	Mudstone	Complete	Secondary	2-4cm
Flake	Mudstone	Complete	Tertiary	0-2cm
Flake	Silcrete	Complete	Tertiary	2-4cm

Site Type: Open artefact scatter

<u>GPS Coordinates</u>: GDA Zone 56 E 317055 N 6412013

Location of Site: 650 m west of Hebden Road and 1.3 km northeast of the New England Highway, Ravensworth, by a vehicle track (**Figure 5-4**). The site is located within eroded B-Horizon deposits on a moderate gradient mid-slope (**Figure 5-31**).

Description of Site: Glendell North OS15 is a low-density artefact scatter comprising six artefacts including flakes, shatter, a blade, and a core (**Table 5-18**; **Figure 5-32**). The 60 by 40 m extent of the site was defined by the area of the landform. Surrounding vegetation has been intensively previously cleared, currently representing grassy paddock with low shrubs fringed by sparse eucalypts and regrowth casuarina. The GSE within the vicinity of the dam was moderate-high (60%) with a GSV of 75% within these exposures. Gravel and regular stones were prevalent. Identified disturbances included clearing, grazing, erosion, and vehicle damage.

Potential for the presence of subsurface archaeological deposits at Glendell North OS15 is assessed as negligible.







Figure 5-32: Photographs showing an overview and details of Glendell North OS15.

Artefact type	Material	Integrity	Reduction	Size	Additional detail
Flake	Mudstone	Complete	Tertiary	0-2cm	
Blade	Silcrete	Distal fragment	Tertiary	2-4cm	
Flake	Silcrete	Complete	Tertiary	0-2cm	
Flake	Silcrete	Complete	Tertiary	2-4cm	
Core	Silcrete	N/A	Secondary	3.1cm	Multidirectional, 10+scars, reduced, 10% cortex
Shatter	Mudstone	N/A	Tertiary	0-2cm	

Table 5-18: Glendell North OS15. Artefact attributes.

Site Type:Open artefact scatter; PADGPS Coordinates:GDA Zone 56 E 317599 N 6410970

Location of Site: 175 m west of Hebden Road and 75 m north of Bowmans Creek, Ravensworth, in an erosive scour (**Figure 5-4**). The site is located on the edge of a dissected spur landform within an open paddock (**Figure 5-33**).

Description of Site: Glendell North OS16 is a low-density artefact scatter comprising nine artefacts, including flakes, a core, and a muller stone made of mudstone, chert and silcrete (**Table 5-19**; **Figure 5-34**). The 50 by 20 m extent of the site was defined by the results of later subsurface investigation (see **Section 6.4.2**). Surrounding vegetation represents grassy paddock with stands of regrowth eucalypts and exotics. The GSE within the vicinity was moderate (40%) with a GSV of 70% within these exposures. Gravel and regular stones were infrequent. Identified disturbances included clearing, grazing, scouring and sheet wash erosion.

At the time of survey, potential for the presence of subsurface archaeological deposits at Glendell North OS16 was assessed as low-moderate in areas not dissected by drainage channels.



Figure 5-33: Aerial showing location and extent of Glendell North OS16.



Figure 5-34: Photographs showing an overview and details of Glendell North OS16.

Artefact type	Material	Integrity	Reduction	Size	Additional detail
Muller stone	Mudstone	Complete	None	20cm	
Flake	Mudstone	Longitudinal break	Tertiary	0-2cm	
Flake	Mudstone	Complete	Primary	0-2cm	
Core	Chert	Longitudinal break	Secondary	2cm	Unidirectional, 20% cortex, 6 scars
Flake	Mudstone	Complete	Tertiary	2-4cm	
Flake	Mudstone	Longitudinal break	Tertiary	0-2cm	
Flake	Silcrete	Longitudinal break	Tertiary	2-4cm	
Flake	Silcrete	Proximal fragment	Tertiary	0-2cm	
Flake	Mudstone	Longitudinal break	Tertiary	2-4cm	

Site Type: Open Artefact Scatter

GPS Coordinates: GDA Zone 56 E 317850 N 6410521

Location of Site: 125 m east of Hebden Road and 1.4 km south of Ravensworth Homestead, Ravensworth, extending north of a property dam (**Figure 5-4**). The site is located on a lower slope landform on an artificial bund. The site also partially extends into the inundation area of the dam (**Figure 5-35**).

Description of Site: Glendell North OS17 is a low-density artefact scatter comprising four flakes made of mudstone and silcrete (**Table 5-20**; **Figure 5-36**). The 70 by 15 m extent of the site was defined by the area of exposure within the artificial bund. Surrounding vegetation has been intensively cleared and currently represents grassy paddock with sparse low shrubbery. The GSE within the vicinity was moderate (40%) with a GSV of 70% within these exposures. Gravel and regular stones were infrequent. Identified disturbances included clearing, cattle trampling, sheet wash erosion and the construction of the adjacent dam and artificial bund.

Potential for the presence of subsurface archaeological deposits at Glendell North OS17 is assessed as negligible.



Figure 5-35: Aerial showing location and extent of Glendell North OS17.



Figure 5-36: Photographs showing an overview and details of Glendell North OS17.

 Table 5-20: Glendell North OS17. Artefact attributes.

Artefact type	Material	Integrity	Reduction	Size
Flake	Mudstone	Proximal fragment	Tertiary	4-6cm
Flake	Mudstone	Complete	Tertiary	4-6cm
Flake	Mudstone	Proximal fragment	Tertiary	4-6cm
Flake	Silcrete	Longitudinal break	Secondary	6-8cm

Glendell North OS18

Site Type: Open artefact scatter

GPS Coordinates: GDA Zone 56 E 317852 N 6410274

Location of Site: 200 m east of Hebden Road and 370 m east of Bowmans Creek, Ravensworth, along a property access track adjacent to a fence (**Figure 5-4**). The site is located on a slight slope receding west toward the Bowmans Creek within an open paddock (**Figure 5-37**). **Description of Site**: Glendell North OS18 is a low-density artefact scatter comprising a mudstone flake and possible sandstone flaked stone (**Table 5-21**; **Figure 5-38**). The 15 by 10 m extent of the site was defined by the area of exposure within the access track. Surrounding vegetation has been intensively cleared, currently representing grassy paddock with sparse low shrubs. The GSE within the vicinity was low (25%) with a GSV of 60% within these exposures. Gravel and regular stones were rare. Identified disturbances included clearing, grazing, and vehicle damage.

Potential for the presence of subsurface archaeological deposits at Glendell North OS18 is assessed as negligible.



Figure 5-37: Aerial showing location and extent of Glendell North OS18.

Table 5-21: Glendell North OS18. Artefact attributes.

Artefact type	Material	Integrity	Reduction	Size
Possible grind stone	Sandstone	Longitudinal break	N/A	6-8cm
Flake	Mudstone	Complete	Tertiary	2-4cm



Figure 5-38: Photographs showing an overview and details of Glendell North OS18.

Site Type:Open artefact scatter; PADGPS Coordinates:GDA Zone 56 E 317790 N 6410020

Location of Site: 150 m east of Hebden Road and 480 m east of Bowmans Creek, Ravensworth, along a property access road (**Figure 5-4**). The site is located on an upper terrace landform associated with Bowmans Creek adjacent to a shed and the location of a previous farm building (**Figure 5-39**).

Description of Site: Glendell North OS19 is a low-moderate density artefact scatter comprising 19 artefacts, including complete and broken flakes, a core, a flaked piece, shatter, a retouched flake, and a retouched blade. All artefacts are manufactured either from mudstone and silcrete (**Table 5-22**; **Figure 5-40**). The 200 by 30 m extent of the site was defined by the results of later subsurface investigation (see **Section 6.4.2**). Surrounding vegetation represents grassy paddock with isolated eucalypts and farmhouse garden exotics. The GSE within the vicinity was low-moderate (35%) with a GSV of 85% within these exposures. Gravel and regular stones were very frequent. Identified disturbances included clearing, grazing, sheet wash erosion, vehicle damage, and the construction of adjacent farm buildings.

At the time of survey, potential for the presence of subsurface archaeological deposits at Glendell North OS19 was assessed as likely extending from the west of the site extent to the edge of the upper terrace landform.

Artefact type	Material	Integrity	Reduction	Size	Additional detail
Flake	Mudstone	Longitudinal break	Secondary	2-4cm	Fine distal bifacial retouch
Blade	Mudstone	Complete	Secondary	2-4cm	Fine unifacial marginal retouch
Flake	Mudstone	Longitudinal break	Tertiary	0-2cm	
Flake	Mudstone	Complete	Tertiary	2-4cm	
Flake	Mudstone	Complete	Tertiary	0-2cm	
Flake	Mudstone	Complete	Tertiary	0-2cm	
Flake	Silcrete	Complete	Tertiary	2-4cm	
Core	Silcrete	Fragment	Secondary	2.5cm	10% cortex, 6 scars, multidirectional
Flake	Mudstone	Distal fragment	Secondary	0-2cm	
Flake	Mudstone	Longitudinal break	Secondary	4-6cm	
Flake	Mudstone	Complete	Secondary	0-2cm	
Flaked piece	Mudstone	Complete	Tertiary	8-10cm	
Flake	Mudstone	Longitudinal break	Tertiary	8-10cm	
Flake	Mudstone	Longitudinal break	Tertiary	0-2cm	
Flake	Mudstone	Complete	Primary	4-6cm	
Flake	Silcrete	Complete	Tertiary	0-2cm	

Table 5-22: Glendell North OS19. Surface artefact attributes.

Artefact type	Material	Integrity	Reduction	Size	Additional detail
Shatter	Silcrete	N/A	Tertiary	4-6cm	
Flake	Silcrete	Longitudinal break	Tertiary	2-4cm	
Flake	Mudstone	Proximal fragment	Tertiary	0-2cm	

Figure 5-39: Aerial showing location and extent of Glendell North OS19 and OS20.



Figure 5-40: Photographs showing an overview and details of Glendell North OS19.





Site Type: Open artefact scatter

GPS Coordinates: GDA Zone 56 E 317856 N 6409957

Location of Site: 300 m east of Hebden Road and 455 m north of Bowmans Creek, Ravensworth, on the wall of a property dam (**Figure 5-4**). The site is on an upper terrace landform associated with Bowmans Creek, and adjacent to a shed and stock holding area (**Figure 5-39**).

Description of Site: Glendell North OS20 is a low-density artefact scatter comprising five artefacts, including flakes, shatter pieces, and a side scraper made of mudstone and silcrete (**Table 5-23**; **Figure 5-41**). The 25 by 10 m extent of the site was defined by the area of exposure within the dam wall. Surrounding vegetation has been intensively cleared, currently representing grassy paddock with sparse low shrubs. The GSE within the vicinity was moderate (60%) with a GSV of 80% within these exposures. Gravel and regular stones were dominant. Identified disturbances included clearing, cattle trampling, erosion and the construction of the adjacent dam.

Potential for the presence of subsurface archaeological deposits at Glendell North OS20 is assessed as negligible.

Artefact type	Material	Integrity	Reduction	Size	Additional detail
Flake	Silcrete	Complete	Secondary	2-4cm	
Shatter	Mudstone	N/A	Secondary	2-4cm	
Side scraper	Mudstone	Complete	Tertiary	2-4cm	Steep marginal unifacial retouch
Shatter	Mudstone	N/A	Tertiary	0-2cm	
Flake	Silcrete	Complete	Secondary	4-6cm	

Table 5-23: Glendell North OS20. Artefact attributes.

Figure 5-41: Photographs showing	an overview and details	of Glendell North OS20.
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Site Type: Open artefact scatter

<u>GPS Coordinates</u>: GDA Zone 56 E 318418 N 6410236

Location of Site: 750 m east of Hebden Road and 400 m north of Swamp Creek, Ravensworth, in the exposed earth at the base of a tree (**Figure 5-4**). The site is located midslope within an open paddock that has been impacted by extensive contour banking (**Figure 5-42**).

Description of Site: Glendell North OS21 is a low-density artefact scatter comprising two flakes made of mudstone and quartz (**Table 5-24**; **Figure 5-43**). The 50 by 15 m extent of the site was defined by the area of exposure. Surrounding vegetation has been extensively previously cleared, currently representing grassy paddock with isolated regrowth casuarinas. The GSE within the vicinity was moderate (40%) with a GSV of 80% within these exposures. Gravel and regular stones were infrequent. Identified disturbances included clearing and cattle grazing.

Potential for the presence of subsurface archaeological deposits at Glendell North OS21 is assessed as negligible.



Figure 5-42: Aerial showing location and extent of Glendell North OS21.

Figure 5-43: Photographs showing an overview and details of Glendell North OS21.





Table 5-24: Glendell North OS21. Artefact attributes.

Artefact type	Material	Integrity	Reduction	Size
Flake	Mudstone	Complete	Secondary	4-6cm
Flake	Quartz	Proximal fragment	Tertiary	0-2cm

Glendell North OS22

<u>Site Type</u>: Open artefact scatter

GPS Coordinates: GDA Zone 56 E 319293 N 6410281

Location of Site: 2.3 km west of Hebden Road and 25 m northwest of Swamp Creek, Ravensworth, along an ephemeral tributary (**Figure 5-4**). The site is located on a flat lower terrace of Swamp Creek (**Figure 5-44**).

Description of Site: Glendell North OS22 is a low-density artefact scatter comprising three mudstone flakes (**Table 5-25**; **Figure 5-45**). The 30 by 15 m extent of the site was defined by the area of exposure over the landform. Surrounding vegetation has been extensively previously cleared, currently representing grassy paddock fringed by stands of regrowth casuarina along the creek line. The GSE within the vicinity was moderate (40%) with a GSV of 70% within these exposures. Gravel and regular stones were infrequent. Identified disturbances included clearing, grazing, and sheet wash erosion.

Potential for the presence of subsurface archaeological deposits in the south at Glendell North OS22 along the terrace is assessed as low.





Figure 5-45: Photographs showing an overview and details of Glendell North OS22.





Table 5-25: Glendell North OS22. Artefact attributes.

Artefact type	Material	Integrity	Reduction	Size	Additional detail
Flake	Mudstone	Complete	Tertiary	2-4cm	
Flake	Mudstone	Complete	Secondary	8-10cm	Right lateral use wear
Flake	Mudstone	Complete	Tertiary	2-4cm	

Glendell North OS23

Site Type:

Open artefact scatter

GPS Coordinates: GDA Zone 56 E 318500 N 6410083

Location of Site: 900 m east of Hebden Road and 250 m north of Swamp Creek, Ravensworth, within an electricity easement (**Figure 5-4**). The site is located within a midslope landform (**Figure 5-46**).

Description of Site: Glendell North OS23 is a low-density artefact scatter comprising three flakes made from silcrete and mudstone and a core made of mudstone (**Table 5-26**; **Figure 5-47**). The 70 by 15 m extent of the site was defined by the area of exposure over the landform. Surrounding vegetation has been extensively previously cleared, currently representing grassy paddock with low shrubs and isolated regrowth casuarinas. The GSE within the vicinity was moderate-high (70%) with a GSV of 85% within these exposures. Gravel and regular stones were frequent. Identified disturbances included clearing, grazing, erosion, and the establishment of the electricity easement.

Potential for the presence of subsurface archaeological deposits at Glendell North OS23 is assessed as negligible.



Figure 5-46: Aerial showing location and extent of Glendell North OS23.

Figure 5-47: Photographs showing an overview and details of Glendell North OS23.




Table 5-26: Glendell North OS23. Artefact attributes.

Artefact type	Material	Integrity	Reduction	Size	Additional detail
Core	Mudstone	N/A	Tertiary	5.2cm	Multidirectional, reduced, 6 scars, 20% cortex
Flake	Mudstone	Complete	Secondary	10+cm	
Flake	Mudstone	Longitudinal break	Tertiary	6-8cm	
Flake	Silcrete	Distal fragment	Tertiary	4-6cm	

Glendell North OS24

Site Type: Open artefact scatter

GPS Coordinates: GDA Zone 56 E 318346 N 6409339

Location of Site: 500 m east of Hebden Road and 60 m southeast of Swamp Creek, Ravensworth, adjacent to an artificial trench (**Figure 5-4**). The site is located on the floodplain of Swamp Creek along an artificial bund for a raised track (**Figure 5-48**).

Description of Site: Glendell North OS24 is a low-density artefact scatter comprising seven mudstone flakes (**Table 5-27**; **Figure 5-49**). The 150 by 10 m extent of the site was defined by the area of exposure along the bund. Surrounding vegetation has been extensively previously cleared, currently representing grassy paddock. The GSE within the vicinity was moderate (30%) with a GSV of 70% within these exposures. Gravel and regular stones were prevalent. Identified disturbances included clearing, grazing, and erosion.

Potential for the presence of subsurface archaeological deposits at Glendell North OS24 is assessed as negligible.

Glendell North OS24 was salvaged on 12 November 2018 according to Section 6.2.1.1 of the MOC ACHMP as it was located within the approved disturbance area for the Glendell Mine. The results of the salvage program are presented in **Appendix 3**.



Figure 5-48: Aerial showing location and extent of Glendell North OS24.

Figure 5-49: Photographs showing an overview and details of Glendell North OS24.





GN OS24.

Table 5-27: Glendell North OS24. Artefact attributes.

Artefact type	Material	Integrity	Reduction	Size
Flake	Mudstone	Complete	Secondary	2-4cm
Flake	Mudstone	Complete	Secondary	2-4cm
Flake	Mudstone	Complete	Primary	4-6cm
Flake	Mudstone	Complete	Secondary	4-6cm
Flake	Mudstone	Distal fragment	Tertiary	0-2cm
Flake	Mudstone	Complete	Secondary	4-6cm
Flake	Mudstone	Distal fragment	Tertiary	0-2cm

Glendell North OS25

Site Type: Open artefact scatter; PAD

GPS Coordinates: GDA Zone 56 E 318367 N 6408758

Location of Site: 1.2 km east of the New England Highway and 1.5 km north of Bettys Creek, Ravensworth (**Figure 5-4**). The site is located on the east side of Swamp Creek eroding out of the bank (**Figure 5-50**).

Description of Site: Glendell North OS25 is a low-density artefact scatter comprising two mudstone flakes (**Table 5-28**; **Figure 5-51**). The 40 by 15 m extent of the site was defined by the results of later subsurface investigation (see **Section 6.4.2**). Surrounding vegetation at the site has been extensively cleared and represents grassy paddock fringed by casuarina regrowth along the creek line. The GSE at the time of recording was moderate (60%) with a GSV of 50% within these exposures. Ordinary stone fragments and pebbles were rare. Identified disturbances included erosion, previous clearing, and grazing.

At the time of survey, potential for the presence of subsurface archaeological deposits at Glendell North OS25 was assessed as low-moderate east of the area of erosion by the creek line.



Figure 5-50: Aerial showing location and extent of Glendell North OS25.

Figure 5-51: Photographs showing an overview and details of Glendell North OS25.





3. View of mudstone flakes from GN OS25.

4. View of a mudstone flake showing use wear from GN OS25.

Table 5-28: Glendell North OS25. Surface artefact attributes.

Artefact type	Material	Integrity	Reduction	Size	Additional detail
Flake	Mudstone	Proximal fragment	Tertiary	4-6cm	Conjoin marginal use wear
Flake	Mudstone	Complete	Tertiary	4-6cm	Marginal use wear

Glendell North OS26

Site Type:

Open artefact scatter

GPS Coordinates: GDA Zone 56 E 318224 N 6410798

Location of Site: 450 m east of Hebden Road and 1.2 km south of Ravensworth Homestead, Ravensworth, on the western wall of a property dam (**Figure 5-4**). The site is located on a lower slope landform sloping toward a tributary of Bowmans Creek (**Figure 5-52**).

Description of Site: Glendell North OS26 is a low-density artefact scatter comprising a flake and shatter piece made from mudstone (**Table 5-29**; **Figure 5-53**). The 15 by 5 m extent of the site was defined by the area of exposure within the dam wall. Surrounding vegetation represents grassy paddock fringed by eucalypt and casuarina regrowth. The GSE within the vicinity was moderate (40%) with a GSV of 70% within these exposures. Gravel and regular stones were moderately frequent. Identified disturbances included clearing, cattle trampling, contour banking and the construction of the adjacent dam.

Potential for the presence of subsurface archaeological deposits at Glendell North OS26 is assessed as negligible.



Figure 5-52: Aerial showing location and extent of Glendell North OS26.

Figure 5-53: Photographs showing an overview and details of Glendell North OS26.





Table 5-29: Glendell North OS26. Artefact attributes.

Artefact type	e Material	Integrity	Reduction	Size
Flake	Mudstone	Complete	Primary	2-4cm
Shatter	Mudstone	N/A	Tertiary	2-4cm

Glendell North OS27

<u>Site Type</u>: Open artefact scatter

GPS Coordinates: GDA Zone 56 E 318588 N 6408562

Location of Site: 200 m east of Swamp Creek, Ravensworth, along the north-western edge of a dam (**Figure 5-4**). The site is located on a gentle-moderate gradient mid-slope on an artificial bund (**Figure 5-54**).

Description of Site: Glendell North OS27 is a low-density artefact scatter comprising a mudstone flake and a silcrete flake (**Table 5-30**; **Figure 5-55**). The 10 by 20 m extent of the site was defined by the area of exposure over the bund. Surrounding vegetation has been previously cleared, currently grassy paddock with low weeds and stands of regrowth casuarinas. The GSE within the vicinity was very high (80%) with a GSV of 50% within these exposures. Gravel and regular stones were dominant. Identified disturbances included clearing, cattle trampling, erosion, and the construction of the artificial bund.

Potential for the presence of subsurface archaeological deposits at Glendell North OS27 is assessed as negligible.

Glendell North OS27 was salvaged on 12 November 2018 according to Section 6.2.1.1 of the MOC ACHMP (V4, XMO SD PLN 0060) as it was located within the approved disturbance area for the Glendell Mine. The results of the salvage program are presented in **Appendix 3**.



Figure 5-54: Aerial showing locations and extents of Glendell North OS27 and Glendell North OS28.

Figure 5-55: Photographs showing an overview and details of Glendell North OS27.





Table 5-30: Glendell North OS27. Artefact attributes.

Artefact type	Material	Integrity	Reduction	Size
Flake	Mudstone	Medial fragment	Tertiary	0-2cm
Flake	Silcrete	Proximal fragment	Tertiary	2-4cm

Glendell North OS28

Site Type: Open artefact scatter

GPS Coordinates: GDA Zone 56 E 318611 N 6408397

Location of Site: 1.7 km north of the New England Highway and 275 m east of Swamp Creek, Ravensworth, in the erosive scour of an access track (**Figure 5-4**). The site is located a gentle-moderate gradient sloping southwest toward Swamp Creek (**Figure 5-54**).

Description of Site: Glendell North OS28 is a low-density artefact scatter comprising a mudstone flake, a piece of mudstone shatter, and a quartz flake (**Table 5-31**; **Figure 5-56**). The 50 by 10 m extent of the site was defined by the area of exposure within an access track. Surrounding vegetation represents grassy paddock with stands of regrowth casuarinas. The GSE within the vicinity was moderate-high (60%) with a GSV of 70% within these exposures. Gravel and regular stones were frequent. Identified disturbances included clearing, grazing, scouring, sheet wash erosion, and vehicle damage.

Potential for the presence of subsurface archaeological deposits at Glendell North OS28 is assessed as negligible.



Figure 5-56: Photographs showing an overview and details of Glendell North OS28.

Table 5-31: Glendell North OS28. Artefact attributes.

Artefact type	Material	Integrity	Reduction	Size
Flake	Mudstone	Complete	Tertiary	2-4cm
Shatter	Mudstone	N/A	Secondary	2-4cm
Flake	Quartz	Complete	Tertiary	0-2cm

Glendell North OS29

Site Type: Open artefact scatter

GPS Coordinates: GDA Zone 56 E 318291 N 6408381

Location of Site: 1.3 km north of the New England Highway and 30 m west of Swamp Creek, Ravensworth (**Figure 5-4**). The site is located on a topsoil dump by a dam (**Figure 5-57**).

Description of Site: Glendell North OS29 is a low-density artefact scatter comprising three flakes and a shatter piece made from mudstone and silcrete (**Table 5-32**; **Figure 5-58**). The 30 by 10 m extent of the site was defined by the area of exposure within the topsoil dump. Surrounding vegetation represents grassy paddock with low shrubs fringed by boxthorn, casuarina, and isolated eucalypts by the creek. The GSE within the vicinity was low (30%) with a GSV of 70% within these exposures. Gravel and regular stones were infrequent. Identified disturbances included clearing, grazing, scouring, sheet wash erosion and the movement of topsoil.

Potential for the presence of subsurface archaeological deposits at Glendell North OS29 is assessed as negligible.





Figure 5-58: Photographs showing an overview and details of Glendell North OS29.



Artefact type	Material	Integrity	Reduction	Size
Flake	Mudstone	Complete	Tertiary	2-4cm
Flake	Silcrete	Proximal fragment	Tertiary	0-2cm
Shatter	Silcrete	N/A	Tertiary	0-2cm
Flake	Silcrete	Complete	Tertiary	2-4cm

Table 5-32: Glendell North OS30. Artefact attributes.

Glendell North OS30

Site Type: Open artefact scatter

<u>GPS Coordinates</u>: GDA Zone 56 E 318530 N 6408206

Location of Site: 1.5 km north of the New England Highway and 175 m east of Swamp Creek, Ravensworth (**Figure 5-4**). The site is located within a moderate gradient sloping west towards Swamp Creek on the western wall of a dam (**Figure 5-59**).

Description of Site: Glendell North OS30 is a low-density artefact scatter comprising a flake, a retouched flake, and a core made from mudstone (**Table 5-33**; **Figure 5-60**). The 130 by 15 m extent of the site was defined by the area of exposure across the dam wall. Surrounding vegetation has been extensively previously cleared, currently representing grassy paddock with stands of regrowth eucalypts and casuarinas. The GSE within the vicinity was high (65%) with a GSV of 85% within these exposures. Gravel and regular stones were infrequent. Identified disturbances included clearing, grazing, scouring, sheet wash erosion, and the construction of the adjacent dam.

Potential for the presence of subsurface archaeological deposits at Glendell North OS30 is assessed as negligible.

Artefact type	Material	Integrity	Reduction	Size	Additional detail
Flake	Mudstone	Distal fragment	Secondary	4-6cm	
Core	Mudstone	N/A	Secondary	4-6cm	Multidirectional, 5 scars, 45% cortex
Flake	Mudstone	Complete	Tertiary	4-6cm	Core rejuvenation flake

Table 5-33: Glendell North OS30. Artefact attributes.



Figure 5-59: Aerial showing location and extent of Glendell North OS30.

Figure 5-60: Photographs showing an overview and details of Glendell North OS30.





Glendell North OS31

Site Type: Open artefact scatter

GPS Coordinates: GDA Zone 56 E 318827 N 6407525

Location of Site: 1 km north of the New England Highway and 300 m north of Bettys Creek, Ravensworth, on an artificial bund (**Figure 5-4**). The site is located on a moderate gradient sloping west toward Swamp Creek (**Figure 5-61**).

Description of Site: Glendell North OS31 is a low-density artefact scatter comprising 15 artefacts, including flakes, shatter, a core, and a blade made of mudstone, silcrete, and quartz (**Table 5-34**; **Figure 5-62**). The 160 by 15 m extent of the site was defined by the area of exposure across the artificial bund and surrounds. Surrounding vegetation has been extensively previously cleared, currently representing grassy paddock with stands of regrowth eucalypts and casuarinas. The GSE within the vicinity was high (65%) with a GSV of 85% within these exposures. Gravel and regular stones were dominant. Identified disturbances included clearing, grazing, scouring, sheet wash erosion and the construction of the artificial bund.

Potential for the presence of subsurface archaeological deposits at Glendell North OS31 is assessed as negligible.



Figure 5-61: Aerial showing location and extent of Glendell North OS31.

Figure 5-62: Photographs showing an overview and details of Glendell North OS31.





Artefact type	Material	Integrity	Reduction	Size	Additional detail
Flake	Mudstone	Complete	Tertiary	2-4cm	
Shatter	Mudstone	N/A	Tertiary	0-2cm	
Core	Silcrete	N/A	Secondary	2.5cm	Bifacial fragment, 6 scars, 25% cortex
Flake	Mudstone	Complete	Secondary	2-4cm	
Flake	Mudstone	Longitudinal break	Secondary	2-4cm	
Flake	Mudstone	Complete	Secondary	0-2cm	
Blade	Mudstone	Longitudinal break	Tertiary	4-6cm	
Flake	Mudstone	Complete	Primary	0-2cm	
Flake	Mudstone	Complete	Tertiary	2-4cm	
Flake	Mudstone	Longitudinal break	Primary	2-4cm	
Flake	Mudstone	Distal fragment	Primary	0-2cm	
Shatter	Mudstone	N/A	Tertiary	2-4cm	
Flake	Mudstone	Distal fragment	Primary	2-4cm	
Flake	Quartz	Complete	Tertiary	0-2cm	
Flake	Silcrete	Complete	Tertiary	2-4cm	

Glendell North OS32

Site Type: Open artefact scatter

GPS Coordinates: GDA Zone 56 E 317951 N 6407475

Location of Site: 80 m northeast of the New England Highway and 30 m west of Bowmans Creek, Ravensworth on an ant nest (**Figure 5-4**). The site is located on an upper terrace landform above Bowmans Creek (**Figure 5-63**).

Description of Site: Glendell North OS32 is a low-density artefact scatter comprising a silcrete flake and a mudstone core (**Table 5-35**; **Figure 5-64**). The 10 by 3 m extent of the site was defined by the area of exposure across the ant mound. Surrounding vegetation has been extensively previously cleared, currently representing grassy paddock with stands of

regrowth eucalypts and casuarinas along the creek channel. The GSE within the vicinity was moderate (40%) with a GSV of 70% within these exposures. Gravel and regular stones were rare. Identified disturbances included clearing, grazing, scouring, sheet wash erosion and the establishment of the adjacent ant mound.

Potential for the presence of subsurface archaeological deposits at Glendell North OS32 is assessed as low.







Figure 5-64: Photographs showing an overview and details of Glendell North OS32.

Table 5-35: Glendell North OS32. Artefact attributes.

Artefact type	Material	Integrity	Reduction	Size	Additional detail
Flake	Silcrete	Proximal fragment	Tertiary	0-2cm	
Core	Mudstone	N/A	Tertiary	5.4cm	Multidirectional, 10+scars, <5% cortex

Glendell North OS33

Site Type: Open artefact scatter

GPS Coordinates: GDA Zone 56 E 319166 N 6407069

Location of Site: 54 m north of the Main North Rail Line and 15 m south of the diversion channel for Bettys Creek, Ravensworth (**Figure 5-4**). The site is located on a modified bank feature of the Bettys Creek diversion (**Figure 5-65**).

Description of Site: Glendell North OS33 is a low-density artefact scatter comprising 12 artefacts, including flakes, blades, a core, and an end scraper made of mudstone and silcrete (**Table 5-36**; **Figure 5-66**). The 100 by 15 m extent of the site was defined by the

area of exposure along the modified bank. Surrounding vegetation has been extensively previously cleared, currently representing open grassy paddock with scattered shrubs and isolated regrowth casuarinas. The GSE within the vicinity was moderate (55%) with a GSV of 75% within these exposures. Gravel and regular stones were frequent. Identified disturbances included clearing, grazing, scouring, sheet wash erosion and the modification of Bettys Creek.

Potential for the presence of subsurface archaeological deposits at Glendell North OS33 is assessed as negligible.



Figure 5-65: Aerial showing location and extent of Glendell North OS33.



Figure 5-66: Photographs showing an overview and details of Glendell North OS33.

Artefact type	Material	Integrity	Reduction	Size	Additional detail
Blade	Silcrete	Complete	Tertiary	4-6cm	
Blade	Mudstone	Complete	Tertiary	4-6cm	
End Scraper	Mudstone	Complete	Secondary	10-12cm	Distal, semi-steep, unifacial, invasive retouch
Flake	Mudstone	Complete	Tertiary	4-6cm	
Flake	Mudstone	Complete	Secondary	2-4cm	
Flake	Silcrete	Proximal fragment	Tertiary	4-6cm	
Shatter	Silcrete	N/A	N/A	0-2cm	
Core	Silcrete	N/A	Secondary	3.1cm	Bifacial fragment, 4 scars, 50-75% cortex
Blade	Mudstone	Proximal fragment	Secondary	2-4cm	
Flake	Silcrete	Proximal fragment	Tertiary	0-2cm	
Flake	Mudstone	Distal fragment	Tertiary	0-2cm	
Flake	Mudstone	Proximal fragment	Tertiary	4-6cm	

Table 5-36: Glendell North OS33. Artefact attributes.

Glendell North OS34

Site Type: Open artefact scatter; PAD

GPS Coordinates: GDA Zone 56 E 317443 N 6411053

Location of Site: 350 m west of Hebden Road at the confluence of Bowmans Creek and Yorks Creek, Ravensworth (**Figure 5-4**). The site is in an open paddock along the steep, eroded edge of a terrace landform at the confluence of Yorks and Bowmans Creeks (**Figure 5-67**).

Description of Site: Glendell North OS34 is a low-density artefact scatter comprising four complete and broken flakes. The artefacts are made of mudstone, chert and silcrete (**Table 5-37**; **Figure 5-68**). The 40 by 15 m extent of the site was defined by the results of later subsurface investigation (see **Section 6.4.2**). Surrounding vegetation at the site has been extensively cleared and represents grassy paddock fringed by casuarina regrowth along the creek line. The GSE at the time of recording was moderate (60%) with a GSV of 50% within these exposures. Ordinary stone fragments and pebbles were rare. Identified disturbances included erosion, previous clearing, and grazing.

At the time of survey, potential for the presence of subsurface archaeological deposits at Glendell North OS34 was assessed as high given its location at the confluence of Yorks and Bowmans Creeks. The test excavation program allowed for a more accurate understanding of the site extent (**Section 6.4**).



Figure 5-67: Aerial showing location and extent of Glendell North OS34 and OS35.

Figure 5-68: Photographs showing an overview and details of Glendell North OS34.



Table 5-37: Glendell North OS34. Surface artefact attributes.

Artefact type	Material	Integrity	Reduction	Size
Flake	Silcrete	Complete	Primary	4-6cm
Flake	Silcrete	Complete	Tertiary	0-2cm
Flake	Mudstone	Distal fragment	Tertiary	2-4cm
Flake	Chert	Longitudinal break	Tertiary	2-4cm

Glendell North OS35 (formerly Glendell North PAD2)

<u>Site Type</u>: Open artefact scatter; PAD

<u>GPS Coordinates</u>: GDA Zone 56 E 317371 N 6411106

Location of Site: 430 m west of Hebden Road near the confluence of Bowmans Creek and Yorks Creek, Ravensworth (**Figure 5-4**). The site is in open paddock on a terrace landform 25 m north of the bank of Bowmans Creek (**Figure 5-67**).

Description of Site: This site was recorded because of the test excavation program and has no surface manifestation. Details on the test excavation results at this site are presented in **Section 6.4.2**.

Glendell North OS36 (formerly Glendell North PAD1)

Site Type: Open artefact scatter; PAD

GPS Coordinates: GDA Zone 56 E 316670 N 6413398

Location of Site: 1.1 km west of Hebden Road and 250 m south of the Liddell pipeline and conveyor route, above the east bank of Bowmans Creek (**Figure 5-4**). The site is located on a flat bench above the confluence of Bowmans Creek and an ephemeral tributary in a cleared agricultural paddock (**Figure 5-69**).

Description of Site: Glendell North OS36 was identified during survey as a potential archaeological deposit identified based on a flat, secondary terrace adjacent to Bowmans Creek. Local depth of deposit was estimated to be 15+ cm (**Figure 5-70**). The 30 by 35 m extent of the site was defined by the results of later subsurface investigation (see **Section 6.4.2**) and there is no surface manifestation of artefacts. Surrounding vegetation at the site was grassy paddock fringed by isolated mature eucalypts. The GSE at the time of recording was very limited (5%) with a GSV of 50% within these exposures. Ordinary stone fragments and pebbles were not observed. Wooden and metal debris from previous historical activity in the area suggest that ground surfaces at the site have been disturbed or artificially levelled. Further identified disturbances included previous clearing and grazing.

At the time of survey, potential for the presence of subsurface archaeological deposits at Glendell North OS36 was assessed as likely despite the absence of surface artefacts.



Figure 5-69: Aerial showing location and extent of Glendell North OS36.

Figure 5-70: Photographs showing an overview and details of Glendell North OS36.





3. View of ground surfaces at GN OS36.

4. View of GN OS36 looking south.

Glendell North OS37

Site Type: Open artefact scatter

GPS Coordinates: GDA Zone 56 E 317843 N 6412369

Location of Site: 2.2 km north east of the New England Highway, 185 m east of Hebden Road, 50 m east of Yorks Creek and 340 m northwest of the Ravensworth Homestead, Ravensworth (**Figure 5-4**). The site is located on a terrace to the east of Yorks Creek in a cleared agricultural paddock (**Figure 5-71**).

Description of Site: Glendell North OS37 is a low-density artefact scatter comprising three flakes, one of which is broken into two pieces, and a mudstone core fragment. (**Table 5-38**; **Figure 5-72**). The 40 by 20 m extent of the site was defined by the area of exposure across the landform. Surrounding vegetation has been intensively previously cleared and represents grassy paddock with regrowth casuarinas lining the creek line. The GSE within the vicinity was moderate (40%) with a GSV of 70% within these exposures. Gravel and regular stones were infrequent. Identified disturbances included clearing, grazing, scouring, sheet wash erosion, historic ploughing, and vehicle damage.

Potential for the presence of subsurface archaeological deposits at Glendell North OS37 is assessed as negligible.

Glendell North OS37 was identified during the historic heritage excavation program (Casey & Lowe 2019).



Figure 5-71: Aerial showing location and extent of Glendell North OS37.

Figure 5-72: Photographs showing an overview and details of Glendell North OS37.





Table 5-38: Glendell North OS37. Artefact attributes.						
Artefact type	Material	Integrity	Reduction	Size	Additional detail	
Core	Mudstone	N/A	Secondary	1.2cm	Multidirectional, fragment, 5 scars, 10% cortex	
Flake	Silcrete	Complete	Tertiary	2-4cm		
Flake	Mudstone	Proximal fragment	Tertiary	0-2cm		
Flake	Silcrete	Proximal fragment	Tertiary	2-4cm	Conjoin	
Flake	Silcrete	Distal fragment	Tertiary	0-2cm	Conjoin	

Glendell North OS38

Open artefact scatter Site Type:

GDA Zone 56 E 317557 N 6411704 GPS Coordinates:

Location of Site: 1.5 km north east of the New England Highway, 500 m southwest of the Ravensworth Homestead and 200 m west of Hebden Road, Ravensworth (Figure 5-4). The site is located on a terrace to the east of Yorks Creek in a cleared agricultural paddock (Figure 5-73). Glendell North OS38 was identified following the survey, during the historical archaeology test excavation program.

Description of Site: Glendell North OS38 is a low-density artefact scatter comprising two flakes, one of which is broken into three pieces. The flakes are manufactured from mudstone and silcrete (Table 5-39; Figure 5-74). One of the artefacts was found at a depth of 15 cm during a historic heritage test excavation program. The 30 by 15 m extent of the site was defined by the area of exposure across the landform. Surrounding vegetation has been intensively previously cleared and represents grassy paddock with regrowth casuarinas lining the creek line. The GSE within the vicinity was moderate (40%) with a GSV of 70% within these exposures. Gravel and regular stones were infrequent. Identified disturbances included clearing, grazing, scouring, sheet wash erosion, historic ploughing, and vehicle damage.

Potential for the presence of intact subsurface archaeological deposits at Glendell North OS38 is assessed as negligible. It is noted that the adjacent subsurface historic archaeological investigations that were monitored by an OzArk archaeologist and Aboriginal community members did not uncover further subsurface Aboriginal archaeological deposits.



Figure 5-73: Aerial showing location and extent of Glendell North OS38.

Figure 5-74: Photographs showing an overview and details of Glendell North OS38.





Table 5-39: Glendell North OS38. Artefact attributes.

Artefact type	Material	Integrity	Reduction	Size	Additional detail
Flake	Mudstone	Longitudinal break	Tertiary	0-2cm	
Flake	Silcrete	Complete	Secondary	2-4cm	Broken into three pieces

Glendell North OS39

<u>Site Type</u>: Open artefact scatter

GPS Coordinates: GDA Zone 56 E 318028 N 6409888

Location of Site: 960 m east of the New England Highway, 320m northwest of Swamp Creek, 560 m northeast of the Bowmans Creek, and 460 m east of Hebden Road, Ravensworth (**Figure 5-4**). The site is located on a slight crest which gently slopes to the west and east to creek lines (**Figure 5-75**).

Description of Site: Glendell North OS39 is a low-density artefact scatter comprising six flakes. The flakes are manufactured mainly from silcrete, with one mudstone flake also recorded (**Table 5-40**; **Figure 5-76**). Artefacts are eroding from the northern and eastern sides of the crest in exposures caused by slope wash. The 100 by 55 m extent of the site was defined by the area of exposure across the landform. Surrounding vegetation has been intensively previously cleared and represents grassy paddock. The GSE within the vicinity was moderate-high (70%) with a GSV of 80% within these exposures. Gravel and regular stones were frequent. Identified disturbances included clearing, grazing, scouring, sheet wash erosion.

Glendell North OS39 is located at the same location as AHIMS site 37-3-0617 (Bowmans Creek 5). Bowmans Creek 5 is listed as 'destroyed' on AHIMS following salvage under AHIP 2267 in 2005 when 42 surface artefacts were collected from the site. Artefacts present in 2005 were manufactured from silcrete, mudstone, quartz and quartzite. The presence of

additional artefacts since the 2005 collection is attributed to ongoing erosion which has exposed the additional artefacts.

Potential for the presence of intact subsurface archaeological deposits at Glendell North OS39 is assessed as negligible.





Figure 5-76: Photographs showing an overview and details of Glendell North OS39.





Table 5-40: Glendell North OS39. Artefact attributes.

Artefact type	Material	Integrity	Reduction	Size
Flake	Mudstone	Longitudinal break	Tertiary	4-6cm
Flake	Silcrete	Longitudinal break	Secondary	2-4cm
Flake	Silcrete	Proximal fragment	Tertiary	2-4cm
Flake	Silcrete	Complete	Tertiary	0-2cm
Flake	Silcrete	Distal fragment	Tertiary	0-2cm
Flake	Silcrete	Proximal fragment	Tertiary	2-4cm

5.4.2 Isolated finds

Twenty-nine isolated finds were recorded during the survey. These are listed in **Table 5-41** and shown on **Figure 5-5**. Details of each isolated find follows.

Site name	GDA Zone 56 Easting	GDA Zone 56 Northing	Artefact type	Material	Size	Additional detail
GN IF1	318189	6414948	Flake	Mudstone	6-8cm	Complete, tertiary
GN IF2	317146	6413503	Flake	Mudstone	0-2cm	Proximal fragment, tertiary
GN IF3	317120	6413414	Flake	Mudstone	2-4cm	Complete, tertiary
GN IF4	316962	6412937	Flake	Tuff	0-2cm	Proximal fragment, tertiary
GN IF5	318054	6412783	Side scraper	Mudstone	4-6cm	Complete, secondary
GN IF6	315966	6412883	Flake	Silcrete	4-6cm	Complete, secondary
GN IF7	315514	6412657	Flake	Chert	0-2cm	Proximal fragment, tertiary, use wear
GN IF8	316956	6412606	Core	Silcrete	8cm	Multidirectional, opportunistic, 50-75% cortex, 5 scars
GN IF9	316545	6411891	Flake	Mudstone	2-4cm	Proximal fragment, tertiary
GN IF10	318745	6411655	Backed flake	Mudstone	4-6cm	Complete tertiary, marginal semi-steep retouch, unifacial, fine and proximal
GN IF11	317221	6411282	Flake	Silcrete	2-4cm	Complete secondary
GN IF12	317765	6410903	Shatter	Mudstone	0-2cm	Tertiary
GN IF13	317688	6410830	Flake	Mudstone	6-8cm	Complete tertiary

Table 5-41: Recorded isolated finds artefact attributes and coordinates.

Site name	GDA Zone 56 Easting	GDA Zone 56 Northing	Artefact type	Material	Size	Additional detail
GN IF14	317752	6410825	Core	Mudstone	2-4cm	Bifacial fragment, 30% cortex, 4 scars
GN IF15	317683	6410588	Flake	Mudstone	0-2cm	Complete tertiary
GN IF16	319072	6410845	Hammerstone	Basalt	14cm	Flat ground on one side
GN IF17	317777	6409943	Flake	Mudstone	0-2cm	Longitudinal break, tertiary
GN IF18	317723	6409918	Flake	Mudstone	2-4cm	Proximal fragment, tertiary
GN IF19	318543	6410024	Blade	Silcrete	2-4cm	Distal fragment, tertiary,
GN IF20	318022	6409310	Flake	Chert	2-4cm	Proximal fragment, secondary
GN IF21	318328	6408936	Flake	Mudstone	0-2cm	Proximal fragment, tertiary
GN IF22	317984	6410954	Flake	Mudstone	4-6cm	Complete tertiary, fine marginal unifacial retouch
GN IF23	318833	6407204	Flake	Silcrete	4-6cm	Proximal fragment, tertiary
GN IF24	318253	6411466	Core	Mudstone	3cm	Multidirectional, 25% cortex, 4 scars
GN IF25	318341	6409244	Flake	Mudstone	2-4cm	Complete, secondary
GN IF26	318252	6408957	Flake	Mudstone	2-4cm	Complete, secondary
GN IF27	317257	6411851	Scraper	Mudstone	4-6cm	Horse shoe scraper; steep, invasive retouch; unifacial
GN IF28	317241	6411902	Flake	Silcrete	4-6cm	Complete, tertiary

Glendell North IF1

Site Type: Isolated find

Location of Site: 170 m east of Hebden Road and 250 m north of the Mount Owen Mine entrance road, Ravensworth, on the north side of a property dam (**Figure 5-5**). The site is in a lightly wooded paddock on a landform with a gentle gradient sloping toward Yorks Creek located 550 m to the south (**Figure 5-77**).

Description of Site: Glendell North IF1 is a single mudstone flake located within the inundation zone of a property dam (**Figure 5-78**). The extent of the site is defined by a 5 m buffer around the artefact. Surrounding vegetation at the site is a combination of sparse-moderate mature and regrowth eucalypts. The GSE at the time of recording was moderate (40%) with a GSV of 80% within these exposures. Small ordinary stone fragments and pebbles were rare. Identified disturbances included erosion, cattle trampling, and the construction of the adjacent dam.

Potential for the presence of further subsurface archaeological deposits at Glendell North IF1 is assessed as negligible.



Figure 5-77: Aerial showing location and extent of Glendell North IF1.

Figure 5-78: Photographs showing an overview and details of Glendell North IF1.



Glendell North IF2

Site Type:

Isolated find

Location of Site: 700 m west of Hebden Road and 450 m east of Bowmans Creek, Ravensworth, upslope of the Liddell pipeline and conveyor route (**Figure 5-5**). The site is located on a lightly wooded hill crest above cleared agricultural paddock (**Figure 5-79**). **Description of Site**: Glendell North IF2 is a single mudstone flake located in skeletal soils (**Figure 5-80**). The extent of the site is defined by a 5 m buffer around the artefact. Surrounding vegetation at the site represents light-moderate casuarina regrowth. The GSE at the time of recording was low (20%) with a GSV of 80% within these exposures. Small ordinary stone fragments and pebbles were prevalent. Identified disturbances included erosion, previous clearing, cattle trampling, and the construction of nearby contour banks.

Potential for the presence of further subsurface archaeological deposits at Glendell North IF2 is assessed as negligible.



Figure 5-79: Aerial showing locations and extents of Glendell North IF2 and Glendell North IF3.



Figure 5-80: Photographs showing an overview and details of Glendell North IF2.

Glendell North IF3

Site Type: Isolated find

Location of Site: 700 m west of Hebden Road and 450 m east of Bowmans Creek, Ravensworth, upslope of the Liddell pipeline and conveyor route (**Figure 5-5**). The site is located on a lightly wooded hill crest above cleared agricultural paddock (**Figure 5-79**).

Description of Site: Glendell North IF3 is a single mudstone flake located in skeletal soils (**Figure 5-81**). The extent of the site is defined by a 5 m buffer around the artefact. Surrounding vegetation at the site represents light-moderate casuarina regrowth. The GSE at the time of recording was low (20%) with a GSV of 80% within these exposures. Small ordinary stone fragments and pebbles were moderate. Identified disturbances included erosion, previous clearing, cattle trampling, and the construction of nearby contour banks.

Potential for the presence of further subsurface archaeological deposits at Glendell North IF3 is assessed as negligible.



Figure 5-81: Photographs showing an overview and details of Glendell North IF3.

Glendell North IF4

Site Type: Isolated find

Location of Site: 650 m west of Hebden Road and 650 m south of the Liddell pipeline and conveyor route, Ravensworth (**Figure 5-5**). The site is located on a gentle gradient mid-slope on a vehicle track (**Figure 5-82**).

Description of Site: Glendell North IF4 is a single tuff flake located in skeletal soils (**Figure 5-83**). The extent of the site is defined by a 5 m buffer around the artefact. Surrounding vegetation at the site represents sparse ironbark sapling and regrowth casuarinas. The GSE at the time of recording was very high (90%) with a GSV of 95% within these exposures. Small ordinary stone fragments of shale and conglomerate were frequent. Identified disturbances included erosion, previous clearing, cattle trampling, and vehicle damage.

Potential for the presence of further subsurface archaeological deposits at Glendell North IF4 is assessed as negligible.


Figure 5-82: Aerial showing location and extent of Glendell North IF4.

Figure 5-83: Photographs showing an overview and details of Glendell North IF4.



Site Type:

Isolated find

Location of Site: 450 m east of Hebden Road and 750 m north of Ravensworth Homestead, Ravensworth (**Figure 5-5**). The site is in shallow sandy soils within the mid-slope of a gentle spur (**Figure 5-84**).

Description of Site: Glendell North IF5 is a single mudstone side scraper (**Figure 5-85**). The extent of the site is defined by a 5 m buffer around the artefact. Surrounding vegetation at the site currently represents regrowth ironbark woodland with isolated casuarina regrowth. The GSE at the time of recording was moderate (50%) with a GSV of 70% within these exposures. Small ordinary stone fragments and pebbles were rare. Identified disturbances included erosion, previous clearing, and grazing.

Potential for the presence of further subsurface archaeological deposits at Glendell North IF5 is assessed as negligible.



Figure 5-84: Aerial showing location and extent of Glendell North IF5.



Figure 5-85: Photographs showing an overview and details of Glendell North IF5.

Glendell North IF6

Site Type: Isolated find

Location of Site: 1.6 km west of Hebden Road and 400 m south of the Liddell pipeline and conveyor route (**Figure 5-5**). The site is located on a lower terrace of Bowmans Creek in a cattle track (**Figure 5-86**).

Description of Site: Glendell North IF6 is a single silcrete flake (**Figure 5-87**). The extent of the site is defined by a 5 m buffer around the artefact. Surrounding vegetation at the site has been previously cleared, currently representing grassy paddock fringed by stands of regrowth casuarinas along the creek line. The GSE at the time of recording was low (30%) with a GSV of 80% within these exposures. Small ordinary stone fragments and pebbles were frequent. Identified disturbances included erosion, previous clearing, and cattle trampling.

Potential for the presence of further subsurface archaeological deposits at Glendell North IF6 is assessed as negligible.



Figure 5-86: Aerial showing location and extent of Glendell North IF6.

Figure 5-87: Photographs showing an overview and details of Glendell North IF6.



Site Type: Isolated find

Location of Site: 1 km north of the New England Highway and 300 m south of the Liddell pipeline and conveyor route, Ravensworth, within an electricity easement (**Figure 5-5**). The site is located within a mid-slope on an access track (**Figure 5-88**).

Description of Site: Glendell North IF7 is a single chert flake (**Figure 5-89**). The extent of the site is defined by a 5 m buffer around the artefact. Surrounding vegetation at the site has been extensively cleared, currently representing grassy paddock fringed by stands of regrowth casuarina. The GSE at the time of recording was low (30%) with a GSV of 65% within these exposures. Gravel and regular stones were prevalent. Identified disturbances included clearing, grazing, erosion, vehicle damage, and the establishment of the electricity easement.

Potential for the presence of subsurface archaeological deposits at Glendell North IF7 is assessed as negligible.



Figure 5-88: Aerial showing location and extent of Glendell North IF7.



Figure 5-89: Photographs showing an overview and details of Glendell North IF7.

Glendell North IF8

Site Type: Isolated find

Location of Site: 650 m west of Hebden Road and 1 km south of the Liddell pipeline and conveyor route, Ravensworth (**Figure 5-5**). The site is in eroded B-Horizon deposits on a low-moderate gradient mid-slope (**Figure 5-90**).

Description of Site: Glendell North IF8 is a single silcrete core (**Figure 5-91**). The extent of the site is defined by a 5 m buffer around the artefact. Surrounding vegetation currently represents open forest of gum and casuarina saplings. The GSE at the time of recording was moderate (40%) with a GSV of 70% within these exposures. Small ordinary stone fragments and pebbles were infrequent. Identified disturbances included erosion, vehicle access track and previous clearing, and cattle grazing.

Potential for the presence of further subsurface archaeological deposits at Glendell North IF8 is assessed as negligible.



Figure 5-90: Aerial showing location and extent of Glendell North IF8.

Figure 5-91: Photographs showing an overview and details of Glendell North IF8.



Site Type:

Isolated find

Location of Site: 1.2 km west of Hebden Road and 50 m east of Bowmans Creek, Ravensworth, on the east side of a property dam (**Figure 5-5**). The site is located on a gently sloping landform of cleared agricultural paddock (**Figure 5-92**).

Description of Site: Glendell North IF9 is a single mudstone flake located in disturbed context (**Figure 5-93**). The extent of the site is defined by a 5 m buffer around the artefact. Surrounding vegetation at the site has been extensively cleared and represents grassy paddock and shrubs. The GSE at the time of recording was low (20%) with a GSV of 70% within these exposures. Ordinary stone fragments and pebbles were rare. Identified disturbances included erosion, previous clearing, cattle trampling, and the construction of the nearby dam.

Potential for the presence of further subsurface archaeological deposits at Glendell North IF9 is assessed as negligible.



Figure 5-92: Aerial showing location and extent of Glendell North IF9.



Figure 5-93: Photographs showing an overview and details of Glendell North IF9.

Glendell North IF10

Site Type: Isolated find

Location of Site: 970 m east of Hebden Road and 1.4 km north of Swamp Creek, Ravensworth (**Figure 5-5**). The site is located on sandy redeposited soils within a moderate gradient mid-slope (**Figure 5-94**).

Description of Site: Glendell North IF10 is a single mudstone backed flake (**Figure 5-95**). The extent of the site is defined by a 5 m buffer around the artefact. Surrounding vegetation at the site has been extensively previously cleared, currently representing grassy paddock with low weeds and isolated regrowth casuarina. The GSE at the time of recording was moderate (45%) with a GSV of 70% within these exposures. Ordinary stone fragments and pebbles were rare. Minimal conglomerate outcropping was present. Identified disturbances included erosion, previous clearing, and grazing.

Potential for the presence of further subsurface archaeological deposits at Glendell North IF10 is assessed as negligible.



Figure 5-94: Aerial showing location and extent of Glendell North IF10.

Figure 5-95: Photographs showing an overview and details of Glendell North IF10.



Site Type: Isolated find

Location of Site: 600 m west of Hebden Road and 60 m north of Bowmans Creek, Ravensworth, within an erosive scour (**Figure 5-5**). The site is located on the edge of a gently sloping landform of cleared agricultural paddock (**Figure 5-96**).

Description of Site: Glendell North IF11 is a single silcrete flake located in an erosive scour (**Figure 5-97**). The extent of the site is defined by a 5 m buffer around the artefact. Surrounding vegetation at the site has been extensively cleared and represents grassy paddock fringing on stands of mature growth. The GSE at the time of recording was low (20%) with a GSV of 80% within these exposures. Ordinary stone fragments and pebbles were prevalent. Identified disturbances included previous clearing, cattle trampling, scouring, and sheet wash erosion.

Potential for the presence of further subsurface archaeological deposits at Glendell North IF11 is assessed as negligible.



Figure 5-96: Aerial showing location and extent of Glendell North IF11.



Figure 5-97: Photographs showing an overview and details of Glendell North IF11.

Glendell North IF12

Site Type: Isolated find

Location of Site: 150 m east of Bowmans Creek and 1 km south of Ravensworth Homestead, Ravensworth, on the west side of Hebden Road (**Figure 5-5**). The site is located on a moderate gradient 650 m from the crest of the hill that slopes towards Bowmans Creek (**Figure 5-98**).

Description of Site: Glendell North IF12 is a single mudstone shatter located within the exposure of a property access track (**Figure 5-99**). The extent of the site is defined by a 5 m buffer around the artefact. Surrounding vegetation at the site has been extensively cleared and represents grassy paddock fringed by isolated regrowth natives. The GSE at the time of recording was low (25%) with a GSV of 60% within these exposures. Ordinary stone fragments and pebbles were infrequent. Identified disturbances included erosion, previous clearing, cattle trampling, and vehicle damage.

Potential for the presence of further subsurface archaeological deposits at Glendell North IF12 is assessed as negligible.



Figure 5-98: Aerial showing locations and extents of Glendell North IF12 to Glendell North IF14.

Figure 5-99: Photographs showing an overview and details of Glendell North IF12.



Isolated find Site Type:

Location of Site: 50 m east of Bowmans Creek and 1.1 km south of Ravensworth Homestead, Ravensworth, west of Hebden Road (Figure 5-5). The site is located within a moderate gradient 750 m from the crest of the hill that slopes toward Bowmans Creek (Figure 5-98).

Description of Site: Glendell North IF13 is a single mudstone flake located on a lower slope (Figure 5-100). The extent of the site is defined by a 5 m buffer around the artefact. Surrounding vegetation at the site has been extensively cleared and represents grassy paddock fringed by isolated regrowth. The GSE at the time of recording was low (15%) with a GSV of 60% within these exposures. Ordinary stone fragments and pebbles were infrequent. Identified disturbances included erosion, previous clearing, and cattle trampling.

Potential for the presence of further subsurface archaeological deposits at Glendell North IF13 is assessed as negligible.



Figure 5-100: Photographs showing an overview and details of Glendell North IF13.

1. View of GN IF13 facing west towards Bowmans Creek.

2. View of GN IF13 mudstone flake.

Glendell North IF14

Site Type:

Isolated find

Location of Site: 100 m east of Bowmans Creek and 1.1 km south of Ravensworth Homestead, Ravensworth, on the west side of Hebden Road (Figure 5-5). The site is located within a moderate gradient 700 m from the crest of the hill that slopes toward Bowmans Creek (Figure 5-98).

Description of Site: Glendell North IF14 is a single mudstone core fragment located within the windrow of Hebden Road beneath a fence (Figure 5-101). The extent of the site is defined by a 5 m buffer around the artefact. Surrounding vegetation at the site has been extensively cleared and represents grassy paddock fringed by isolated regrowth natives. The GSE at the time of recording was low (25%) with a GSV of 60% within these exposures. Ordinary stone fragments and pebbles were dominant. Identified disturbances included erosion, previous clearing, cattle trampling, and the construction of Hebden Road and adjacent fence.

Potential for the presence of further subsurface archaeological deposits at Glendell North IF14 is assessed as negligible.



Figure 5-101: Photographs showing an overview and details of Glendell North IF14.

Glendell North IF15

Site Type: Isolated find

Location of Site: 50 m east of Bowmans Creek and 1.4 km south of Ravensworth Homestead, Ravensworth, west of Hebden Road (**Figure 5-5**). The site is located within a moderate gradient 850 m from the crest of the hill that slopes toward Bowmans Creek (**Figure 5-102**).

Description of Site: Glendell North IF15 is a single mudstone flake located on an ant mound (**Figure 5-103**). The extent of the site is defined by a 5 m buffer around the artefact. Surrounding vegetation at the site has been extensively cleared and represents grassy paddock fringed by isolated regrowth. The GSE at the time of recording was low (20%) with a GSV of 70% within these exposures. Ordinary stone fragments and pebbles were frequent. Identified disturbances included erosion, previous clearing, cattle trampling, and the development of the adjacent ant mound.

Potential for the presence of further subsurface archaeological deposits at Glendell North IF15 is assessed as negligible.



Figure 5-102: Aerial showing location and extent of Glendell North IF15.

Figure 5-103: Photographs showing an overview and details of Glendell North IF15.



Site Type: Isolated find

Location of Site: 1.3 km east of Hebden Road and 700 m north of Swamp Creek, Ravensworth, on a contour bank (**Figure 5-5**). The site is located within a low-moderate gradient mid-slope (**Figure 5-104**).

Description of Site: Glendell North IF16 is a single possible basalt grindstone (**Figure 5-105**). The extent of the site is defined by a 5 m buffer around the artefact. Surrounding vegetation at the site has been extensively previously cleared, currently representing grassy paddock with low weeds fringed by isolated regrowth casuarina. The GSE at the time of recording was moderate (45%) with a GSV of 80% within these exposures. Ordinary stone fragments and pebbles were rare. Minimal local conglomerate outcropping was present. Identified disturbances included erosion, previous clearing, grazing, and local contour banking.

Potential for the presence of further subsurface archaeological deposits at Glendell North IF16 is assessed as negligible.



Figure 5-104: Aerial showing location and extent of Glendell North IF16.



Figure 5-105: Photographs showing an overview and details of Glendell North IF16.

Glendell North IF17

Site Type: Isolated find

Location of Site: 220 m east of Hebden Road and 2 km south of Ravensworth Homestead, Ravensworth (**Figure 5-5**). The site is located within a slight gradient 50 m east of a terrace of Bowmans Creek, on the southern edge of a dam (**Figure 5-106**).

Description of Site: Glendell North IF17 is a single mudstone flake located on an artificial bund of a property dam (**Figure 5-107**). The extent of the site is defined by a 5 m buffer around the artefact. Surrounding vegetation at the site has been extensively cleared and represents grassy paddock fringed by isolated regrowth. The GSE at the time of recording was moderate (40%) with a GSV of 80% within these exposures. Ordinary stone fragments and pebbles were frequent. Identified disturbances included erosion, previous clearing, cattle trampling, and the construction of the adjacent dam.

Potential for the presence of further subsurface archaeological deposits at Glendell North IF17 is assessed as negligible.



Figure 5-106: Aerial showing locations and extents of Glendell North IF17 and Glendell North IF18.

Figure 5-107: Photographs showing an overview and details of Glendell North IF17.



Site Type: Isolated find

Location of Site: 175 m east of Hebden Road and 2 km south of Ravensworth Homestead, Ravensworth (**Figure 5-5**). The site is located on a terrace of Bowmans Creek overlooking a grassy paddock floodplain (**Figure 5-106**).

Description of Site: Glendell North IF18 is a single mudstone flake (**Figure 5-108**). The extent of the site is defined by a 5 m buffer around the artefact. Surrounding vegetation at the site has been extensively cleared and represents grassy paddock fringed by isolated regrowth. The GSE at the time of recording was moderate (40%) with a GSV of 70% within these exposures. Ordinary stone fragments and pebbles were frequent. Identified disturbances included erosion, previous clearing, and grazing.

Potential for the presence of further subsurface archaeological deposits at Glendell North IF18 is assessed as likely, with good soil depth observed.



Figure 5-108: Photographs showing an overview and details of Glendell North IF18.

Glendell North IF19

Site Type: Isolated find

Location of Site: 1 km east of Hebden Road and 150 m north of Swamp Creek, Ravensworth, west of Hebden Road (**Figure 5-5**). The site is located within an upper terrace of Swamp Creek adjacent to a graded road (**Figure 5-109**).

Description of Site: Glendell North IF19 is a single silcrete blade (**Figure 5-110**). The extent of the site is defined by a 5 m buffer around the artefact. Surrounding vegetation at the site has been extensively cleared, currently representing grassy paddock with low shrubs fringed by stands of regrowth casuarina along the creek line. The GSE at the time of recording was high (70%) with a GSV of 90% within these exposures. Ordinary stone

fragments and pebbles were frequent. Identified disturbances included erosion, clearing, and grazing.

Potential for the presence of further subsurface archaeological deposits at Glendell North IF19 is assessed as negligible.



Figure 5-109: Aerial showing location and extent of Glendell North IF19.

Figure 5-110: Photographs showing an overview and details of Glendell North IF19.



Site Type: Isolated find

Location of Site: 220 m east of Hebden Road and 100 m west of Swamp Creek, Ravensworth, on an access track (**Figure 5-5**). The site is located on the break of slope of a gentle gradient and adjacent to a graded road (**Figure 5-111**).

Description of Site: Glendell North IF20 is a single chert flake (**Figure 5-112**). The extent of the site is defined by a 5 m buffer around the artefact. Surrounding vegetation at the site has been extensively cleared and represents grassy paddock fringed by isolated casuarina regrowth. The GSE at the time of recording was low (30%) with a GSV of 60% within these exposures. Ordinary stone fragments and pebbles were frequent. Identified disturbances included erosion, previous clearing, grazing, and vehicle damage.

Potential for the presence of further subsurface archaeological deposits at Glendell North IF20 is assessed as negligible.



Figure 5-111: Aerial showing location and extent of Glendell North IF20.



Figure 5-112: Photographs showing an overview and details of Glendell North IF20.

Glendell North IF21

Site Type: Isolated find

Location of Site: 1.1 km northeast of The New England Highway and 1.7 km north of Bettys Creek, Ravensworth (**Figure 5-5**). The site is located on the east side of Swamp Creek eroding out of the bank (**Figure 5-113**).

Description of Site: Glendell North IF21 is a single mudstone flake (**Figure 5-114**). The extent of the site is defined by a 5 m buffer around the artefact. Surrounding vegetation at the site has been extensively cleared and represents grassy paddock fringed by casuarina regrowth along the creek line. The GSE at the time of recording was moderate-high (60%) with a GSV of 50% within these exposures. Ordinary stone fragments and pebbles were rare. Identified disturbances included erosion, previous clearing, and grazing.

Potential for the presence of further subsurface archaeological deposits at Glendell North IF21 is assessed as negligible.



Figure 5-113: Aerial showing location and extent of Glendell North IF21.

Figure 5-114: Photographs showing an overview and details of Glendell North IF21.



Site Type: Isolated find

Location of Site: 150 m east of Hebden Road and 950 m south of Ravensworth Homestead, Ravensworth, on the eastern wall of a property dam (**Figure 5-5**). The site is located within a mid-slope landform that slopes towards Yorks Creek located 450 m to the west (**Figure 5-115**).

Description of Site: Glendell North IF22 is a single mudstone flake situated within the inundation area of a dam (**Figure 5-116**). The extent of the site is defined by a 5 m buffer around the artefact. Surrounding vegetation at the site has been extensively cleared and represents grassy paddock fringed by isolated casuarina regrowth. The GSE at the time of recording was moderate (50%) with a GSV of 80% within these exposures. Ordinary stone fragments and pebbles were infrequent. Identified disturbances included erosion, previous clearing, cattle trampling, and the construction of the adjacent dam.

Potential for the presence of further subsurface archaeological deposits at Glendell North IF22 is assessed as negligible.



Figure 5-115: Aerial showing location and extent of Glendell North IF22.



Figure 5-116: Photographs showing an overview and details of Glendell North IF22.

Glendell North IF23

Site Type: Isolated find

Location of Site: 125 m north of the Main North Rail Line and 50 m north of Bettys Creek, Ravensworth (**Figure 5-5**). The site is located at the junction of an access track and a graded road within a moderate gradient sloping south toward Bettys Creek (**Figure 5-117**).

Description of Site: Glendell North IF23 is a single silcrete flake (**Figure 5-118**). The extent of the site is defined by a 5 m buffer around the artefact. Surrounding vegetation at the site has been extensively cleared and represents grassy paddock fringed by boxthorn and regrowth casuarina. The GSE at the time of recording was low-moderate (25%) with a GSV of 60% within these exposures. Ordinary stone fragments and pebbles were infrequent. Identified disturbances included erosion, previous clearing, cattle trampling, and vehicle damage.

Potential for the presence of further subsurface archaeological deposits at Glendell North IF23 is assessed as negligible.



Figure 5-117: Aerial showing location and extent of Glendell North IF23.

Figure 5-118: Photographs showing an overview and details of Glendell North IF23.



Site Type: Isolated find

Location of Site: 450 m east of Hebden Road and 500 m south of Ravensworth Homestead, Ravensworth, on the south western wall of a property dam (**Figure 5-5**). The site is located within a mid-slope that descends towards Yorks Creek located 800 m to the west (**Figure 5-119**).

Description of Site: Glendell North IF24 is a single mudstone core situated within the disturbance area of an artificial bund (**Figure 5-120**). The extent of the site is defined by a 5 m buffer around the artefact. Surrounding vegetation at the site has been extensively cleared and represents grassy paddock fringed by stands of box, gum and casuarina regrowth to the south. The GSE at the time of recording was moderate (40%) with a GSV of 80% within these exposures. Ordinary stone fragments and pebbles were dominant. Identified disturbances included erosion, previous clearing, cattle trampling, and the construction of the adjacent dam.

Potential for the presence of further subsurface archaeological deposits at Glendell North IF24 is assessed as negligible.



Figure 5-119: Aerial showing location and extent of Glendell North IF24.



Figure 5-120: Photographs showing an overview and details of Glendell North IF24.

Glendell North IF25

Site Type: Isolated find

Location of Site: 1.2 km northeast of the New England Highway and 150 m southeast of Swamp Creek, Ravensworth (**Figure 5-5**). The site is located on the upper floodplain of Swamp Creek in stockpiled soil (**Figure 5-121**).

Description of Site: Glendell North IF25 is a single mudstone flake (**Figure 5-122**). The extent of the site is defined by a 5 m buffer around the artefact. Surrounding vegetation at the site has been extensively cleared and disturbed by earthworks, currently representing high weed cover fringed by grassy paddock. The GSE at the time of recording was low (30%) with a GSV of 70% within these exposures. Ordinary stone fragments and pebbles were frequent. Identified disturbances included erosion, previous clearing, grazing, and earthworks. As a result, it is likely that the artefact has been transported to its find location from elsewhere.

Potential for the presence of further subsurface archaeological deposits at Glendell North IF25 was assessed as negligible.

Glendell North IF25 was salvaged on 12 November 2018 according to Section 6.2.1.1 of the MOC ACHMP as it was located within the approved disturbance area for the Glendell Mine. The results of the salvage program are presented in **Appendix 3**.



Figure 5-121: Aerial showing location and extent of Glendell North IF25.

Figure 5-122: Photographs showing an overview and details of Glendell North IF25.



Glendell North IF26 (formerly Glendell North PAD3)

Site Type: Isolated find with PAD

Location of Site: 1.1 km northeast of The New England Highway and 1.7 km north of Bettys Creek, Ravensworth (**Figure 5-5**). The site is located on the western side of Swamp Creek (**Figure 5-123**).

Description of Site: This site was recorded because of the test excavation program and has no surface manifestation. Details on the test excavation results at this site is presented in **Section 6.4.2**.



Figure 5-123: Aerial showing location and extent of Glendell North IF26.

Glendell North IF27

Site Type: Isolated find

Location of Site: 1.4 km north of the New England Highway, 485 m west of Hebden Road and at its closest 280 m northwest of Yorks Creek, Ravensworth (**Figure 5-5**). The site is located on the edge of a low ridge which overlooks the Yorks and Bowmans Creek floodplains (**Figure 5-124**).

Description of Site: Glendell North IF27 is a single mudstone horseshoe scraper (**Figure 5-125**). Glendell North IF27 was identified during the historical archaeology test excavation program.

The extent of the site is defined by a 5 m buffer around the artefact. Surrounding vegetation at the site has been extensively cleared, currently representing high weed cover fringed by grassy paddock. The GSE at the time of recording was low (30%) with a GSV of 70% within these exposures. Identified disturbances included erosion, previous clearing, grazing, and earthworks. Rock fragments and pebbles were frequent. Identified disturbances included erosion, previous clearing, grazing, and earthworks.

Potential for the presence of further, intact, subsurface archaeological deposits at Glendell North IF27 is assessed as negligible. It is noted that the adjacent subsurface historic archaeological investigations that were monitored by an OzArk archaeologist and Aboriginal community members did not uncover further subsurface Aboriginal archaeological deposits.



Figure 5-124: Aerial showing location and extent of Glendell North IF27 and Glendell North IF28.



Figure 5-125: Photographs showing an overview and details of Glendell North IF27.

Glendell North IF28

Site Type:

Isolated find

Location of Site: 1.4 km north of the New England Highway, 490 m west of Hebden Road and at its closest 335 m northwest of Yorks Creek, Ravensworth (**Figure 5-5**). The site is located along a low ridge which overlooks the Yorks and Bowmans Creek floodplains (**Figure 5-124**).

Description of Site: Glendell North IF28 is a single silcrete flake (**Figure 5-126**). Glendell North IF28 was identified during the historical archaeology test excavation program.

The extent of the site is defined by a 5 m buffer around the artefact. Surrounding vegetation at the site has been extensively cleared, currently representing high weed cover fringed by grassy paddock. Identified disturbances included erosion, previous clearing and grazing. Rock fragments and pebbles were frequent.

Potential for the presence of further, intact, subsurface archaeological deposits at Glendell North IF28 is assessed as negligible. It is noted that the adjacent subsurface historic archaeological investigations that were monitored by an OzArk archaeologist and Aboriginal community members did not uncover further subsurface Aboriginal archaeological deposits.

Figure 5-126: Photographs showing an overview and details of Glendell North IF28.



1. Overview of GN IF28 (at location of bag) facing northwest.

2. View of GN IF28 silcrete flake.

Glendell North IF29

Site Type: Isolated find

Location of Site: 1.5 km northeast of the New England Highway, 140 m west of Hebden Road, Ravensworth (Figure 5-5). The site is located on the eastern side of Yorks Creek on an elevated terrace, approximately 30 m from the creek line (Figure 5-127).

Description of Site: Glendell North IF29 is a single mudstone flake (Figure 5-128). Glendell North IF29 was identified during the historical archaeology test excavation program.

The extent of the site is defined by a 5 m buffer around the artefact. Surrounding vegetation has been intensively previously cleared and represents grassy paddock with low shrubs fringed by casuarina and exotics along the creek line. The GSE within the vicinity of the dam was low-moderate (35%) with a GSV of 65% within these exposures. Gravel and regular stones were rare. Identified disturbances included clearing, grazing, ploughing, and erosion.

Potential for the presence of further subsurface archaeological deposits at Glendell North IF29 is assessed as negligible. It is noted that the adjacent subsurface historic archaeological investigations that were monitored by an OzArk archaeologist and Aboriginal community members did not uncover further subsurface Aboriginal archaeological deposits.



Figure 5-127: Aerial showing location and extent of Glendell North IF29.

Figure 5-128: Photographs showing an overview and details of Glendell North IF29.



5.4.3 Scarred tree

Glendell North ST1 (37-3-1561)

<u>Site Type</u>: Modified tree (scarred)

GPS Coordinates: GDA Zone 56 E 316124 N 6412405

Location of Site: 1 km north of the New England Highway and 1 km south of the Liddell pipeline and conveyor route, Ravensworth (**Figure 5-5**). The site is located on the southwestern bank of Bowmans Creek below a defined upper terrace (**Figure 5-129**).

Description of Site: Glendell North ST1 is a single scarred box tree (**Table 5-42**; **Figure 5-130**). The extent of the site is defined by a 10 m buffer around the tree. Surrounding vegetation at the site has been previously cleared, currently representing grassy paddock fringed by isolated eucalypts and casuarinas on the terrace and moderately-dense regrowth casuarinas along the creek line. The tree was not recorded in association with any other archaeological features. The GSE at the time of recording was low (20%) with a GSV of 60% within these exposures. Identified disturbances included erosion, previous clearing, and cattle trampling.

Potential for the presence of subsurface archaeological deposits at Glendell North ST1 is assessed as negligible.



Figure 5-129: Aerial showing location and extent of Glendell North ST1.




Attribute	Description	Scar dimensions	Measurements (cm)
Tree species	Box	Length of dry face	210
Tree condition	Dead	Width of dry face	38
Scar orientation	Northwest	Height of base of scar above ground	<20
Type of scar	Elongated	Thickness of overgrowth (radial, from centre of tree)	30
Scar condition	Poor, rotten	Tree circumference	350

Table 5-42: Attributes of Glendell North ST1.

5.5 PREVIOUSLY RECORDED ABORIGINAL SITES LOCATED

In **Section 5.3** it was noted that 55 previously recorded sites remain 'valid' within the survey area or within immediate buffer areas. Of these 55 sites, 39 are within the Additional Disturbance Area. Two sites (37-3-0469; Bowmans/Swamp Creek Trench 1 and 37-3-1198; MOCO OS-10) have been partially salvaged under AHIP #2267 (Bowmans/Swamp Creek Trench 1) or the Mount Owen Continued Operations Project (SSD-5850) ACHMP (MOCO OS-10).

Table 5-43 lists all 55 registered sites and **Table 5-44** lists the results of the 2018 re-assessment of these sites. **Figure 5-131** shows the location of the previously recorded and registered Aboriginal sites. In **Table 5-43**, **Table 5-44** and **Figure 5-131**, the sites are identified by a unique ID (numeral from 70 to 124) to allow easier concordance between the tables and the figure. In addition, those sites <u>not</u> within the Additional Disturbance Area are marked by a blue highlight.

Further photographs of the sites and/or artefacts are presented in **Appendix 4**.

ID	AHIMS ID	Site name	GDA Zone 56 Easting	GDA Zone 56 Northing	Site type	Site status	Notes
70	37-3-0294	Site 2; (MORL2)	321168	6410327	Artefact scatter	Valid	Within Additional Disturbance Area
71	37-3-0343	Mt Owen (1996) 1;MtO1;	318524	6414512	Artefact scatter	Valid	
72	37-3-0360	Mt Owen (1996)_2;	319084	6414419	Isolated find	Location uncertain	
73	37-3-0469	Bowmans/Swamp Creek Trench 1	318072	6409137	Artefact scatter	Partially destroyed	AHIP 2267 Within Additional Disturbance Area
74	37-3-0494	MO-IF2	319060	6410265	Isolated find	Valid	
75	37-3-0521	MO-IF1	319123	6410319	Isolated find	Valid	Within Additional Disturbance Area
76	37-3-0612	Bettys Creek 22	321138	6410296	Isolated find	Valid	Within Additional Disturbance Area
77	37-3-0686	Bowmans Ck 13	315983	6412942	Artefact scatter	Duplicate site	
78	37-3-0688	G12	315806	6412691	Artefact scatter	Valid	
79	37-3-0689	G11 Glendell	319223	6410211	Artefact scatter	Valid	Within Additional Disturbance Area
80	37-3-0727	Yorks Creek (Mt Owen Mine) 2	319041	6414427	Artefact scatter	Location uncertain	
81	37-3-0744	York Creek 1	317440	6411356	Artefact scatter	Valid	Within Additional Disturbance Area
82	37-3-0745	York Creek 2	317577	6411112	Artefact scatter	Valid	Within Additional Disturbance Area
83	37-3-0746	York Creek 3	317745	6411008	Artefact scatter	Valid	Within Additional Disturbance Area
84	37-3-0747	York Creek 4	317373	6411322	Artefact scatter	Valid	Within Additional Disturbance Area
85	37-3-0748	York Creek 5	317365	6411471	Artefact scatter	Valid	Within Additional Disturbance Area

Table 5-43: All previously recorded and registered sites in or near the survey area.

ID	AHIMS ID	Site name	GDA Zone 56 Easting	GDA Zone 56 Northing	Site type	Site status	Notes
86	37-3-0749	York Creek 6	317501	6411813	Artefact scatter	Valid	Within Additional Disturbance Area
87	37-3-0750	York Creek 7	317484	6412170	Artefact scatter	Valid	Within Additional Disturbance Area
88	37-3-0751	York Creek 8	317496	6412805	Isolated find	Valid	Within Additional Disturbance Area
89	37-3-0752	York Creek 9	317685	6411312	Artefact scatter	Valid	Within Additional Disturbance Area
90	37-3-0753	York Creek 10	317865	6412266	Artefact scatter	Valid	Within Additional Disturbance Area
91	37-3-0754	York Creek 11	317782	6412443	Artefact scatter	Valid	Within Additional Disturbance Area
92	37-3-0755	York Creek 12	317846	6412581	Artefact scatter	Valid	Within Additional Disturbance Area
93	37-3-0756	York Creek 13	318352	6411400	Artefact scatter	Valid	Within Additional Disturbance Area
94	37-3-0757	York Creek 14	318417	6411813	Isolated find	Valid	Within Additional Disturbance Area
95	37-3-0758	York Creek 15	317849	6411202	Artefact scatter	Valid	Within Additional Disturbance Area
96	37-3-0759	York Creek 16	317827	6411497	Artefact scatter	Valid	Within Additional Disturbance Area
97	37-3-0760	York Creek 17	317626	6412595	Isolated find	Valid	Within Additional Disturbance Area
98	37-3-0761	York Creek 18	317712	6412158	Isolated find	Valid	Within Additional Disturbance Area
99	37-3-0762	Bowmans Ck 6	317645	6410765	Isolated find	Valid	Within Additional Disturbance Area
100	37-3-0763	Bowmans Ck 7	316542	6413142	Artefact scatter	Valid	Within Additional Disturbance Area
101	37-3-0764	Bowmans Ck 8	317205	6412329	Artefact scatter	Valid	Within Additional Disturbance Area
102	37-3-0765	Bowmans Ck 9	316878	6412410	Artefact scatter	Valid	Within Additional Disturbance Area
103	37-3-0766	Bowmans Ck 10	316833	6412566	Artefact scatter	Valid	Within Additional Disturbance Area
104	37-3-0768	Bowmans Ck_13	315982	6412940	Artefact scatter	Valid	
105	37-3-0770	Bowmans Ck 11	315824	6412493	Artefact scatter	Valid	
106	37-3-0771	Bowmans Ck 15	315825	6412677	Artefact scatter	Duplicate site	
107	37-3-0773	Swamp Ck 10	319006	6411169	Isolated find	Valid	Within Additional Disturbance Area
108	37-3-1013	REA141	318206	6407186	Artefact scatter	Valid	
109	37-3-1155	MT OWEN ISOLATED FIND2	317854	6411236	Isolated find	Valid	Within Additional Disturbance Area
110	37-3-1156	MT OWEN ISOLATED FIND1	318001	6410455	Isolated find	Valid	Within Additional Disturbance Area
111	37-3-1158	RPS DLW IF1	317148	6412677	Isolated find	Valid	Within Additional Disturbance Area
112	37-3-1166	LIDEE - IF3	315930	6413149	Isolated find	Valid	

ID	AHIMS ID	Site name	GDA Zone 56 Easting	GDA Zone 56 Northing	Site type	Site status	Notes
113	37-3-1194	MOCO OS-6	320718	6409739	Artefact scatter	Partially destroyed	
114	37-3-1198	MOCO OS-10	317840	6409364	Artefact scatter	Partially destroyed	Permit SSD 5850 Within Additional Disturbance Area
115	37-3-1490	Swamp Creek IF-4	318805	6407340	Isolated find	Valid Duplicate site	Within Additional Disturbance Area Description included in ID 122 (Swamp Creek- OS1)
116	37-3-1492	Swamp Creek IF-2	318807	6407327	Isolated find	Valid Duplicate site	Within Additional Disturbance Area Description included in ID 122 (Swamp Creek- OS1)
117	37-3-1493	Swamp Creek IF-3	318805	6407330	Isolated find	Valid Duplicate site	Within Additional Disturbance Area Description included in ID 122 (Swamp Creek- OS1)
118	37-3-1494	Swamp Creek IF-1	318640	6407727	Isolated find	Valid	Within Additional Disturbance Area Description included in ID 122 (Swamp Creek- OS1)
119	37-3-1496	SCK-9	318880	6410211	Artefact scatter	Valid	
120	37-3-1497	SCK-11	319086	6410220	Isolated find	Valid	
121	37-3-1498	Swamp Creek-OS2	318006	6408283	Artefact scatter	Valid	
122	37-3-1499	Swamp Creek-OS1	318819	6407300	Artefact scatter	Valid	Within Additional Disturbance Area. Encompasses Swamp Creek IF-1 to 4.
123	37-3-1502	Bowmans Creek 6	315509	6412710	Artefact scatter	Valid	Within Additional Disturbance Area
124	37-3-1503	Yorks Creek 19	317369	6411237	Artefact scatter	Valid	Within Additional Disturbance Area

Figure 5-131: Aerial showing the location of all previously recorded and registered sites in or near the survey area.



ID	AHIMS ID	Site Name	GDA 56 Easting	GDA 56 Northing	Site type	Original site description	Current condition	2018 Site Photo
70	37-3-0294	Site 2; (MORL2)	321168	6410327	Artefact scatter	20+ artefacts, including flakes and flaked pieces made from silcrete, chert, mudstone, and quartz, located adjacent to an ant's nest along Bettys Creek. The primary identified disturbance was grazing.	Artefacts were not able to be located, likely due to heavy vegetation cover and poor visibility. Location matches site card description and map plot. The site extent is currently fenced off.	VIEW OF SITE 2; (MORL2) LOCATION.
71	37-3-0343	Mt Owen (1996) 1;MtO1;	318524	6414512	Artefact scatter	11 artefacts, including flakes and flakes pieces made from mudstone and silcrete located on a vehicle track leading away from Yorks Creek. The primary identified disturbance was noted as grazing.	Artefacts were not able to be located, likely due to heavy vegetation cover and poor visibility. Location matches site card description and map plot.	VIEW OF MT OWEN (1996)1; MT01 LOCATION.

ID	AHIMS ID	Site Name	GDA 56 Easting	GDA 56 Northing	Site type	Original site description	Current condition	2018 Site Photo
72	37-3-0360	Mt Owen (1996)_2;	319084	6414419	Isolated find.	A single mudstone flake located mid-slope in grassland by a fence line.	Artefact was not able to be located at the AHIMS location despite adequate areas of exposure. Site card did not provide a photograph or description sufficient to be able to confirm accuracy of location.	VIEW OF MT OWEN (1996)2; LOCATION.
73	37-3-0469	Bowmans/Swamp Creek Trench 1	318072	6409137	Artefact scatter	479 artefacts, including flakes, retouched flakes, flaked pieces, cores, and a hammerstone, located within and along the wall of an artificial trench. Raw materials included mudstone, silcrete, quartz, quartzite, porcellanite, tuff, and volcanics. The 350 by 20 my extent was defined by the area of visibility within the trench.	Site comprises 100+ artefacts, consistent with those described, located in the context outlined in the site card. The primary identified disturbance, additional to the construction of the trench, was erosion. See Appendix 4 for additional site location and artefact photos.	VIEW OF BOWMANS/SWAMP CREEK TRENCH 1 IN 2018.

ID	AHIMS ID	Site Name	GDA 56 Easting	GDA 56 Northing	Site type	Original site description	Current condition	2018 Site Photo
74	37-3-0494	MO-IF2	319060	6410265	Isolated find	A single retouched chert flake. Context not described.	Artefact was not able to be located at the AHIMS location despite adequate areas of exposure. Site card did not provide a photograph or description sufficient to be able to confirm accuracy of location.	VIEW OF MO-IF2 LOCATION.
75	37-3-0521	MO-IF1	319123	6410319	Isolated find	A single mudstone flake. Context not described.	Artefact was not able to be located at the AHIMS location despite adequate areas of exposure. Site card did not provide a photograph or description sufficient to be able to confirm accuracy of location.	VIEW OF MO-IF1 LOCATION.

ID	AHIMS ID	Site Name	GDA 56 Easting	GDA 56 Northing	Site type	Original site description	Current condition	2018 Site Photo
76	37-3-0612	Bettys Creek 22	321138	6410296	Isolated find	A single mudstone flake located within an erosive scour on the bank of Bettys Creek. The surrounding area was assessed as a PAD. Identified disturbances included erosion and cattle trampling.	Artefact was not able to be located, likely due to heavy vegetation cover and poor visibility. Location matches site card description and map plot. The site extent is currently fenced off.	View of Bettys Creek 22 in 2018.
77	37-3-0686	Bowmans Ck 13	315983	6412942	Artefact scatter	Five artefacts, including flakes and a microblade core, made from mudstone and silcrete, located on a lower slope above Bowmans Creek. The 20 by 10 m extent was defined by the area of visibility. The primary identified disturbance was erosion.	This site was determined to be a duplicate of Bowmans Creek_13 (#37-3-0768).	VIEW OF BOWMANS CK 13 IN 2018.

ID	AHIMS ID	Site Name	GDA 56 Easting	GDA 56 Northing	Site type	Original site description	Current condition	2018 Site Photo
78	37-3-0688	G12	315806	6412691	Artefact scatter	A scatter of chert, silcrete, mudstone, and quartz artefacts distributed at variable density over a segmented terrace of Bowmans Creek. The highest recorded artefact density was 7/m ² and the presence of at least two knapping floors was noted. The 70 by 10 m extent was defined by the area of exposure over the landform. The primary identified disturbance was erosion.	Site comprises 100+ artefacts, including flakes, flaked pieces, backed flakes, blades, scrapers, and cores, located in the context described and in adjacent exposures along the same landform. Raw materials included mudstone, silcrete, quartz, chert, petrified wood, and tuff. The artefact scatter comprising this site was determined to be continuous over a 550 by 100 m area of creek terrace. Sites 37-3- 0771 and 37-3-0770 were recorded as duplicates of G12. Additional disturbances identified included previous clearing and grazing. See Appendix 4 for additional site location and artefact photos.	View of G12 in 2018.
79	37-3-0689	G11 Glendell	319223	6410211	Artefact scatter	Three artefacts located on a low rise above Swamp Creek. Description of artefacts not included in site card. The primary identified disturbance was grazing.	Site comprises five artefacts, including flakes, a flaked piece, and a core, located in the context described. Raw materials included mudstone and silcrete. Additional identified disturbances included previous clearing and erosion. See Appendix 4 for additional site location and artefact photos.	VIEW OF G11 GLENDELL IN 2018.

ID	AHIMS ID	Site Name	GDA 56 Easting	GDA 56 Northing	Site type	Original site description	Current condition	2018 Site Photo
80	37-3-0727	Yorks Creek (Mt Owen Mine) 2	319041	6414427	Artefact scatter	Twelve mudstone and silcrete artefacts located on an eroded bank of Yorks Creek.	Artefacts were not able to be located at the AHIMS location despite adequate areas of exposure. Context was not consistent with site card photograph or description. It is suspected that this site lies further north outside of the Additional Disturbance Area. However, as this cannot be verified by the information on the site card, it will be considered to be one of the sites within the Additional Disturbance Area.	VIEW OF YORKS CREEK (MT OWEN MINE) 2 IN 2018.
81	37-3-0744	Yorks Creek 1	317440	6411356	Artefact scatter	Six artefacts, including a flake and a backed flake, located on the floodplain of Yorks Creek at the toe of the first terrace. The 20 by 10 m site extent was defined by the area of exposure created by erosion. Raw materials included quartz, silcrete, and mudstone. No disturbances were noted.	Site comprises two silcrete flakes and a mudstone flake located along a vehicle track in the context described. Additional disturbances included previous clearing, grazing, and vehicle damage. See Appendix 4 for additional site location and artefact photos.	VIEW OF YORKS CREEK 1 IN 2018.

ID	AHIMS ID	Site Name	GDA 56 Easting	GDA 56 Northing	Site type	Original site description	Current condition	2018 Site Photo
82	37-3-0745	Yorks Creek 2	317577	6411112	Artefact scatter	16 artefacts, including mudstone flakes, a core rejuvenation flakes, and a burin, located on an island of uneroded sediment (former terrace) on the floodplain of Yorks Creek. The 30 by 10 m extent of the site was defined by the area of visibility. No disturbances noted.	Site comprises 10+ artefacts, including mudstone flakes and chert shatter, recorded in the context described. Identified disturbances included erosion, vegetation clearing, and grazing. See Appendix 4 for additional site location and artefact photos.	VIEW OF YORKS CREEK 2 IN 2018.
83	37-3-0746	Yorks Creek 3	317745	6411008	Artefact scatter	17 artefacts, including flakes, flaked pieces, and a core located over two exposures of a scoured tributary to Yorks Creek. Raw materials included mudstone and silcrete. The primary identified disturbance was erosion leading to heavy soil loss.	Site comprises 50+ artefacts, including mudstone cores, flakes, shatter, and debitage, as well as a pounder recorded in the context described. In the northern exposure of the site, many of these artefacts were distributed in a knapping floor complete with re-fits and debitage. Intactness of this feature suggested that a thin PAD may be present despite local erosion. See Appendix 4 for additional site location and artefact photos.	VIEW OF YORKS CREEK 3 IN 2018.

ID	AHIMS ID	Site Name	GDA 56 Easting	GDA 56 Northing	Site type	Original site description	Current condition	2018 Site Photo
84	37-3-0747	Yorks Creek 4	317373	6411322	Artefact scatter	12 artefacts, including flakes, and a backed blade with PAD recorded along an access track on a terrace of Yorks Creek. Raw materials included mudstone, silcrete, and porcellanite. The primary identified disturbance was cultivation.	Site comprises 20+ artefacts recorded in the context described, including flakes, cores, and shatter made from mudstone and silcrete as well as a volcanic material axe blank. Additional identified disturbances included erosion and vehicle damage. See Appendix 4 for additional site location and artefact photos.	VIEW OF YORKS CREEK 4 IN 2018.
85	37-3-0748	Yorks Creek 5	317365	6411471	Artefact scatter	The site was recorded in 2001 as sixteen flakes made from mudstone, silcrete, and petrified wood with PAD on an upper terrace of Yorks Ck. The 20 by 2 m extent was defined by area of exposure. The primary identified disturbance was cultivation. The site was re-recorded in 2017 as being sixteen artefacts with a 60 by 20 m extent. The PAD landform was delineated with a 130 by 75 m extent but described as having a thin A-Horizon, likely <10cm.	Site comprises seven silcrete and mudstone flakes recorded in the context described. Additional identified disturbances included erosion, vehicle damage, and stock trampling. See Appendix 4 for additional site location and artefact photos.	VIEW OF YORK CREEK 5 IN 2018.

ID	AHIMS ID	Site Name	GDA 56 Easting	GDA 56 Northing	Site type	Original site description	Current condition	2018 Site Photo
86	37-3-0749	Yorks Creek 6	317501	6411813	Artefact scatter	Five artefacts, including flakes and a core, located on a lower slope along the wall of a dam. The 20 by 5 m site extent was defined by the area of visibility. Raw materials included mudstone, silcrete, and tuff. The primary identified disturbance was the construction of the adjacent dam.	Site comprises a silcrete flake and a retouched tuff flake located in the context described. Additional identified disturbances included previous clearing and grazing. See Appendix 4 for additional site location and artefact photos.	VIEW OF YORKS CREEK 6 IN 2018.
87	37-3-0750	Yorks Creek 7	317484	6412170	Artefact scatter	Eighteen artefacts including flakes, cores, manuports, and a blade with PAD located on a lower slope above a tributary of Yorks Creek. The 100 by 20 m extent of the site was defined by exposure. The primary identified disturbance was slope wash erosion.	Site comprises three artefacts, including mudstone flakes as well as a possible pounder. These artefacts were primarily distributed along the steep eroded walls of the creek terrace. Additional identified disturbances included cultivation and cattle trampling. See Appendix 4 for additional site location and artefact photos.	VIEW OF YORKS CREEK 7 IN 2018.

ID	AHIMS ID	Site Name	GDA 56 Easting	GDA 56 Northing	Site type	Original site description	Current condition	2018 Site Photo
88	37-3-0751	Yorks Creek 8	317496	6412805	Isolated find	A single mudstone flake recorded in a large area of sheet wash erosion along a tributary to Yorks Creek.	Artefact was not able to be located at the AHIMS location despite adequate areas of exposure. Area surrounding GPS plot matches site card description and figure.	View of Yorks Creek 8 in 2018.
89	37-3-0752	Yorks Creek 9	317685	6411312	Artefact scatter	Six artefacts, including flakes and a core, located mid-slope by an artificial drain. The 200 by 20 m extent is defined by the area of visibility along the drain. Raw materials included mudstone, silcrete, and tuff. The primary identified disturbance was the construction of the artificial drain, yet also included cultivation.	Site comprises four flakes, made from silcrete and mudstone, located in the context described. Additional identified disturbances included previous clearing and grazing. See Appendix 4 for additional site location and artefact photos.	<text></text>

ID	AHIMS ID	Site Name	GDA 56 Easting	GDA 56 Northing	Site type	Original site description	Current condition	2018 Site Photo
90	37-3-0753	Yorks Creek 10	317865	6412266	Artefact scatter	Seven artefacts, including mudstone flakes and a backed point located on the lower slope of a creek terrace. Site described as being heavily disturbed by dam construction, fencing, and stock trampling.	Site comprises four artefacts, including flakes and a core made from silcrete and mudstone. These artefacts were recorded 50 m to the west within possible soil dumps associated with the construction/maintenance of the adjacent property dam. See Appendix 4 for additional site location and artefact photos.	VIEW OF YORKS CREEK 10 IN 2018.
91	37-3-0754	Yorks Creek 11	317782	6412443	Artefact scatter	Nine artefacts, including flakes, flakes pieces, and a core located on a second creek terrace of Yorks Creek by a tributary. Raw materials included silcrete, mudstone, and quartz. The 20 by 2 m extent of the site was defined by area of exposure. The primary identified disturbance was cultivation.	Site comprises 15+ artefacts, including flakes, shatter, and cores, recorded in the context described. Was assessed as incorporating a PAD of limited depth in areas back from the creek. See Appendix 4 for additional site location and artefact photos.	VIEW OF YORKS CREEK 11 IN 2018.

ID	AHIMS ID	Site Name	GDA 56 Easting	GDA 56 Northing	Site type	Original site description	Current condition	2018 Site Photo
92	37-3-0755	Yorks Creek 12	317846	6412581	Artefact scatter	Three mudstone flakes located mid-slope in an area of shade trees and frequent cattle movement. The 20 by 5 m extent was defined by area of exposure. The primary identified disturbance was cattle trampling.	Site comprises a single mudstone flake in the context described. See Appendix 4 for an additional artefact photo.	View of Yorks Creek 12 in 2018.
93	37-3-0756	Yorks Creek 13	318352	6411400	Artefact scatter	A mudstone flake and a silcrete flake located on an upper slope to the north of a tributary to Yorks Creek. The 15 by 5 m extent was defined by area of exposure. Identified disturbances included riling and scouring.	Artefact was not able to be located at the AHIMS location despite adequate areas of exposure. Area surrounding GPS plot matches site card description and photo.	VIEW OF YORKS CREEK 13 AHIMS LOCATION.

ID	AHIMS ID	Site Name	GDA 56 Easting	GDA 56 Northing	Site type	Original site description	Current condition	2018 Site Photo
94	37-3-0757	Yorks Creek 14	318417	6411813	Isolated find	A single quartzite flake recorded on an ant's nets mid-slope by a tributary to Yorks Creek. The primary identified disturbance was erosive scouring.	Artefact was not able to be located at the AHIMS location despite adequate areas of exposure. Area surrounding GPS plot matches site card description and photo.	VIEW OF YORKS CREEK 14 LOCATION.
95	37-3-0758	York Creek 15	317849	6411202	Artefact scatter	Seven artefacts, including flakes and an edge ground pebble axe made from mudstone, silcrete, and tuff. Located on a lower slope within a gully of extensive erosive scouring.	Site comprises four visible artefacts, including mudstone flakes and a mudstone core, located in the context described. Identified disturbances were consistent with the original recording. See Appendix 4 for additional site location and artefact photos.	

ID	AHIMS ID	Site Name	GDA 56 Easting	GDA 56 Northing	Site type	Original site description	Current condition	2018 Site Photo
96	37-3-0759	York Creek 16	317827	6411497	Artefact scatter	Two mudstone flakes located on a foot slope above a tributary to Yorks Creek. The 2 by 2 m extent was defined by the distribution of the artefacts within a large area of exposure. The primary identified disturbance was cultivation.	Site comprises a single mudstone flake located in the context described. See Appendix 4 for an additional artefact photo.	View of Yorks Creek 16 in 2018.
97	37-3-0760	York Creek 17	317626	6412595	Isolated find	A single mudstone flake located on a bank of Yorks Creek.	Artefact was not able to be located at the AHIMS location despite adequate areas of exposure. Area surrounding GPS plot matches site card description and figure. Additional identified disturbances included previous clearing and grazing.	VIEW OF YORKS CREEK 17 LOCATION.

ID	AHIMS ID	Site Name	GDA 56 Easting	GDA 56 Northing	Site type	Original site description	Current condition	2018 Site Photo
98	37-3-0761	York Creek 18	317712	6412158	Isolated find	A single silcrete flake located on a creek flat by a cattle track. The primary identified disturbance was cultivation.	Artefact was not able to be located at the AHIMS location despite adequate areas of exposure. Area surrounding GPS plot matches site card description and figure. Additional identified disturbances included previous clearing and grazing.	VIEW OF YORKS CREEK 18 LOCATION.
99	37-3-0762	Bowmans Ck 6	317645	6410765	Originally recorded as an isolated find; now an artefact scatter	A single mudstone blade located on the bank of Bowmans Creek in a scoured erosive scar.	Site comprises two mudstone flakes located 30 m to the northeast of the GPS plot in an area consistent with site description and photograph. Additional disturbances included cattle trampling and cultivation. See Appendix 4 for additional site location and artefact photos.	VIEW OF BOWMANS CK 6 IN 2018.

ID	AHIMS ID	Site Name	GDA 56 Easting	GDA 56 Northing	Site type	Original site description	Current condition	2018 Site Photo
100	37-3-0763	Bowmans Ck 7	316542	6413142	Artefact scatter	Artefact scatter (number of artefacts not disclosed) with PAD located along a track on a bench above Bowmans Creek. The 8 by 2 m extent was defined by exposure. The primary identified disturbance was land clearance.	Site comprises four mudstone flakes located in the context described. Additional identified disturbance included vehicle damage and the establishment of adjacent ant mounds. See Appendix 4 for additional site location and artefact photos.	VIEW OF BOWMANS CK 7 IN 2018.
101	37-3-0764	Bowmans Ck 8	317205	6412329	Artefact scatter	Four artefacts, including flakes, a flaked piece, and a core, located on a saddle landform along a linear erosive scour. The 30 by 2 m extent of the site was defined by the area of visibility along the scour. Raw materials included mudstone and silcrete. The primary identified disturbance was erosive scouring.	Artefact was not able to be located despite adequate areas of exposure. Area surrounding updated GPS plot matches site card description and photo. Additional disturbances included previous clearing and grazing.	VIEW OF BOWMANS CK 8 LOCATION.

ID	AHIMS ID	Site Name	GDA 56 Easting	GDA 56 Northing	Site type	Original site description	Current condition	2018 Site Photo
102	37-3-0765	Bowmans Ck 9	316878	6412410	Artefact scatter	A mudstone flake and a quartzite flake located in skeletal soils mid-slope, on the eroded banks of a tributary to Bowmans Creek. The 20 by 10 m site extent was defined by the area of visibility. The primary identified disturbance was erosive scouring.	Site comprises a single mudstone flake located in the context described. Additional disturbances included previous clearing and grazing. See Appendix 4 for additional site location and artefact photos.	VIEW OF BOWMANS CK 9 IN 2018.
103	37-3-0766	Bowmans Ck 10	316833	6412566	Artefact scatter	Seven artefacts, including flakes, a retouched flake, and a muller, located in skeletal soils mid-slope. The 150 by 20 m site extent was defined by area of visibility. Raw materials included mudstone, silcrete, quartz, and basalt. Identified disturbances included land clearance and slope wash erosion.	Site comprises five artefacts, including flakes and a retouched flake made of mudstone and a basalt axe blank, located in the context described. Identified disturbances were consistent with the original recording. See Appendix 4 for additional site location and artefact photos.	VIEW OF BOWMANS CK 10 IN 2018.

ID	AHIMS ID	Site Name	GDA 56 Easting	GDA 56 Northing	Site type	Original site description	Current condition	2018 Site Photo
104	37-3-0768	Bowmans Ck_13	315982	6412940	Artefact scatter	Five artefacts, including flakes and a microblade core made from mudstone and silcrete, located in skeletal soils on a lower slope at the head of a gully. The 20 by 10 m extent of the site was defined by the area of visibility. The primary identified disturbance was erosion.	Site comprises 15+ artefacts, including flakes, flaked pieces, a core, shatter pieces, and a blade, recorded in the context described. These were made from mudstone, silcrete, tuff, and volcanic raw materials. Additional identified disturbances included previous clearing, grazing, and water wash erosion. See Appendix 4 for additional site location and artefact photos.	VIEW OF BOWMANS CK_13 IN 2018.
105	37-3-0770	Bowmans Ck 11	315824	6412493	Artefact scatter	50+ artefacts, including flakes, retouched flakes, flaked pieces, cores, and a hammerstone, located either side of an eroded tributary to Bowmans Creek. The 200 by 300 m extent was defined by area of visibility. The potential for subsurface archaeological material was assessed as unlikely. The primary identified disturbance was erosion.	This site was determined to be a duplicate of G12 (#37- 3-0688).	VIEW OF BOWMANS CK 11 IN 2018.

ID	AHIMS ID	Site Name	GDA 56 Easting	GDA 56 Northing	Site type	Original site description	Current condition	2018 Site Photo
106	37-3-0771	Bowmans Ck 15	315825	6412677	Artefact scatter	55+ artefacts, including flakes, retouched flakes, blades, cores, and a pebble basalt grindstone, located in the eroded bank of a tributary to Bowmans Creek. The 50 by 30 m extent was defined by area of visibility. The potential for subsurface archaeological material was assessed as highly likely back from the eroded bank. The primary identified disturbance was erosion.	This site was determined to be a duplicate of G12 (#37- 3-0688).	VIEW OF BOWMANS CK 15 IN 2018.
107	37-3-0773	Swamp Ck 10	319006	6411169	Isolated find	A single mudstone flake recorded on the wall of a dam across a tributary to Swamp Creek. Identified disturbances include erosion and the construction of the adjacent dam.	Artefact was not able to be located at the AHIMS location despite adequate areas of exposure. Area surrounding GPS plot matches site card description and photo.	VIEW OF SWAMP CK 10 LOCATION.

ID	AHIMS ID	Site Name	GDA 56 Easting	GDA 56 Northing	Site type	Original site description	Current condition	2018 Site Photo
108	37-3-1013	REA141	318206	6407186	Artefact scatter	Eight flakes made from mudstone and silcrete located within the flooring of a shed on a terrace of Bowmans Creek. The 10 by 5 m extent of the site was defined by the distribution of these artefacts. Identified disturbances included construction of the shed, cultivation, grazing, and sheet erosion.	Site comprises a mudstone flake and a chert core located in the context described. Heavy vegetation cover hampered visibility surrounding the shed. No additional disturbances identified. See Appendix 4 for additional site location and artefact photos.	View of REA141 IN 2018.
109	37-3-1155	MT OWEN ISOLATED FIND2	317854	6411236	Isolated find	A single porcellanite core on an eroded lower slope on the edge of a small gully.	Artefact was not able to be located at the AHIMS location despite adequate areas of exposure. Area surrounding GPS plot matches site card description and photo. Recorded in an area of high general erosion.	VIEW OF MT OWEN ISOLATED FIND2 AHIMS LOCATION.

ID	AHIMS ID	Site Name	GDA 56 Easting	GDA 56 Northing	Site type	Original site description	Current condition	2018 Site Photo
110	37-3-1156	MT OWEN ISOLATED FIND1	318001	6410455	Isolated find	A single mudstone flake located on an upper slope along a property access track.	Artefact was not able to be located at the AHIMS location despite adequate areas of exposure. Area surrounding GPS plot matches site card description and photo	VIEW OF MT OWEN ISOLATED FIND1 AHIMS LOCATION.
111	37-3-1158	RPS DLW IF1	317148	6412677	Isolated find	A single mudstone flake located on an ant mound on a gentle slope.	Artefact was successfully re- recorded in the context described. Identified disturbances included clearing, grazing, and the establishment of the adjacent ant mound. See Appendix 4 for additional artefact photo.	VIEW OF RPS DLW IF1 IN 2018.

ID	AHIMS ID	Site Name	GDA 56 Easting	GDA 56 Northing	Site type	Original site description	Current condition	2018 Site Photo
112	37-3-1166	LIDEE – IF3	315930	6413149	Originally recorded as an isolated find; now an artefact scatter	A single mudstone flake located in an erosive scar at a break of slope above the Bowmans Creek Floodplain. Area was assessed as likely to contain further artefacts, however thick vegetation hampered visibility.	Site comprises seven artefacts, including silcrete and mudstone flakes and shatter located along the edge of a steep drop-off to Bowmans Creek floodplain amidst thin soils and heavy rock outcropping. The 130 by 30 m extent was defined by the area of visibility over the landform at the site. Identified disturbances included sheet wash erosion, severe subsidence, and cracking. See Appendix 4 for additional site location and artefact photos.	View of LIDEE-IF3 in 2018.
113	37-3-1194	MOCO OS-6	320718	6409739	Artefact scatter	14 artefacts located adjacent Bettys Creek upon a flat plain within dense casuarina regrowth forest.	Site comprises five artefacts, including flakes, shatter, and a core made from mudstone and silcrete located in the context described. Identified disturbances included erosion and intensive previous clearing. The site has been partially destroyed under the Mount Owen Continued Operations Project (SSD-5850). See Appendix 4 for additional site location and artefact photos.	VIEW OF MOCO OS-6 IN 2018.

ID	AHIMS ID	Site Name	GDA 56 Easting	GDA 56 Northing	Site type	Original site description	Current condition	2018 Site Photo
114	37-3-1198	MOCO OS-10	317840	6409364	Artefact scatter	Ten artefacts, including mudstone and silcrete flakes, located on a rocky rise above Bowmans Creek. The 325 by 115 m extent was defined by area of exposure over the landform. Identified disturbances included construction of adjacent farm house and shed as well as vehicle damage.	Site comprises two silcrete flakes and a mudstone core located in the context described. Additional identified disturbances included previous clearing and grazing. The site has been partially destroyed under the Mount Owen Continued Operations Project (SSD-5850). The site extent is currently fenced off.	VIEW OF MOCO OS-10 IN 2018.
115	37-3-1490	Swamp Creek IF-4	318805	6407340	Isolated	Description included in ID	122 (Swamp Creek-OS1)	
116	37-3-1492	Swamp Creek IF-2	318807	6407327	finds			
117	37-3-1493	Swamp Creek IF-3	318805	6407330				
118	37-3-1494	Swamp Creek IF-1	318640	6407727	Isolated find	A single mudstone scraper located on the artificial wall of a dam.	Artefact was not able to be located at the AHIMS location despite adequate areas of exposure. Area represents highly modified artificial wall of dam. Additional disturbances included bulldozer trampling and erosion. Artefact was likely washed downslope or moved by machinery.	VIEW OF SWAMP CREEK-IF1 LOCATION.

ID	AHIMS ID	Site Name	GDA 56 Easting	GDA 56 Northing	Site type	Original site description	Current condition	2018 Site Photo
119	37-3-1496	SCK-9	318880	6410211	Artefact scatter	Four artefacts, including mudstone, volcanic, and silcrete flakes with use wear, recorded on an ant mound by the bank of Swamp Creek. The primary identified disturbance was the establishment of the adjacent ant mound.	Site comprises five artefacts, including flakes and a flaked piece made from mudstone, silcrete, and volcanic material, located in the context described. Additional disturbances included previously clearing, grazing, and erosion. See Appendix 4 for additional site location and artefact photos.	VIEW OF SCK-9 IN 2018.
120	37-3-1497	SCK-11	319086	6410220	Originally recorded as an isolated find; now an artefact scatter	A single mudstone end scraper located along a spur landform above Swamp Creek.	Site comprises two mudstone flakes located in the context described. Identified disturbances included previous clearing and grazing. See Appendix 4 for additional site location and artefact photos.	VIEW OF SCK-11 IN 2018.

ID	AHIMS ID	Site Name	GDA 56 Easting	GDA 56 Northing	Site type	Original site description	Current condition	2018 Site Photo
121	37-3-1498	Swamp Creek- OS2	318006	6408283	Artefact scatter	Six artefacts, including mudstone and silcrete flakes, located on the artificial bund of a property dam on the floodplain between Bowmans and Swamp Creeks. The 220 by 20 m extent was defined by the area of exposure over the bund. The primary identified disturbance was the construction and maintenance of the adjacent dam.	Site comprises three mudstone flakes and a silcrete flake recorded in the context described. Identified disturbances were consistent with those described. See Appendix 4 for additional site location and artefact photos.	View of Swamp Creek-OS2 in 2018.
122	37-3-1499	Swamp Creek-	318819	6407300	Artefact	26 artefacts, including	Site comprises 20+	VIEW OF SWAMP CREEK-OS1 IN 2018.
		(encompassing ID 116 to 118)				retouched flakes made from mudstone, silcrete, and volcanic material located along an exposure created by earthworks associated with the construction of a large contour bank.	cores, an end scraper, and a microlith located in the context described. Sites Swamp Creek-IF2 through to -IF4 (ID 115 to 117) were assessed as being part of this site. The 150 by 15 m extent of the site was defined by the area of exposure created by earthworks. Additional identified disturbances included erosion. See Appendix 4 for additional site location and artefact photos.	

ID	AHIMS ID	Site Name	GDA 56 Easting	GDA 56 Northing	Site type	Original site description	Current condition	2018 Site Photo
123	37-3-1502	Bowmans Creek 6	315509	6412710	Artefact scatter	Twelve artefacts, including flakes, flaked pieces, and an end scraper, located mid- slope within an electricity easement. Identified disturbances included previous clearing, grazing, sheet wash erosion, and the establishment of the electricity easement.	Site comprises 15+ artefacts, including flakes and a blade made from mudstone and silcrete, located in the context described. Disturbances were consistent with those previously described. See Appendix 4 for additional site location and artefact photos.	View of Bowmans Creek 6 in 2018.
124	37-3-1503	Yorks Creek 19	317369	6411237	Artefact scatter	Two flakes made from silcrete and a fine- grained siliceous material located on an upper terrace by a vehicle track. Identified disturbances included previous clearing, grazing, vehicle damage, and erosion.	No artefacts were able to be located at the previously recorded location likely due to inadequate GSV. Area surrounding GPS plot matches previous description and photos.	VIEW OF YORKS CREEK 19 LOCATION.

6 ABORIGINAL ARCHAEOLOGICAL TEST EXCAVATION PROGRAM

6.1 BACKGROUND TO THE TEST EXCAVATION PROGRAM

The test excavation program followed an extensive program of surface survey across areas that will be potentially impacted by the Project (**Section 5**).

The survey identified 12 areas where test excavation would provide a clearer picture of the subsurface archaeological potential. These areas, and the reasons why they were selected are outlined in **Table 6-1**. The location of these 12 areas are shown on **Figure 6-1**.

There several previously recorded sites in the Additional Disturbance Area where PADs are mentioned on the site card. However, not all these sites were investigated during the test excavation program and the reasons for their exclusion are outlined in **Table 6-2**.

The test excavation program was conducted at the 12 select locations from 3 September to 19 September 2018.

Area	Landform	Reason for test excavation
Area 1	A broad elevated spur running parallel to Bowmans Creek.	Several artefact scatters are located within the landform.
Area 2	A large level area that is elevated above Yorks Creek on its eastern bank.	Area also occupied by Ravensworth Homestead, often an indicator of a prime occupational location.
Areas 3 & 4	Landforms on western bank of Yorks Creek close to its confluence with Bowmans Creek.	Appeared to have high archaeological potential during the survey.
Areas 5 & 6	Elevated landforms on the eastern bank of Yorks Creek close to its confluence with Bowmans Creek.	Appeared to have high archaeological potential during the survey.
Area 7	Terrace overlooking the floodplain for Bowmans Creek.	Several surface artefacts were visible during the survey.
Area 8	Elevated landform between Swamp Creek and what appears to be an old channel for Swamp Creek.	Allows landforms in this portion of Swamp Creek to be tested.
Areas 9 & 10	Two locations on either side of Swamp Creek.	Chosen at random in order to test the nature of deposits along this portion of Swamp Creek.
Areas 11 & 12	Centred on previously recorded sites where original recorders suggested PAD may be present.	Allows the banks on either side of Yorks Creek to be tested. Includes AHIMS #37-3-0754 and #37-3-0761.

Table 6-1: Reasons why certain areas were chosen for test excavation.





Site ID	Site name	GDA East	GDA North	Reason for not including in test excavation
37-3-0753	York Creek 10	317865	6412266	Disturbed location. No potential noted during survey.
37-3-0752	York Creek 9	317685	6411312	Disturbed location. No potential seen during survey.
37-3-0748	York Creek 5	317365	6411471	Low-medium archaeological significance. Better location being tested to south (Area 3).
37-3-0617	Bowmans Creek 5	318015	6409874	Disturbed location. No potential seen during survey.
37-3-0612	Bettys Creek 22	321138	6410296	Within what was once a swamp/pond? Low archaeological potential.
37-3-0469	Bowmans/Swamp Creek Trench 1	318072	6409137	Previously investigated by Umwelt (see Section 4.4.2.1) and partially destroyed.
37-3-0766	Bowmans Ck 10	316833	6412566	Low archaeological values. Potential not visible at time of survey.
37-3-0764	Bowmans Ck 8	317205	6412329	Disturbance from buried pipeline. Will test nearby Bowmans Ck 7 (Area 1).
37-3-0762	Bowmans Ck 6	317645	6410765	Disturbed by cultivation. Other testing sites nearby (Area 4 to 6).
37-3-0760	York Creek 17	317555	6411497	Disturbed location. No potential noted during survey.
37-3-0759	York Creek 16	317827	6411497	Disturbed location. No potential seen during survey.

Table 6-2: Previously recorded sites with PADs not included in the test excavation program.

6.2 METHODOLOGY

6.2.1 Purpose of the test excavation program

Although the archaeologically sensitive areas that will be impacted by the Project are within a landscape that has undergone varying degrees of disturbance, there was still the potential for partially intact features and/or archaeological deposits to exist within the proposed disturbance area.

The purpose of the test excavation program was to understand more completely the nature of the subsurface material within the Additional Disturbance Area. Data obtained from the test excavation program informs the mitigation and management options in this AAIA.

The aims were therefore to:

- 1. Establish the extent and nature the of subsurface archaeological deposits at a site or landform with archaeological potential;
- 2. Use the data gained from the test excavation program to better evaluate the archaeological significance and potential of the Additional Disturbance Area; and
- 3. Develop, in consultation with the RAPs, an informed management strategy for the site to assist in mitigating the proposed impacts.

As a result, locations initially considered for the test excavation program are limited to:

- Areas identified during the pedestrian survey as having archaeological potential;
- Landforms which are relatively intact (i.e. not within disturbed contexts); and
- Previously recorded sites which were PADs or had PADs associated with them.

6.2.2 Rationale behind the test excavation methodology

The test excavation methodology is provided as **Appendix 5**. This document sets out the predictive model used to design the test exaction program.

While any test excavation program is limited in the level of research objectives it can achieve due to the restricted nature of the excavations, the test excavations for the Project attempted to shed light on:

- Do the results support previous findings that occupation appears denser along Yorks Creek when compared to Swamp Creek?
- Do elevated landforms associated with Bowmans Creek preserve subsurface archaeological deposits?
- Are additional archaeological features, such as hearths, present in the Additional Disturbance Area?
- How do the findings in terms of raw material use compare to other investigations in the vicinity of the Additional Disturbance Area?

6.2.3 Sampling methodology for text excavation program

For further details pertaining to the methodology of the test excavation program, see **Appendix 5**. **Table 6-3** summarises the methodology planned at each excavation area.

Area	Test excavation methodology
Area 1	5 x 50 m transects, with each 50 m transect separated by 50 m. Transects will be positioned running along the spur, parallel to Bowmans Creek. Area 1 includes an area of PAD recorded during the survey. Decisions on the suitability of expansion will depend on the results of the first five transects.
Area 2	4 x 50 m transects will be initially excavated to examine areas closet to Yorks Creek and a tributary to Yorks Creek located to the south of the PAD area. Decisions on whether to expand excavation will depend on results of the initial four transects.
Area 3	2 x 50 m transects will be excavated so entire PAD area is investigated.
Area 4	5 x 50 m transects will be excavated to investigate areas closest to Yorks Creek and Bowmans Creek, as well as landforms near the confluence of the two creeks.
Areas 5 & 6	These PADs are too small for an entire transect. Instead two sets of two conjoined 0.5 m x 0.5 m pits will initially investigate these areas.
Area 7	2 x 50 m transects will be excavated running along the length of the terrace.
Area 8, 9, 10, 11 & 12	1 x 50 m transect excavated initially at each location.

Table 6-3: Sampling methodology for the text excavation program.

6.3 THE ARTEFACT CATALOGUE

6.3.1 Analysis terminology

The artefact catalogue of the excavation assemblage forms the basis of the presentation and discussion of test excavation results that follow. The full catalogue is presented in **Appendix 6**.

Preliminary examination of the assemblage prior to cataloguing noted that it was not a complex assemblage with almost all artefacts being unmodified flakes. As a result, a tailored analysis was

carried out on the assemblage that allowed the site's characteristics to be captured. The flake attributes that were analysed for the assemblage are shown in **Table 6-4**.

Catalogue entry	Description of catalogue entry
Area	Denotes which of the twelve excavation areas is being referred to (see Figures 6–1 and 6–2).
Transect	(Tr) Denotes which transect within an area is being referred to.
Square	(Sq) Denotes which square within a transect is being referred to.
Spit	All spits were 5cm. Therefore Spit 1 is 0cm to 5cm. If no spit is recorded it is because, due to the paucity of results, the entire pit was excavated in one spit.
Artefact type	Describes the type of artefact recorded. At this excavation, primarily flakes or less commonly blades, cores or scarpers etc. The following abbreviations are used:
	F = Flake; B = Blade; FP = Flaked Piece; BF = Backed Flake; BB = Backed Blade; M = Microlith; ES = End scraper; SS = Side scraper; A = Ground edge axe; AB = Axe blank; C = Core; S = Shatter; AH = Anvil/hammerstone; O = Other
Raw Material	Silcrete, mudstone, quartz and volcanics were recorded in the Survey Area.
	The following abbreviations are used:
	MS = Mudstone; S = Silcrete; C = Chert; T = Tuff; B = Basalt; V = Volcanics (other); PW = Petrified Wood; QZ = Quartzite; Q = Quartz; O = Other
Integrity	Records whether an artefact is complete or broken, and if broken, what type of break has occurred (i.e. whether the break is to the top (proximal) end of a flake, to the bottom (distal) end or medial if both proximal and distal ends are missing. Rarely longitudinal breaks (i.e. broken down the flake's axis) were recorded.
Max. dimension	Most often this measurement is along the plane of percussion. In some instances, such as when a flake is inordinately wide, measurement along the largest plane is taken.
	Size ranges are provided where: 1 = 0-10mm; 2 = 10-20mm; 3 = 20-30mm; 4 = 30-50mm; 5 = 50-100mm; 6 = greater than 100mm.
Reduction phase	The percentage of cortex in comparison to the full artefact was catalogued according to the following scale.
	Primary reduction (1): 50% or more cortex; Secondary reduction (2): 1% to 50% cortex; Tertiary reduction (3): no cortex.
Rotation	A parallel rotation (p) is one where the dorsal scars are in the same direction as the flake's plane of percussion. A rotated flake (r) is one where the dorsal flake scars are at a varying angle to the flake's plane of percussion. Not discernible (n) refers to flakes with cortical dorsal surfaces where rotation cannot be determined or on often small flakes that only retain one previous flake scar on the ventral surface.
Platform type	Records the proximal characteristics of a flake. Terms used to describe platforms are 'simple' (s) for what would commonly be regarded as a standard platform showing no faceting; 'point' (p) for very small platforms; 'Cortex' © for platforms containing cortex; 'Crushed' (cr) for platforms displaying crushing/shattering to the platform; and "Flaked (f) for platforms displaying platform preparation in the form of several flake removals from the platform surface.
Platform size	When intact on an artefact the platform size was described through the following abbreviations:
	1 = Point; 2 = Very small (up to c. 3mm); 3 = Small (up to c. 5mm); 4 = Moderate (up to c. 10mm); 5 = Large (over c. 10mm)
Termination type	Records the distal characteristics of a flake. At this excavation 'Feather' (f) terminations were common where a flake terminates in a smooth, triangular cross-section. Also present were 'Step/Hinge' (sh) terminations and rarely 'Plunge' (p) terminations.
Notes	Any additional comments are provided here.

A discussion on why these attributes were analysed follows.

Artefact type

Description: Possible artefact types include flakes, blades, retouched flakes/blades, cores, scrapers, shatter/fragments and other (hammerstones, grindstones, ground-edge axes) although not all may be present at any one site.
Issues: Classing artefacts, generally, does not usually entail significant problems. A minority of artefacts are difficult to define such as ambiguities between recognising flaked pieces (flakes subsequently used as a core to source further flakes), and between cores and scrapers.

Uses: This category will be used to assess differences in provisioning strategies (e.g. core provisioning as opposed to flake provisioning), differences in site function/use (e.g. presence/absence of grindstones), and the taphonomic effects of past land use on the site (are more broken artefacts part of the assemblage?).

Raw Material

Description: A largely self-explanatory attribute, raw materials expected to be present include silcrete, mudstone, quartz and volcanics.

Issues: This category often has problems for analysts without a geological background. Even then, without breaking an artefact, the true nature of the stone will sometimes remain uncertain. Illustrations are provided in **Figure 6-2** to remove the ambiguity often associated with stone raw material identification. This will allow other researchers to identify the type of stone recorded here as, for example, 'silcrete'. By far the most common stones utilised for artefact manufacture in the Additional Disturbance Area are mudstone and silcrete; both of which come in a variety of colours from pale, through yellow to red. Sometimes a single artefact will have been struck from a cobble displaying two distinct colours. While heat treatment has been put forward to explain this colour variation; particularly from yellow to red in silcrete (Moore 2000), examples from the Additional Disturbance Area lack a lustre that would suggest that heat treatment has caused this colour change. Other stone types such as chert, quartz, volcanics etc. occur but in much smaller quantities when compared to mudstone and silcrete.

Uses: Raw material is an important attribute, which may broadly indicate the place of origin of an artefact. The dominance of one raw material or another may also be used to group or differentiate sites. Raw material is also frequently used in concert with attributes in the creation of analytic units for more in-depth inter and intra site comparisons.



Figure 6-2. Examples of raw material types from the Additional Disturbance Area.

Artefact Breakage

Description: At a basic level, flakes break in three different ways. Two are transverse (at 90 degrees to the direction of percussion) – proximal and distal; one is longitudinal (along the plane of percussion).

Issues: It is occasionally difficult to be certain of the breakage on an artefact. In most cases, however, the kind of breakage can be ascertained.

Use: It is important to differentiate broken from complete flakes for the purposes of analysis, as the two are not comparable in regard to a number of measures. The amount of artefact breakage in an assemblage also indicates the degree of fragmentation to which the assemblage has been subject. In highly fragmented assemblages, the actual number of artefacts represented may be significantly exaggerated. Quantifying breakage allows a more accurate approximation of artefact numbers to be made.

Dimensions⁸

Description: Percussive dimensions measure the maximum length of the flake in the direction of force application from the point that force was applied. In this regard it relates to the length of core face that was removed during the manufacture of the artefact.

Issues: There is some uncertainty as to what these attributes are actually measuring in terms of the flake manufacturing process.

Use: Flake dimensions are expected to correlate with differences in the provisioning and reduction strategies at different places. For example, the reduction of cores at a site will produce many moderate to small flakes and some larger flakes. As a result, a histogram of flake length will show a relatively consistent increase in number of flakes from large to small. Contrastingly, when most flakes are the result of retouching or maintenance tasks on other flakes, most of the flakes remaining should be very small, with comparably few large to moderate flakes. However, it may be the case that a few moderate to large flakes will be discarded at the site as they are exhausted through excessive/heavy retouch or simply thrown away prior to a reprovisioning event. In such a case, a histogram of artefact size should show bimodality regarding length (a small peak in the moderate range and a large peak in the small range).

⁸ From experience OzArk does not routinely weigh artefacts as this information has been found to closely correlate either to artefact size or the raw material from which the flake has been struck. Thus, smaller artefacts are lighter than larger artefacts when made from the same material and artefacts made from denser stone (such as volcanics) are heavier than comparably sized artefacts from lighter (lessdense) stones such as IMT. In practice, the category cataloguing the maximum size of the artefact is analogous with the artefact's weight.

Reduction

Description: This category refers to the level of reduction evident on an artefact. This is assessed by the amount of cortex remaining on the artefact. Cortex refers to the 'skin' of a rock – the surface that has been weathered to a different texture and colour by exposure to the elements over a long period. The amount of cortex as a percentage of surface area will be measured on all artefacts (in relation to flakes, cortex can, by definition only occur on the dorsal and platform surfaces). The nature of cortex – its shape and texture – will vary depending on where the raw material was sourced. This measurement will help determine if a particular artefact is at a primary, secondary or tertiary level of reduction.

Issues: This is a relatively unambiguous descriptive category.

Use: When a natural cobble is first selected it will usually be covered in cortex. Therefore, the first artefacts produced from it will have a complete coverage of cortex on the dorsal side (primary reduction). As the cobble is increasingly reduced the amount of cortex on each artefact will rapidly decrease (secondary reduction) until it ceases to be present on artefacts (tertiary reduction). As a result of this trend, it should be possible to determine how early in the reduction sequence the artefact was produced. If large numbers of artefacts or a high proportion of the artefacts of a raw material retain cortex it may indicate that the site is in close proximity to the source. Differences between the proportions of artefacts retaining cortex between different raw material indicates relative differences in distance to source. This does not necessarily mean distance in terms of measurable distance across the landscape; it may also reflect length of time since leaving the source. For example, the last campsite when a group is returning to the source of the raw material may be very close to the source in terms of distance, but distant in terms of time elapsed since the group left the source. If artefacts with cortex are occurring in sites a long distance from the place of origin of the natural cobble, then it is likely that cobbles were being transferred to the site when still only slightly reduced. This would imply an attempt to maximise the amount of stone being provisioned with the weight of transported material being a relatively minor concern.

Rotation

Description: Describes whether a particular flake was struck from a core that was rarely rotated (a unidirectional or bidirectional core), or from a core that has been rotated frequently (a multidirectional core).

Issues: There is little ambiguity in assessing this category. If the orientation of previous flakes was unclear, this category is left blank.

Use: An examination of the direction in which previous flake scars on an artefact's dorsal surface have been removed, along with the orientation in which the flake itself was removed from its core, will give evidence about the core from which the flake was struck. This enables a greater sample

pool to determine the types of cores used in the Project Disturbance Boundary even if the original core may not have been recorded in the investigation.

Platform Surface

Description: Platform surface will be recorded as one of the following: simple, point, cortical, crushed or flaked.

Issues: This is a largely unambiguous descriptive attribute.

Use: The surface of a platform provides information about the history of the core prior to the detachment of the flake, and also about methods employed to control the flaking process. In particular 'point' platforms often imply the use of an intermediary punch (or in-direct percussion) to remove a flake; while 'simple' platforms are often indicative of free-hand percussion. Crushing on the platform surface can imply a bipolar reduction technique where the core is first rested on an anvil prior to the flake being detached. Platforms displaying flaking have been linked to the systematic production of 'blades'. Patterns in the spatial distribution of these attributes may be used to infer differences in reduction strategies.

Platform Size

Description: Platform size will be recorded as fulfilling one of a series of size ranges.

Issues: This is a largely unambiguous descriptive attribute.

Use: Like the platform surface, platform size is illustrative in determining the type of reduction technique used to detach a flake. Generally speaking, the smaller (finer) the platform size implies a greater likelihood that it was detached by in-direct percussion rather than direct percussion which often results in a large platform size.

Termination

Description: Termination refers to the way in which force leaves a core during the detachment of a flake. Every complete flake has a termination. There are patterns in the forms that terminations will take, with the three major categories (those to be used here) being feather, hinge/step and plunging (outrepasse).

Issues: This is a largely unambiguous descriptive attribute although care needs to be taken to distinguish terminations on a previous flake scar from hinge/step terminations or breakages.

Use: Different terminations have different implications both for flake and core morphology. A flake with a feather termination (in which force exits the core at a low or gradual angle) will have a continuous sharp edge around the periphery beneath the platform. This has advantages in terms of the amount of the flake edge that can be used for cutting and makes the flake more amenable to subsequent retouching or resharpening activities. Detaching flakes with feather terminations also

has minimal impact on the effective platform angle of the core, and so platform angle thresholds are reached relatively slowly while feather terminating flakes continue to be produced.

Hinge and step terminating flakes have none of these advantages. They result in edges that are amenable neither to cutting nor to retouching. Furthermore, hinge and step terminations lead to rapidly increasing effective platform angles, leading to a requirement for core rejuvenation and core exhaustion. For these reasons, such terminations are considered undesirable or *aberrant*. The number of aberrant flake terminations is expected to increase towards the end of a core's use-life, as reduction in core size and increase in core platform angle make it increasingly difficult to detach feather terminating flakes. In areas where aberrantly terminating flakes are relatively common it may be inferred that core potential was more thoroughly exploited. From this it may in turn be inferred that the pressure to realize core potential (e.g. a strategy of heavy raw material conservation) was greater. Increased mobility/emphasis on portability is one possible explanation of such a pattern.

Plunging or outrepasse flakes have the opposite effect on core morphology to step and hinge flakes, in that they remove the entire core face and part of the core bottom. As a result, such flakes may be used to rejuvenate cores in which core angles have become high, but which still retain useable potential (e.g. are still quite large). The presence of outrepasse flakes may be taken to indicate core rejuvenation and the requirement to increase core use-life.

6.3.2 Research considerations

Stone artefacts are probably the most resilient physical evidence of Aboriginal occupation in Australia and for many parts of the country form the most abundant archaeological evidence of Aboriginal occupation. Stone artefacts are important because they are tangible evidence of Aboriginal use of an area and can potentially contain information about lithic activities, the organisation of stone technologies, and potentially information about larger-scale issues of settlement organisation across regions and even social change over time.

The kinds of information which can be obtained from stone artefacts may vary considerably, depending in part on:

- The numbers of artefacts which can be examined and recorded: generally, the larger the number of artefacts the more reliable will be statistical statements about them;
- The presence of other assemblages with which the artefacts can be compared;
- The condition of sites in which they occur: generally undisturbed sites have more information potential than disturbed sites, depending on the scale at which research is carried out; and
- The theory which underlies the artefact recording and analysis.

6.3.2.1 Statistically useful sample sizes

A large enough number of artefacts need to be recorded so that analyses can be based on statistically sound data (Leonard and Jones 1989). The numbers of artefacts which are needed in a sample will depend on how common or rare certain kinds of artefacts are. If a summary of most common raw material types is required, then a random sample of 20 or 30 artefacts might suffice. On the other hand, if no backed artefacts were found, and this type normally makes up 1% of an assemblage, then several hundred artefacts would need to be recorded to indicate whether or not backed artefacts are present on a site or in a certain landscape setting. Ideally, sample sizes should be large enough to be able to carry out statistical tests of significance (Clegg 1990).

6.3.2.2 Condition

As a rule, artefacts from undisturbed sites may be able to provide more information than artefacts from disturbed sites. On sites in good physical condition it may be possible to identify artefacts relating to individual lithic activities, such as knapping floors (Hiscock & Mitchell 1993). It may be possible to refit or conjoin artefacts and analyse the evidence from those activities (White 1999). On very heavily disturbed sites the artefacts themselves may be very broken, making it harder to analyse them.

6.3.2.3 Theory and recording

Stone artefacts can be recorded and analysed in different ways to give different kinds of information about different topics. The variables that are recorded and the interpretations which are made will depend in part on the theory which underlies the analysis. If someone wants to know what stone tools were used for, then artefacts should be examined under a microscope for use-wear and residues. If someone wants to know how stone was flaked and tools were made, then a technological analysis may record data on stone flaking such as patterns of scarring on cores or flakes. If someone wants to know about how stone materials were obtained (procured), transported and discarded then recording might focus on stone raw materials – information about raw material types and where they occur naturally in the landscape will be critical, and raw material type and size of artefacts may be recorded.

Consulting projects may seek to provide a basic description of an assemblage, recording just a few variables to give information about general topics. The present analysis records provenance information (where each artefact was found) and nine other variables, with some additional information for modified artefacts and cores. This level of recording should not be regarded as a definitive record of the assemblage. If artefacts are kept in a safe place they can be reanalysed in the future to provide new information and address new questions.

6.4 TEST EXCAVATION RESULTS

6.4.1 Preamble

The results of the test excavation program were surprisingly sparse. 152 0.5 m by 0.5 m excavation squares were excavated at 12 separate localities: a total of 38 square metres. From this area of excavation, 180 artefacts were recovered; an average of 4.7 artefacts per square metre or 1.18 artefacts per excavation square. This density of artefacts is extremely low.

In addition, there were only two excavation squares that recorded artefacts in numbers greater than 15. Both squares were located at Area 1 along Tr5, however, squares excavated adjacent to them failed to record similar artefact numbers.

Therefore, in summary, the results show an extremely low incidence of subsurface artefacts apart from two isolated clusters at Area 1. Based on these results it would appear that, as a result of the historic disturbances to the area, intact subsurface deposits are extremely rare within the Project Area and that the visible artefacts are the remnants of sites that have been comprehensibly disturbed.

Consequently, due to the low artefact numbers it is difficult to draw many conclusions from the test excavation assemblage as any one location did not record artefacts in sufficient quantities to make analysis, beyond the most basic, meaningful (see **Section 7.2.1**).

Table 6-5 summarises the location and results from each excavation square (locations of each area are shown in **Figure 6-1**). The artefact count in this table records all artefacts, regardless of size, and regardless of whether they are broken, or pieces catalogued as 'shatter'. As can be seen in this table, 101 excavation squares (or 66 per cent) recorded no artefacts and a further 43 excavation squares (or 28 per cent) recorded between one and five artefacts. Therefore, only six per cent of the excavation squares contained artefacts at a density greater than five per excavation square and no squares recorded more than 20 artefacts: a benchmark which is commonly regarded as the division between a 'background scatter of artefacts' and artefacts being recorded at densities that allow meaningful interpretation.

GDA Zone 56 East	GDA Zone 56 North	Area	Transect	Square	Artefacts (total)
316638	6413318	Area 1	TR1	1	2
316632	6413310	Area 1	TR1	2	0
316626	6413301	Area 1	TR1	3	1
316619	6413292	Area 1	TR1	4	0
316614	6413284	Area 1	TR1	5	1
316607	6413275	Area 1	TR1	6	6
316612	6413270	Area 1	TR2	1	0
316620	6413264	Area 1	TR2	2	0
316630	6413258	Area 1	TR2	3	1

 Table 6-5. Summary of results from each excavation square.

GDA Zone 56 East	GDA Zone 56 North	Zone 56 North Area Transect		Square	Artefacts (total)	
316641	6413250	Area 1	TR2	4	0	
316648	6413245	Area 1	TR2	5	0	
316656	6413239	Area 1	TR2	6	0	
316682	6413410	Area 1	TR3	1	1	
316677	6413404	Area 1	TR3	2	0	
316672	6413398	Area 1	TR3	3	2	
316667	6413392	Area 1	TR3	4	0	
316662	6413386	Area 1	TR3	5	0	
316662	6413386	Area 1	TR3	6	0	
316656	6413378	Area 1	TR4	1	4	
316558	6413180	Area 1	TR4	2	4	
316552	6413174	Area 1	TR4	3	2	
316547	6413166	Area 1	TR4	4	5	
316540	6413160	Area 1	TR4	5	1	
316534	6413150	Area 1	TR4	6	8	
316527	6413143	Area 1	TR5	1	17	
316481	6413132	Area 1	TR5	2	3	
316477	6413120	Area 1	TR5	3	11	
316472	6413107	Area 1	TR5	4	4	
316468	6413097	Area 1	TR5	5	17	
316462	6413087	Area 1	TR5	6	1	
317942	6412044	Area 2	TR1	1	0	
317932	6412043	Area 2	TR1	2	0	
317922	6412041	Area 2	TR1	3	0	
317912	6412041	Area 2	TR1	4	0	
317903	6412040	Area 2	TR1	5	0	
317892	6412039	Area 2	TR1	6	0	
317884	6412023	Area 2	TR2	1	0	
317882	6412015	Area 2	TR2	2	0	
317880	6412005	Area 2	TR2	3	0	
317877	6411996	Area 2	TR2	4	0	
317875	6411987	Area 2	TR2	5	0	
317872	6411981	Area 2	TR2	6	0	
317947	6411954	Area 2	TR3	1	0	
317947	6411942	Area 2	TR3	2	0	
317946	6411930	Area 2	TR3	3	0	
317945	6411920	Area 2	TR3	4	0	
317945	6411910	Area 2	TR3	5	0	
317944	6411900	Area 2	TR3	6	0	
317927	6411918	Area 2	TR4	1	0	
317919	6411922	Area 2	TR4	2	0	
317910	6411925	Area 2	TR4	3	0	
317899	6411929	Area 2	TR4	4	0	
317890	6411933	Area 2	TR4	5	0	

GDA Zone 56 East	GDA Zone 56 North Area		Transect	Square	Artefacts (total)
317881	6411936	Area 2	TR4	6	0
317363	6411375	Area 3	TR1	1	0
317363	6411363	Area 3	TR1	2	0
317363	6411352	Area 3	TR1	3	1
317363	6411341	Area 3	TR1	4	0
317363	6411333	Area 3	TR1	5	1
317364	6411324	Area 3	TR1	6	0
317340	6411372	Area 3	TR2	1	0
317339	6411360	Area 3	TR2	2	0
317340	6411350	Area 3	TR2	3	4
317340	6411341	Area 3	TR2	4	2
317340	6411332	Area 3	TR2	5	2
317339	6411324	Area 3	TR2	6	0
317368	6411221	Area 4	TR1	1	1
317371	6411211	Area 4	TR1	2	0
317375	6411202	Area 4	TR1	3	0
317379	6411194	Area 4	TR1	4	1
317386	6411186	Area 4	TR1	5	0
317390	6411177	Area 4	TR1	6	2
317489	6411195	Area 4	TR2	1	1
317489	6411188	Area 4	TR2	2	2
317489	6411179	Area 4	TR2	3	0
317490	6411168	Area 4	TR2	4	1
317489	6411157	Area 4	TR2	5	0
317488	6411145	Area 4	TR2	6	0
317460	6411092	Area 4	TR3	1	0
317459	6411084	Area 4	TR3	2	0
317458	6411074	Area 4	TR3	3	0
317456	6411065	Area 4	TR3	4	1
317455	6411056	Area 4	TR3	5	2
317453	6411046	Area 4	TR3	6	2
317428	6411050	Area 4	TR4	1	0
317434	6411042	Area 4	TR4	2	1
317440	6411034	Area 4	TR4	3	0
317446	6411025	Area 4	TR4	4	11
317452	6411017	Area 4	TR4	5	3
317457	6411010	Area 4	TR4	6	2
317443	6411029	Area 4	TR4	7	0
317443	6411024	Area 4	TR4	8	3
317448	6411022	Area 4	TR4	9	0
317371	6411097	Area 4	TR5	1	14
317363	6411104	Area 4	TR5	2	0
317356	6411110	Area 4	TR5	3	0
317348	6411117	Area 4	TR5	4	0

GDA Zone 56 East	GDA Zone 56 North	Area	Transect	Square	Artefacts (total)
317341	6411123	Area 4	TR5	5	0
317334	6411130	Area 4	TR5	6	0
317374	6411095	Area 4	TR5	7	0
317374	6411101	Area 4	TR5	8	0
317367	6411101	Area 4	TR5	9	5
317565	6411087	Area 5	TR1	1	0
317568	6411085	Area 5	TR1	2	0
317574	6411086	Area 5	TR1	3	0
317576	6411083	Area 5	TR1	4	0
317611	6410955	Area 6	TR1	1	1
317610	6410951	Area 6	TR1	2	1
317612	6410950	Area 6	TR1	3	1
317611	6410947	Area 6	TR1	4	1
317747	6410190	Area 7	TR1	1	0
317746	6410180	Area 7	TR1	2	0
317745	6410170	Area 7	TR1	3	0
317744	6410161	Area 7	TR1	4	0
317743	6410153	Area 7	TR1	5	0
317742	6410146	Area 7	TR1	6	0
317750	6410066	Area 7	TR2	1	1
317750	6410057	Area 7	TR2	2	2
317750	6410046	Area 7	TR2	3	3
317750	6410036	Area 7	TR2	4	2
317751	6410026	Area 7	TR2	5	0
317751	6410016	Area 7	TR2	6	0
319242	6410219	Area 8	TR1	1	0
319232	6410218	Area 8	TR1	2	0
319223	6410215	Area 8	TR1	3	0
319213	6410213	Area 8	TR1	4	0
319203	6410210	Area 8	TR1	5	0
319193	6410207	Area 8	TR1	6	1
318230	6408987	Area 9	TR1	1	0
318236	6408978	Area 9	TR1	2	0
318242	6408971	Area 9	TR1	3	0
318247	6408963	Area 9	TR1	4	0
318253	6408954	Area 9	TR1	5	1
318362	6408773	Area 10	TR1	1	0
318371	6408765	Area 10	TR1	2	1
318379	6408759	Area 10	TR1	3	0
318381	6408748	Area 10	TR1	4	0
318383	6408738	Area 10	TR1	5	2
318385	6408728	Area 10	TR1	6	0
317776	6412466	Area 11	TR1	1	0
317781	6412458	Area 11	TR1	2	0

GDA Zone 56 East	GDA Zone 56 North	Area	Transect	Square	Artefacts (total)
317786	6412449	Area 11	TR1	3	0
317794	6412392	Area 11	TR1	4	1
317797	6412384	Area 11	TR1	5	0
317723	6412201	Area 12	TR1	1	0
317724	6412191	Area 12	TR1	2	5
317725	6412180	Area 12	TR1	3	0
317727	6412172	Area 12	TR1	4	0
317729	6412162	Area 12	TR1	5	1
317730	6412153	Area 12	TR1	6	0

6.4.2 Description of excavation areas

The following section will describe the landscape features of each excavation area along with an analysis of any landform modification present that may pertain to the excavation results. Excavation areas are shown in **Figure 6-1**.

<u>Area 1</u>

Area 1 stretches for approximately 450 m on the eastern bank of Bowmans Creek along a broad, elevated spur parallel to the creek. As the survey recorded a reasonable number of artefacts in areas of erosion along the edge of the spur, and in isolated areas along the crest of the spur, it was the intention of the test excavation program to investigate adjacent to the eroded areas to ascertain if intact archaeological deposits remain.

The landform where all transects were located, except for Tr3, is a reasonably broad spur elevated above Bowmans Creek with a gradual slope to the east. A former dwelling and farm infrastructure are present on the crest. The northernmost extent of Area 1, encompassing what was originally termed Glendell North PAD1 prior to the test excavation, is located on a lower, secondary terrace in a sheltered area. The area has been previously cleared of trees, although regrowth casuarina is present in small patches, as well as isolated mature eucalypts. The entire area is used largely for low-intensity livestock grazing.

Five transects (Tr1–5) were investigated and a total of 30 excavation squares excavated; six squares in each transect. Tr1 is located parallel to Bowmans Creek across the spur and adjacent to Glendell North OS5; Tr2 is perpendicular to Bowmans Creek heading upslope along the spur towards a dwelling and farm complex; Tr3 is parallel to Bowmans Creek on a secondary terrace at the location of Glendell North PAD1; Tr4 is parallel to Bowmans Creek on the crest of the spur adjacent to 37-3-0763; and Tr5 is located adjacent to Glendell North OS6, between Bowmans Creek and an farm shed (**Figure 6-3** and **Figure 6-4**).

Area 1 is in the vicinity of newly recorded sites Glendell North OS5 and Glendell North OS6, as well as previously recorded site 37-3-0763 (Bowmans Ck 7).



Figure 6-3. Location of transects within Area 1 showing total artefact numbers from each square.

Figure 6-4. Area 1. View of transects.





<u>Area 2</u>

Area 2 is located between Yorks Creek in the west and the Ravensworth Homestead in the east. The area occupies a large, low gradient area that is elevated above Yorks Creek on its eastern bank and the Ravensworth Homestead. The rationale of this placement was based on the presence of the Ravensworth Homestead, often an indicator of a prime occupational location, and the elevated landform which it occupies on the eastern side of Yorks Creek.

Area 2 is located in an open paddock and while there are disturbances nearby, such as the Ravensworth Homestead, an underground Telstra line, a rehabilitated exploration site and associated farming infrastructure i.e. sheds and dams and vehicle tracks, there was little sign of extensive disturbance beyond that arising from the area's past agricultural use (vegetation clearing, stock trampling and erosion). Vegetation within Area 2 is limited to three isolated box trees. To the east, regrowth casuarinas line the bank of Yorks Creek.

Four transects were investigated at Area 2 through the excavation of 24 excavation squares (six along each transect spaced 10 m apart) (**Figure 6-5** and **Figure 6-6**). Tr1 and Tr2 were placed to the north of an access track which leads from Hebden Road in the west to the Ravensworth Homestead. Both transects occupy the lower slope above the floodplain of Yorks Creek, however the area is generally flat. Tr1 is perpendicular to Yorks Creek and is approximately 75 m from the perimeter of the Ravensworth Homestead, while Tr2 is parallel to Yorks Creek. Tr3 is located across the flat crest of a knoll, occupied by the Ravensworth Homestead, which slopes to the south towards an ephemeral drainage line that has been dammed. Tr4 is located along the edge of the elevated landform which slopes to the west to the same drainage line as Tr3, but also slopes to the west towards Yorks Creek. Tr3 was placed parallel to the drainage line to determine whether artefacts associated with Glendell North OS13 were present subsurface.



Figure 6-5. Location of transects within Area 2 showing total artefact numbers from each square.

Figure 6-6. Area 2. View of transects.





3. VIEW SOUTH ALONG TRANSECT 3 TOWARDS A DRAINAGE4. VIEW SOUTHLINE OF YORKS CREEK.CREEK (TREE LIN

4. VIEW SOUTHWEST ALONG TRANSECT 4 TOWARDS YORKS CREEK (TREE LINE).

<u>Area 3</u>

Area 3 is located on the western bank of Yorks Creek, approximately 70 m north of Area 2. During the survey the area was identified as having high archaeological potential based on its proximity to Yorks Creek, its location on an elevated landform, and the presence of surface artefacts. Therefore, Area 3 was selected for test excavation to determine if intact deposits remained at this location and whether the visible artefacts originated locally from deposits in non-eroded landforms.

Two transects were investigated at Area 3 through the excavation of 12 excavation squares (**Figure 6-7** and **Figure 6-8**). Specifically, this was comprised of: Tr1 (six squares along the edge of a terrace where surface artefacts were visible) and Tr2 (six squares to the west of Tr1 where deeper A-Horizon deposits were predicted due to lower levels of erosion). Both transects were parallel to Yorks Creek and squares were spaced 10 m apart.

Area 3 encompasses site 37-3-0747, originally recorded by Umwelt in 2001, which identified 12 artefacts at the site location along an unformed road where A-Horizon soils have been removed. Additional disturbances at the site location include low-intensity grazing and potential past cultivation. The area has likely also been subject to vegetation clearing and now consists only of grass and weed cover.



Figure 6-7. Location of transects within Area 3 showing total artefact numbers from each square.





<u>Area 4</u>

Area 4 encompasses an upper terrace landform at the confluence of Bowmans and Yorks Creeks, the only major creek confluence in the Project Area. Umwelt 2004 emphasises that creek confluences have often been found to have Aboriginal camp sites and terrain features that may have acted as pathways between resource locations. As such, there is increased archaeological sensitivity at the confluence of Bowmans and Yorks Creeks.

Area 4 encompasses previously recorded sites 37-3-0750 and is in close proximity to 37-3-1503. Site 37-3-0750 was originally recorded by Umwelt in 2001 and noted the area surrounding the surface scatter as having high PAD potential, but artefacts would likely be in a disturbed context. Area 4 also includes newly recorded site Glendell North OS34, a low-density artefact scatter recorded closest to the confluence of the creek lines, and Glendell North PAD2, located on an upper terrace adjacent to Bowmans Creek.

Area 4 is located in an open paddock with little sign of disturbances beyond that arising from the area's past agricultural use (vegetation clearing, stock trampling and erosion). Vegetation within the area is limited to one eucalypt tree and grass and weed cover. High levels of erosion are present along the edges of the upper terrace and along a drainage line.

The area extends for 260 m and is 70 m west of Area 5. Five transects were investigated at Area 4 through the excavation of 36 excavation squares (**Figure 6-9** and **Figure 6-10**). Specifically this comprised of: Tr1 (six squares spaced 10 m apart, parallel to Yorks Creek along a fence line and nearby site 37-3-1503); Tr2 (six squares spaced 10 m apart, parallel to Yorks Creek encompassing site 37-3-0750); Tr3 (six squares spaced 10 m apart, parallel to Yorks Creek but placed further back from the edge of the terrace and to the south of a drainage line); Tr4 (six squares spaced 10 m apart initially, with an additional three squares spaced 5 m to the northwest, southeast and southwest of Sq4, located closest to the confluence of the creeks); and Tr5 (six squares spaced 10 m apart initially, with an additional three squares spaced 5 m to the northwest, southeast and northeast of Sq1, located parallel to Bowmans Creek on an upper terrace). The additional investigation completed adjacent to Tr4 Sq4 (n=11) and Tr5 Sq1 (n=14) was completed due to the higher number of artefacts recorded within these squares compared to any others within the area. The investigation of three squares placed 5 m apart at each location was used to determine whether the artefact extent continued to different directions or if it was more localised.



Figure 6-9. Location of transects within Area 4 showing total artefact numbers from each square.

Figure 6-10. Area 4. View of transects.





Area 5

Area 5 is located on an elevated landform to the east of Yorks Creek, extending for 30 m. The rationale of its placement was to obtain information on deposits from the eastern side of the creek, close to the confluence of Bowmans and Yorks Creek.

Area 5 is located in an open paddock encompassing a remnant confined portion of a terrace with drainage lines to the north and south.

Area 5 consisted of a single transect (Tr1) comprising four excavation squares (**Figure 6-11** and **Figure 6-12**). Due to the length of the area, two clusters consisting of two immediately adjacent squares were excavated. These clusters were positioned 10 m apart.

Area 5 is in the vicinity of site 37-3-0745, located 20 m to the north.



Figure 6-11. Location of transect within Area 5 showing total artefact numbers from each square.

Figure 6-12. Area 5. View of transect.



<u>Area 6</u>

Area 6 is located on an elevated landform to the east of Yorks Creek and extends for 30 m. The rationale of its placement was to obtain information on deposits from the eastern side of the creek, close to the confluence of Bowmans and Yorks Creeks, similar to Area 5.

Area 6 is located in an area with high levels of general disturbances including the construction of farm infrastructure. The area is lightly treed, but vegetation largely consists of grass and weed cover. The area is currently used for low-intensity grazing.

Area 6 consisted of a single transect (Tr1) comprising four excavation squares (**Figure 6-13** and **Figure 6-14**). Due to the length of the area, two clusters consisting of two immediately adjacent squares were excavated. These clusters were positioned 10 m apart.

Area 6 encompasses newly recorded site Glendell North OS16.







Figure 6-14. Area 6. View of transects.

<u>Area 7</u>

Area 7 was investigated to gain an understanding of deposits along an elevated terrace overlooking the Bowmans Creek floodplain, where a number of visible artefacts were identified during the survey. The original extent of Area 7 extended for 155 m, however, during the test excavation program the extent was increased in the north for another 65 m to move Tr1 to part of an upper terrace landform to the north of a drainage line which has been subject to lower levels of disturbance.

Area 7 is adjacent to a historic farm complex and includes the foundations of a former dwelling and garden beds. Additional disturbances identified during the survey included clearing, grazing, sheet wash erosion and vehicle damage. Surrounding vegetation represents grassy paddocks with isolated eucalypts, and farmhouse garden exotics including a palm tree.

Specifically, the transects excavated at Area 7 consisted of Tr1 (six squares spaced 10 m apart along an upper terrace to the north of a drainage line and south of a vehicle track) and Tr2 (six squares spaced 10 m apart along an upper terrace bounded to the north and south by drainage lines) (**Figure 6-15** and **Figure 6-16**).

Area 7 is located immediately west of newly recorded site Glendell North OS19.

^{1.} VIEW OF TRANSECT 1, VIEW SOUTH ALONG A TERRACE EAST OF YORKS CREEK.



Figure 6-15. Location of transects within Area 7 showing total artefact numbers from each square.

Figure 6-16. Area 7. View of transects.



1. VIEW NORTH ALONG TRANSECT 1 LOCATED ON AN UPPER TERRACE OF BOWMANS CREEK.

2. VIEW OF SOUTH ALONG TRANSECT 2. LOCATED ON THE EDGE OF AN UPPER TERRACE TO THE WEST OF FARMING INFRASTRUCTURE.

<u>Area 8</u>

Area 8 is located approximately 10 m north of the break of slope to Swamp Creek on a generally flat, low rise. The area is grassed and located between the current channel of Swamp Creek and a

possible anabranch. The rationale of its placement was to obtain information on deposits from an elevated landform between Swamp Creek and what appears to be an old channel for Swamp Creek.

Area 8 is generally devoid of trees, excluding the regrowth casuarinas lining Swamp Creek. It has been subject to generally low levels of disturbance, although it is nearby an above ground pipeline, as well as being located 130 m north of a Glendell haul road.

Area 8 consisted of a single transect (Tr1) with six excavation squares (Sq1 to Sq6) spaced 10 m apart (**Figure 6-17** and **Figure 6-18**). The transect was laid parallel to Swamp Creek to test the extent of the low rise.

Area 8 encompasses previously recorded site 37-3-0689 and is near newly recorded site Glendell North OS22.







Figure 6-18. Area 8. View of transects.

1. VIEW OF TRANSECT 1 VIEW NORTHEAST. LOCATED ON THE EDGE OF THE FRINGING CASUARINA REGROWTH ADJACENT TO SWAMP CREEK.

<u>Area 9</u>

Area 9 (encompassing Glendell North PAD3) is located on the western bank of Swamp Creek, to the southeast of the fenced off area of site 37-3-0649. The area was selected at random in order to test the nature of deposits along the more southern portion of Swamp Creek.

Area 9 is on a flat, grassed area along the fringe of regrowth casuarinas lining the creek line. Identified disturbances included clearing, grazing and the movement of topsoil. The area is currently used for low-intensity livestock grazing.

Area 9 consisted of a single transect (Tr1) of six excavation squares (Sq1 to Sq6) spaced 10 m apart (**Figure 6-19** and **Figure 6-20**). The transect was laid out, approximately 15 m back from the erosion edge of Swamp Creek.

No previously recorded sites exist near Area 9 on the western side of the creek line.



Figure 6-19. Location of transects within Area 9 showing total artefact numbers from each square.

Figure 6-20. Area 9. View of transects.



1. VIEW OF TRANSECT 1 VIEW SOUTHEAST. LOCATED ON THE EDGE OF THE FRINGING CASUARINA REGROWTH ADJACENT TO SWAMP CREEK.

<u>Area 10</u>

Area 10 is located on the eastern bank of Swamp Creek, and extends for 100 m, 190 m southeast of Area 9. The area, similarly to Area 9, was selected at random in order to test the nature of deposits along the more southern portion of Swamp Creek.

Area 10 is on a flat, grassed area along the fringe of regrowth casuarinas lining the creek line. Identified disturbances included clearing, grazing and the movement of topsoil. The current land use of the area is mine buffer land.

Area 10 consisted of a single transect (Tr1) of six excavation squares (Sq1 to Sq6) (**Figure 6-21** and **Figure 6-22**). Due to the curvature of the creek in this area, there is a slight bend in the transect to ensure it is was in closer proximity to the erosion edge of Swamp Creek.

Newly recorded site, Glendell North OS25, is encompassed within the extent of Area 10.

Figure 6-21. Location of transects within Area 10 showing total artefact numbers from each square.





Figure 6-22. Area 10. View of transects.

1. VIEW OF TRANSECT 1 VIEW NORTHWEST. LOCATED ON THE EDGE OF THE FRINGING CASUARINA REGROWTH ADJACENT TO SWAMP CREEK.

<u>Area 11</u>

Area 11 encompasses site 37-3-0754 and its associated PAD recorded by Umwelt in 2001. Umwelt noted at the time of recording that PADs were possible, but the area is likely to have been impacted by cultivation except at depths below 50 cm from the ground surface. As such, the test excavation program included the excavation of six squares along one transect to determine whether subsurface deposits were present in association with the identified surface artefact manifestation, and whether deposits present to a depth greater than 50 cm are disturbed.

Tr1 was placed parallel to Yorks Creek on a lower slope of a secondary terrace within 5 m of the break of slope to Yorks Creek. (**Figure 6-23** and **Figure 6-24**). Despite the specified 10 m spacing highlighted in the sampling strategy between squares (**Appendix 5**), the distance between Sq3 and Sq4 was increased to approximately 50 m in order to avoid either side of a gully where A-Horizon soils have been removed.

Area 11 is located to the east of Yorks Creek, within the grounds of the historic Ravensworth Homestead property. The area has been previously cleared of trees although regrowth casuarina trees are present along the riparian corridor of Yorks Creek. The area is currently used for low-intensity livestock grazing. Additional disturbances within Area 11 include the construction of a former structure, evidenced by the presence of larger building blocks along a fence line which traverses the central portion of the area. Some evidence of ploughing was also observed adjacent to Sq4 to 6.



Figure 6-23. Location of transects within Area 11 showing total artefact numbers from each square.

Figure 6-24. Area 11. View of transects.



<u>Area 12</u>

Area 12 encompasses site 37-3-0761 and its associated PAD recorded by Umwelt in 2001. Umwelt noted at the time of recording that PADs were possible, but the area is likely to have been impacted by cultivation. As such, the intention of the test excavation program was to place one transect parallel to Yorks Creek to test the western bank and determine whether subsurface deposits were present in association with the identified isolated surface artefact (**Figure 6-25** and **Figure 6-26**).

Area 12 is located between Hebden Road in the west and Yorks Creek in the east and extends for 90 m, approximately 145 m northwest of Area 2. The area has been previously cleared of trees although regrowth casuarina trees are present along the riparian corridor of Yorks Creek. The area is currently used for low-intensity livestock grazing.

Area 12 consisted of a single transect (Tr1) of six excavation squares (Sq1 to Sq6) spaced 10 m apart.







Figure 6-26. Area 12. View of transects.

1. VIEW OF TRANSECT 1 VIEW NORTHWEST. LOCATED TO THE WEST OF YORKS CREEK (TREE LINE ON RIGHT).

6.4.2.1 Stratigraphy

Archaeological stratigraphy was not present at any of the excavation squares investigated. Generally, excavation squares consisted of a thin (c. 5 cm) humic layer at the surface resting on a light clay loam extending down to the basal clays. This generalisation varied from area to area as will be examined below but the general sequence of a thin A1-Horizon resting on a 10–20 cm A2-Horizon resting on the B-Horizon was reasonably consistent across the investigation area. Excavated depths typically averaged from 20 cm to 30 cm.

At a number of areas, the lack of artefacts and stratigraphy meant that a change of strategy was agreed to between the archaeologists and the RAPs present. This change was going from excavating in 5 cm spits to 10 cm spits. It was felt that without artefacts or stratigraphy to justify a finer excavation methodology that the main aim of the test excavation program was to identify where there may be surviving archaeological deposits of any note. The excavation depth at each area is highlighted below by location.

<u>Area 1</u>

All squares within Tr1 and Tr2 were excavated in 5 cm spits, as well as Tr3 Sq 6. The remainder of Tr3 and the entirety of squares within Tr4 to Tr5 were excavated in 10 cm spits. **Table 6-6** provides detail on the soil profiles at Area 1 and **Figure 6-27** shows a sample of excavated soil profiles from Tr1 to Tr5 excavated at Area 1.

Soils in this area had a high amount of gravels throughout when compared with the other investigation areas, with the exception of Area 2. The thick gravel lag layer was consistent across all transects except at Tr3. This difference is attributed to the different landform occupied by Tr3, a secondary terrace, compared to the remaining transects which were laid across the more elevated spur landform. The thick gravel lag layer comprised decomposed conglomerate or regolith, the bedrock present across portions of the Project Area which can also be seen outcropping throughout portions of Area 1 (**Figure 6-27**; image 1 & 2). Gravels generally ranged in size from 1–3 cm across

Tr1, Tr2 and Tr4, however, the maximum size of gravels increased significantly across Tr5 to approximately 12 cm. The average depth of squares across Tr1, Tr2, Tr4 and Tr5 was generally from 20 to 25 cm. The nature of soils across these transects generally consisted of a thin layer of humic topsoil (<5 cm) then a compact light grey/brown loam with gravels overlying an orange clay base.

Soils throughout Tr3 consisted of a thin humic layer above an undifferentiated mid-brown silt extending to a mottled brown and orange clay base. A few squares demonstrated disturbances from bioturbation and large tree roots (**Figure 6-27**; image 3).

Spit 2 (10–20 cm) recorded 54 per cent of artefacts at Area 1 (**Figure 6-28**). The second highest number of artefacts were recorded in spit 1 (0–10 cm). Only four artefacts were recovered from spit 3 (20–30 cm) and no artefacts were recorded in spit 4 (30–40 cm). At the two squares along Tr5 (Sq1 and Sq5) where 17 artefacts were recorded, all artefacts were recorded in either spit 1 or spit 2. Within Tr5 Sq1, 16 of the 17 artefacts were located in spit 1 (0–10 cm); differing from Tr5 S5 with only four recorded in spit 1 (0–10 cm) and the remainder recorded in spit 2 (10–20 cm).

Transect/Square	Total depth of square (cm)	Soil profile description
Tr1 Sq1	18	2 cm humic topsoil. Hard, dry, light grey/brown loam with gravels to 18 cm. Hard orange clay at base.
Tr1 Sq2	20	3 cm humic topsoil. Hard, dry, light grey/brown loam with gravels to 15cm. Hard orange clay loam from 15-20 cm.
Tr1 Sq3	16	4 cm humic topsoil. Hard, dry, light grey/brown loam with gravels to 8 cm. Hard orange clay loam from 8-16 cm.
Tr1 Sq4	20	3 cm humic topsoil. Hard, dry, light grey/brown loam with gravels to 15 cm. Hard orange clay loam from 15-20 cm.
Tr1 Sq5	21	4 cm humic topsoil. Hard, dry, light grey/brown loam with gravels to 12 cm. Hard orange clay loam from 12-21 cm.
Tr1 Sq6	28	2 cm humic topsoil. Hard, dry, light grey/brown loam with gravels to 23 cm. Hard orange clay loam from 23-28 cm.
Tr2 Sq1	20	5 cm humic topsoil. Hard, dry, light grey/brown loam with gravels to 20 cm. Hard orange clay base.
Tr2 Sq2	12	3 cm humic topsoil. Hard, dry, light grey/brown loam with gravels to 12 cm. Hard orange clay base.
Tr2 Sq3	22	4 cm humic topsoil. Hard, dry, light grey/brown loam to 22 cm with gravels present from 17 cm. Hard orange clay base.
Tr2 Sq4	32	3 cm humic topsoil. Hard, dry, light grey/brown loam to 32 cm with gravels present from 15 cm. Hard orange clay base.
Tr2 Sq5	38	2 cm humic topsoil. Hard, dry, light grey/brown loam to 38 cm with gravels present from 23 cm. Hard orange clay base.
Tr2 Sq6	45	6 cm humic topsoil. Hard, dry, light grey/brown loam to 35 cm. Hard mottled orange/brown clay base with charcoal flecks.
Tr3 Sq1	30	5 cm humic topsoil. Hard, mid-brown silt to 28 cm. Mottled orange/brown clay base.
Tr3 Sq2	29	4 cm humic topsoil. Hard, mid-brown silt to 29 cm. Mottled orange/brown clay base.
Tr3 Sq3	28	5 cm humic topsoil. Hard, mid-brown silt to 28 cm. Mottled orange/brown clay base.
Tr3 Sq4	26	3 cm humic topsoil. Hard, mid-brown silt to 26 cm. Mottled orange/brown clay base.
Tr3 Sq5	33	3 cm humic topsoil. Hard, mid-brown silt to 33 cm. Mottled orange/brown clay base.

Table 6-6. Area 1: Excavation log.

Transect/Square	Total depth of square (cm)	Soil profile description
Tr3 Sq6	45	6 cm humic topsoil. Hard, mid-brown silt to 45 cm. Mottled orange/brown clay base with charcoal flecks and root at base.
Tr4 Sq1	20	4 cm humic topsoil. Hard, dry, light grey/brown silt to 20 cm with gravels present. Hard orange clay base.
Tr4 Sq2	29	3 cm humic topsoil. Hard, dry, light grey/brown silt to 29 cm with gravels present from 18 cm. Hard orange clay base.
Tr4 Sq3	26	2 cm humic topsoil. Hard, dry, light grey/brown silt to 26 cm with gravels present from 17 cm. Hard orange clay base.
Tr4 Sq4	20	2 cm humic topsoil. Hard, dry, light grey/brown silt to 20 cm with gravels present from 16 cm. Hard orange clay base.
Tr4 Sq5	22	1 cm humic topsoil. Hard, dry, light grey/brown silt to 22 cm with gravels present. Hard orange clay base.
Tr4 Sq6	29	2 cm humic topsoil. Hard, dry, light grey/brown silt to 29 cm with gravels present and large charcoal flakes. Hard orange clay base.
Tr5 Sq1	20	5 cm humic topsoil. Light brown/grey silt with gravels from 6 cm and charcoal flecks to 20 cm. Orange to brown clay base.
Tr5 Sq2	20	4 cm humic topsoil. Light brown/grey silt with gravels from 9 cm. Orange to brown clay base.
Tr5 Sq3	12	2 cm humic topsoil. Light mid-brown silt with few gravels. Orange to brown clay base.
Tr5 Sq4	24	3 cm humic topsoil. Light brown/grey silt with gravels from 5 cm. Orange to brown clay base.
Tr5 Sq5	25	3 cm humic topsoil. Light brown/grey silt with large rocks and gravels throughout. Orange to brown clay base.
Tr5 Sq6	12	2 cm humic topsoil. Mid-brown silt with large rocks and gravels throughout. Orange to brown clay base.

Figure 6-27. Test excavation Area 1. Stratigraphy.





Figure 6-28. Test excavation Area 1. Vertical artefact distribution.



<u>Area 2</u>

Tr2, the first transect excavated at Area 2, was excavated in 5 cm spits, however, due to a lack of artefacts the excavation depth was increased to 10 cm for Tr1, Tr3 and Tr4. **Table 6-7** provides detail on the soil profiles at Area 2 and **Figure 6-29** shows a sample of excavated soil profiles from Tr1 to Tr4 excavated at Area 2.

Area 2, similar to Area 1, recorded gravels in all excavated squares attributed to the presence of decomposed conglomerate bedrock (**Table 6-7**; **Figure 6-29**). Overall, A-Horizon soil depths did not exceed 30 cm. The soil profiles along Tr1 were consistent across all squares, including a mid-brown humic layer down to a maximum of 7 cm (often only extending to the depth of grass roots), overlying a brown clay loam with small gravels then down to a blocky clay loam with larger pebbles. The B-Horizon consists of a yellow clay base.

Soils differed between Tr1 and Tr2 with Tr2 consisting of leached loams as opposed to clayey loam. The depth of topsoil was also substantially lower, averaging 0.5 cm although Sq4 had 3 cm of topsoil. The A2-Horizon featured a light brown leached loam to an average depth of 10 cm then a darker brown leached loam with large and consistent pebble inclusions overlying an orange clay base. Soils between Tr2, Tr3 and Tr4 were similar, however, Tr3 and Tr4 squares generally retained a greater depth of topsoil.

No Aboriginal artefacts were recorded at Area 2, so the soil profile has no association with recorded artefacts. Several insignificant historic heritage items (glass and ceramic fragments) were excavated, however, and these were passed on to Casey & Lowe (Casey & Lowe 2019: Section 3.9.1).

Transect/Square	Total depth of square (cm)	Soil profile description
Tr1 Sq1	20	Mid-brown humic layer down to 5 cm. Brown clay loam with small gravels down to 15 cm then blocky clay loam with weathered conglomerate to 20 cm overlying yellow clay base.
Tr1 Sq2	18	Mid-brown humic layer down to 5 cm. Brown clay loam with small gravels down to 12 cm then blocky clay loam with weathered conglomerate to 18 cm overlying yellow clay base.
Tr1 Sq3	15	Mid-brown humic layer down to 5 cm. Brown clay loam with small gravels down to 9 cm then blocky clay loam with weathered conglomerate to 15 cm overlying yellow clay base.
Tr1 Sq4	16	Mid-brown humic layer down to 4 cm. Brown clay loam with small gravels down to 10 cm then blocky clay loam with weathered conglomerate to 16 cm overlying yellow clay base.
Tr1 Sq5	13	Mid-brown humic layer down to 3 cm. Brown loamy clay with gravels from 3-5 cm in west of pit and 3-13 cm in east of pit. Yellow clay at base with some weathered conglomerate.
Tr1 Sq6	15	Mid-brown humic layer down to 7 cm. Mid-brown leached loam with small gravels from 7-10 cm in the western portion and 7-15 cm in the eastern portion. Yellow clay base.
Tr2 Sq1	25	0-5 cm mid-brown humic layer then light brown leached loam with a weathered conglomerate layer in the western section overlying orange clay base.

Table 6-7. Area 2: Excavation log.
Transect/Square	Total depth of square (cm)	Soil profile description
Tr2 Sq2	25	0-5 cm mid-brown humic layer then light brown leached loam to 15 cm. Weathered conglomerate and brown leached loam from 15 cm to 25 cm overlying orange clay base.
Tr2 Sq3	25	0-5 cm mid-brown humic layer then light brown leached loam to 17 cm. Weathered conglomerate and brown leached loam from 17 cm to 25 cm overlying orange clay base.
Tr2 Sq4	10	Mid-brown humic layer to 3 cm. Light brown leached loam with small gravels to 10 cm overlying orange clay base.
Tr2 Sq5	20	0-5c m mid-brown humic layer then light brown leached loam to 11 cm. Weathered conglomerate and brown leached loam from 12 cm to 20 cm overlying orange clay base.
Tr2 Sq6	20	0-5 cm mid-brown humic layer then light brown leached loam to 10 cm. Weathered conglomerate and brown leached loam from 10 cm to 20 cm overlying orange clay base.
Tr3 Sq1	23	Mid-brown loam to 10 cm then light brown leached loam to 23 cm overlying yellow clay base.
Tr3 Sq2	24	Dark brown humic layer to 3 cm. Light brown leached loam to 16 cm then decomposed conglomerate overlying clay base at 24 cm.
Tr3 Sq3	30	Dark brown humic layer to 4 cm. Light brown leached loam to 20 cm then decomposed conglomerate overlying clay base at 30 cm.
Tr3 Sq4	29	Dark brown humic layer to 3 cm. Mid-brown leached loam to 7 cm then a thick layer of decomposed conglomerate to 29 cm. Yellow clay base.
Tr3 Sq5	18	Dark brown humic layer to 5 cm. Light brown leached loam to 18 cm then decomposed conglomerate overlying clay base.
Tr3 Sq6	19	Dark brown humic layer to 5 cm. Light brown leached loam to 19 cm then decomposed conglomerate overlying clay base.
Tr4 Sq1	29	Dark brown humic layer to 7 cm. Mid-brown, fine loam to 20 cm. 20 cm+ comprised of decomposed conglomerate. Excavation ceased at 29 cm.
Tr4 Sq2	22	Dark brown humic layer to 7cm. Mid-brown, fine loam to 20cm. 20cm+ comprised of decomposed conglomerate. Excavation ceased at 22cm.
Tr4 Sq3	27	Dark brown humic layer to 5 cm. Dark brown loam up to 15 cm, then light brown leached loam to 27 cm. Decomposed conglomerate at 27 cm+.
Tr4 Sq4	16	Dark brown humic layer to 3 cm then mid-brown loam to 16 cm. Decomposed conglomerate from 16 cm.
Tr4 Sq5	10	Dark brown humic layer to 4 cm then mid-brown loam to 10 cm. Decomposed conglomerate from 10 cm.
Tr4 Sq6	20	Dark brown humic layer to 5 cm then mid-brown loam to 20 cm. Decomposed conglomerate from 20 cm.



Figure 6-29. Test excavation Area 2. Stratigraphy.

Area 3

Squares within Tr1 and Tr2 at Area 3 were excavated in 10 cm spits. **Table 6-8** provides detail on the soil profiles at Area 3 and **Figure 6-30** shows a sample of excavated soil profiles from Tr1 and Tr2 at Area 1.

No archaeological stratigraphy or features were noted in any of the excavation squares. Generally, the A1-Horizon at Tr1 was non-existent, except for Sq3 and Sq6 which retained 3 cm and 6 cm of humic topsoil, respectively. Sq3 and Sq6 also recorded the deepest layer of A2-Horizon soil reaching depths up to 13 cm. All other pits across Tr1 possessed very thin A2-Horizons (<5 cm). As such, it can be concluded that the area along the terrace has been subject to high levels of erosion.

Soil depth across Tr2 was deeper than Tr1 and therefore this area has been subject to lower levels of erosion, with basal clay encountered between 12 and 20 cm. Squares recorded up to 5 cm of humic topsoil, on top of a mid-brown silt and followed by mid to dark brown clay.

At Area 3, most artefacts were recorded in spit 1 (0–10 cm; 60 per cent) with 40 per cent recorded in spit 2 (10–20 cm). Artefacts were recorded at both transects, however, 80 per cent were recorded at Tr2.

Transect/Square	Total depth of square (cm)	Soil profile description
Tr1 Sq1	5	Mid-brown silt to 5 cm then hard mid to dark brown clay base.
Tr1 Sq2	1	Very thin mid-brown silt layer overlying hard mid to dark brown clay base.
Tr1 Sq3	13	3 cm humic topsoil, then mid-brown silt to 13 cm overlying hard mid-brown clay base.
Tr1 Sq4	3	Mid-brown silt to 3 cm then hard mid-brown clay base.
Tr1 Sq5	2	Very thin mid-brown silt to 2 cm then hard mid-brown clay base.
Tr1 Sq6	10	5 cm humic topsoil, then mid-brown silt to 10 cm overlying hard mid-brown clay base.
Tr2 Sq1	12	2 cm humic topsoil, then mid-brown silt to 12 cm overlying hard mid-brown clay base.
Tr2 Sq2	20	4 cm humic topsoil, then mid-brown silty clay to 13 cm with some clay nodules and a higher clay content, overlying hard mid-brown clay base.
Tr2 Sq3	14	5 cm humic topsoil, then mid-brown silty clay to 10 cm, becoming more compact with depth, overlying hard mid to dark brown clay base.
Tr2 Sq4	14	3 cm humic topsoil, then mid-brown silty clay to 14 cm overlying hard mid-brown clay base.
Tr2 Sq5	15	3 cm humic topsoil, then mid-brown silty clay to 15 cm, becoming more compact with depth, overlying hard mid-brown clay base.
Tr2 Sq6	13	3 cm humic topsoil, then mid-brown silty clay to 13 cm overlying hard mid to dark brown clay base.

Table	6-8.	Area	3:	Excavation	log.
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Figure 6-30. Test excavation Area 3. Stratigraphy.



<u>Area 4</u>

Squares within Tr1 to Tr5 at Area 4 were excavated in 10 cm spits. **Table 6-9** provides detail on the soil profiles at Area 4 and **Figure 6-31** shows a sample of excavated soil profiles from Tr1 and Tr5 at Area 4.

Area 4 demonstrated, in general, hard-packed soils indicating past stripping of topsoils and redeposition. Tr1 to Tr 3 were excavated to basal clay, however, due to the nature of the soils, becoming more compact with depth and therefore being difficult to excavate, Tr4 and Tr5 squares were not excavated to clay.

Tr4 and Tr5 demonstrated that the alluviums at the confluence of Bowmans and Yorks Creeks, and along the edge of Bowmans Creek, are deep (excavation stopped at 55 cm at Tr4 Sq2). The transects at Area 4 that were placed closer to the erosion edge of Yorks Creek at the confluence showed that soil depths were shallower, all reaching clay at 46 cm or less.

The highest density of artefacts at Area 4 were recorded in spit 2 (10–20 cm; 68 per cent) (**Figure 6-32**). The second highest density of artefacts were recorded in spit 3 (20–30 cm; 16 per cent), although this density was substantially lower than that of spit 2. Five artefacts were recorded in spit 1 (0–10 cm) and two in spit 4 (30–40 cm), and one artefact was recorded in spit 5 (40–50 cm). The greatest concentration of artefacts within a single square at Area 4 was Tr5 Sq1 with 14 artefacts. Of the 14 artefacts, one was in spit 1 (0-10 cm) and the remaining 13 were in spit 2 (10-20 cm). The second highest concentration of artefacts was recorded at Tr4 Sq4 with 11 artefacts. Similarly, with Tr5 Sq1, most artefacts were in spit 2 (10–20 cm) (n=9) and two were recorded in spit 1 (0–10 cm).

Transect/Square	Total depth of square (cm)	Soil profile description
Tr1 Sq1	30	3 cm mid-brown humic layer. Mid-brown silt to 30 cm overlying compacted orange/brown clay base.
Tr1 Sq2	31	5 cm mid-brown humic layer. Mid-brown silt to 31 cm overlying compacted orange/brown clay base.
Tr1 Sq3	33	3 cm mid-brown humic layer. Mid-brown silt to 33 cm overlying compacted orange/brown clay base.
Tr1 Sq4	33	3 cm mid-brown humic layer. Mid-brown silt to 33 cm overlying compacted orange/brown clay base.
Tr1 Sq5	32	3 cm mid-brown humic layer. Mid-brown silt to 32 cm overlying compacted orange/brown clay base.
Tr1 Sq6	34	4 cm mid-brown humic layer. Mid-brown silt to 34 cm overlying compacted orange/brown clay base.
Tr2 Sq1	12	3 cm mid-brown humic layer. Mid-brown silt with some clay inclusions to 12 cm overlying compacted orange/brown clay base.
Tr2 Sq2	15	3 cm mid-brown humic layer. Mid-brown silt with some clay inclusions to 15 cm overlying compacted orange/brown clay base.
Tr2 Sq3	17	17 cm mid-brown humic layer. Mid-brown silt with some clay inclusions and charcoal flecks to 20 cm overlying compacted orange/brown clay base.
Tr2 Sq4	10	4 cm mid-brown humic layer. Mid-brown silt with some clay inclusions to 10 cm overlying compacted orange/brown clay base.
Tr2 Sq5	20	2 cm mid-brown humic layer. Mid-brown silt with some clay inclusions to 20 cm overlying compacted orange/brown clay base.
Tr2 Sq6	18	3 cm mid-brown humic layer. Mid-brown silt with some clay inclusions to 18 cm overlying compacted orange/brown clay base.
Tr3 Sq1	15	3 cm mid-brown humic layer. Mid-brown sandy silt becoming more compacted with depth overlying compacted orange/brown clay base.
Tr3 Sq2	38	4 cm mid-brown humic layer. Mid-brown sandy silt becoming more compacted with depth overlying compacted orange/brown clay base.
Tr3 Sq3	47	3 cm mid-brown humic layer. Mid-brown sandy silt becoming more compacted with depth overlying compacted orange/brown clay base.

Table 6-9. Area 4: Excavation log.

Transect/Square	Total depth of square (cm)	Soil profile description
Tr3 Sq4	42	3 cm mid-brown humic layer. Mid-brown sandy silt becoming more compacted with depth overlying compacted orange/brown clay base.
Tr3 Sq5	45	4 cm mid-brown humic layer. Mid-brown sandy silt becoming more compacted with depth overlying compacted orange/brown clay base.
Tr3 Sq6	46	4 cm mid-brown humic layer. Mid-brown sandy silt becoming more compacted with depth overlying compacted orange/brown clay base.
Tr4 Sq1	49	4 cm mid-brown humic layer. Mid-brown sandy silt becoming more compacted with depth to 20 cm. Light brown silty sand with gravels from 40 cm. Not excavated to basal clay.
Tr4 Sq2	55	4 cm mid-brown humic layer. Mid-brown sandy silt becoming more compacted with depth to 22 cm. Light brown silty sand with gravels from 45 cm. Not excavated to basal clay.
Tr4 Sq3	50	5 cm mid-brown humic layer. Mid-brown sandy silt becoming more compacted with depth to 26 cm. Light brown silty sand with gravels from 50 cm. Not excavated to basal clay.
Tr4 Sq4	44	4 cm mid-brown humic layer. Mid-brown sandy silt becoming more compacted with depth to 18 cm. Light brown silty sand from 18 cm to 44 cm. Not excavated to basal clay.
Tr4 Sq5	47	3 cm mid-brown humic layer. Mid-brown sandy silt becoming more compacted with depth to 20 cm. Light brown silty sand with gravels from 49 cm. Not excavated to basal clay.
Tr4 Sq6	50	4 cm mid-brown humic layer. Mid-brown sandy silt becoming more compacted with depth to 18 cm. Light brown silty sand with gravels from 40 cm. Not excavated to basal clay.
Tr4 Sq7	48	5 cm mid-brown humic layer. Mid-brown sandy silt becoming more compacted with depth to 28 cm. Light brown sandy silt with small gravels. Not excavated to basal clay.
Tr4 Sq8	48	5 cm mid-brown humic layer. Mid-brown sandy silt becoming more compacted with depth to 28 cm. Light brown sandy silt with small gravels to 48 cm. Not excavated to basal clay.
Tr4 Sq9	47	4 cm mid-brown humic layer. Mid-brown sandy silt becoming more compacted with depth to 27 cm. Light brown sandy silt with small gravels to 37 cm. Not excavated to basal clay.
Tr5 Sq1	43	4 cm mid-brown humic layer. Mid-brown sandy silt becoming more compacted with depth to 43 cm. Not excavated to basal clay.
Tr5 Sq2	42	4 cm mid-brown humic layer. Mid-brown sandy silt becoming more compacted with depth to 42 cm. Not excavated to basal clay.
Tr5 Sq3	49	3 cm mid-brown humic layer. Mid-brown sandy silt becoming more compacted with depth to 49 cm. Not excavated to basal clay.
Tr5 Sq4	45	4 cm mid-brown humic layer. Mid-brown sandy silt becoming more compacted with depth to 45 cm. Not excavated to basal clay.
Tr5 Sq5	42	4 cm mid-brown humic layer. Mid-brown sandy silt becoming more compacted with depth to 42 cm. Not excavated to basal clay.
Tr5 Sq6	48	3 cm mid-brown humic layer. Mid-brown sandy silt becoming more compacted with depth to 48 cm. Not excavated to basal clay.
Tr5 Sq7	40	6 cm mid-brown humic layer. Mid-brown sandy silt becoming more compacted with depth to 40 cm. Moderate gravels between 24 cm to 40 cm Not excavated to basal clay.
Tr5 Sq8	40	5 cm mid-brown humic layer. Mid-brown sandy silt becoming more compacted with depth to 40 cm. Moderate gravels between 28 cm to 40 cm Not excavated to basal clay.
Tr5 Sq9	35	5 cm mid-brown humic layer. Mid-brown sandy silt becoming more compacted with depth to 35 cm. Not excavated to basal clay.



Figure 6-31. Test excavation Area 4. Stratigraphy.



Figure 6-32. Test excavation Area 4. Vertical artefact distribution.

<u>Area 5</u>

Squares within Tr1 at Area 5 were excavated in 5 cm spits. **Table 6-10** provides detail on the soil profiles at Area 5 and **Figure 6-33** shows a sample of excavated soil profiles from Tr1 at Area 5.

Tr1 Sq4 was the only excavation square that possessed any topsoil (4 cm). Despite the lack of topsoils across the remaining three squares, all excavation squares contained the same subsoil soil profiles. This included a light brown, leached loam extending down to a very light brown, leached loam. A notable difference was the two more western squares (Sq1 and 2) were only 15–16 cm deep and contained an orange/brown clay base, while the eastern squares (Sq3 and 4) were 10 cm deeper at 25 cm and contained a more yellow clay base.

No artefacts were recorded at Area 5, so these soil profiles have no association with recorded artefacts.

Transect/Square	Total depth of square (cm)	Soil profile description
Tr1 Sq1	16	Light brown loam to 4 cm then very light brown leached loam to 16 cm overlying orange/brown clay.
Tr1 Sq2	15	Light brown loam to 4 cm then very light brown leached loam to 15 cm overlying orange/brown clay.
Tr1 Sq3	25	Light brown loam to 13 cm then very light brown leached loam to 25 cm overlying yellowish clay.
Tr1 Sq4	25	4 cm humic topsoil above light brown loam to 15 cm then very light brown leached loam to 25 cm overlying yellowish clay.

Table	6-10	Area	5.	Excav	ation	loa
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Figure 6-33. Test excavation Area 5. Stratigraphy.

<u>Area 6</u>

Squares within Tr1 at Area 6 were excavated in 5 cm spits. **Table 6-11** provides detail on the soil profiles at Area 4 and **Figure 6-34** shows a sample of excavated soil profiles from Tr1 at Area 6.

Area 6, as well as Area 5, demonstrated more evidence of leaching and re-deposition of soils when compared to all other excavated areas. Soil depth and profiles were consistent across Tr1 exhibiting 5–8 cm of topsoil then a light brown leached loam above a dark prismatic clay. Clay was encountered across the squares at either 18 or 20 cm deep.

Artefacts were recorded in all spits and squares at Area 6. More specifically, this included: a broken silcrete blade in Sq1 spit 3 (10–15 cm); a broken mudstone flake in Sq2 spit 4 (15–20 cm); a broken mudstone flake in Sq3 spit (0–5 cm); and a broken silcrete flake in Sq4 spit 2 (5–10 cm).

Transect/Square	Total depth of square (cm)	Soil profile description
Tr1 Sq1	20	Dark brown topsoil to 5 cm, then light brown leached loam (hard-packed) down to 15 cm overlying a dark hard-packed prismatic clay/loam.
Tr1 Sq2	18	Dark brown topsoil to 5 cm, then friable leached loam to 18 cm above a dark, prismatic clay.
Tr1 Sq3	18	Dark brown topsoil to 5 cm, then friable leached loam to 18 cm above a dark, prismatic clay.
Tr1 Sq4	20	Dark brown loam to 8 cm, then light brown leached loam to 20 cm above a dark, clay.

Table 6-11. Area 6: Excavation log.



Figure 6-34. Test excavation Area 6. Stratigraphy.

<u>Area 7</u>

Squares within Tr1 and Tr2 at Area 7 were excavated in 10 cm spits. **Table 6-12** provides detail on the soil profiles at Area 7 and **Figure 6-35** shows a sample of excavated soil profiles from Tr1 and Tr2 at Area 7.

Soils profiles were consistent across both Tr1 and Tr2. This comprised dark brown, humic topsoil between 2 and 4 cm, overlying a mid-brown, clay loam with variable depths. Friable mid-brown, clay loam clay was encountered between 10 and 28 cm. Despite evidence of large amounts of disturbance across the terrace in which Tr1 was located from the construction of a dwelling and surrounding farm infrastructure, no disturbances were identified within any of the squares. Charcoal was entirely absent from the deposits and bioturbation was low apart from plant roots in the upper layers.

The depth at which artefacts were recorded at Area 7 Tr2 varied between spit 1 (0–10 cm) to spit 3 (20–30 cm). One artefact, a mudstone flaked piece, was recorded in spit 1 of Sq3. Four artefacts were recorded in spit 2 across two squares (Sq3 and Sq4) and two artefacts were recorded in spit 3 across two squares (Sq1 and Sq2). No artefacts were recorded within Tr1.

Transect/Square	Total depth of square (cm)	Soil profile description
Tr1 Sq1	18	Dark drown humic topsoil to 4 cm above mid-brown clay loam to 18 cm. Friable mid- brown clay loam clay.
Tr1 Sq2	10	Dark drown humic topsoil to 2 cm above mid-brown clay loam to 6 cm. Friable mid- brown clay loam clay.
Tr1 Sq3	20	Dark drown humic topsoil to 4 cm above mid-brown clay loam to 20 cm. Friable mid- brown clay loam clay.
Tr1 Sq4	15	Dark drown humic topsoil to 3 cm above mid-brown clay loam to 15 cm. Friable mid- brown clay loam clay.

Transect/Square	Total depth of square (cm)	Soil profile description
Tr1 Sq5	20	Dark drown humic topsoil to 5 cm above mid-brown clay loam to 20 cm. Friable mid- brown clay loam clay.
Tr1 Sq6	20	Dark drown humic topsoil to 5 cm above mid-brown clay loam to 20 cm. Friable mid- brown clay loam clay.
Tr2 Sq1	25	Dark drown humic topsoil to 3 cm above mid-brown clay loam to 15 cm. Friable mid- brown clay loam to 25 cm.
Tr2 Sq2	22	Dark drown humic topsoil to 5 cm above mid-brown clay loam to 17 cm. Friable mid- brown clay loam clay.
Tr2 Sq3	20	Dark drown humic topsoil to 4 cm above mid-brown clay loam to 18 cm. Friable mid- brown clay loam clay.
Tr2 Sq4	18	Dark drown humic topsoil to 4 cm above mid-brown clay loam to 18 cm. Friable mid- brown clay loam clay.
Tr2 Sq5	20	Dark drown humic topsoil to 5 cm above mid-brown clay loam to 20 cm. Friable mid- brown clay loam clay.
Tr2 Sq6	15	Dark drown humic topsoil to 5 cm above mid-brown clay loam to 15 cm. Friable mid- brown clay loam clay.

Figure 6-35. Test excavation Area 7. Stratigraphy.



<u>Area 8</u>

Squares within Tr1 at Area 8 were excavated in 10 cm spits. **Table 6-13** provides detail on the soil profiles at Area 8 and **Figure 6-36** shows a sample of excavated soil profiles from Tr1 at Area 8.

The squares excavated at Area 8 showed very little in the way of a soil profile and almost all consisted of a mid-brown, loam light extending down to basal clays. Apart from a very thin (<6 cm) humic layer, there was very little to distinguish the soils until clay was reached. The major difference between the squares was a gravel layer over the clay within the western squares in the transect.

The only artefact recorded at Area 8, a mudstone flaked piece, was in spit 1 (0–10 cm) of Sq6.

Transect/Square	Total depth of square (cm)	Soil profile description
Tr1 Sq1	20	Dark brown humic topsoil to 4 cm, then mid-brown loam to 13 cm overlying a yellowish clay at 20 cm.
Tr1 Sq2	26	Dark brown humic topsoil to 4 cm, then mid-brown loam to 26 cm overlying a yellowish clay base.
Tr1 Sq3	28	Dark brown humic topsoil to 4 cm, then mid-brown loam to 18 cm overlying a gravel base and yellowish clay at 28 cm.
Tr1 Sq4	30	Dark brown humic topsoil to 4 cm, then mid-brown loam to 25 cm overlying a gravel base and yellowish clay at 30 cm.
Tr1 Sq5	30	Dark brown humic topsoil to 6 cm, then mid-brown loam to 15 cm overlying a gravel base and yellowish clay at 30 cm.
Tr1 Sq6	20	Dark brown humic topsoil to 4 cm, then mid-brown loam to 13 cm overlying a gravel base and yellowish clay at 20 cm.

Table 6-13. Area 8: Excavation log.

Figure 6-36. Test excavation Area 8. Stratigraphy.



Area 9

Squares within Tr1 at Area 9 were excavated in 10 cm spits. **Table 6-14** provides detail on the soil profiles at Area 9 and **Figure 6-37** shows a sample of excavated soil profiles from Tr1 at Area 9.

The soils were predominantly shallow and sandy with evidence of active erosion and alluvial origins. The squares presented two distinct A2-Horizons below a thin A1-Horizon. The topmost layer is a mid-brown, sandy loam extending down approximately 20 cm before a light brown layer is reached that extends for approximately 5 cm to B-Horizon clays. This pattern was consistent in the all excavation squares, however Sq2 was particularly deep compared to all other squares at 40 cm.

The only artefact recorded at Area 9, a complete mudstone flake, was located within spit 2 (10–20 cm) of Sq5.

Transect/Square	Total depth of square (cm)	Soil profile description
Tr1 Sq1	26	Dark brown humic topsoil to 5 cm, then mid-brown sandy loam to 20 cm. Light brown sandy loam present between 20 cm and 26 cm where the orange clay base is present.
Tr1 Sq2	40	Dark brown humic topsoil to 5 cm, then mid-brown sandy loam to 18cm. Light brown sandy loam present between 18 cm and 40 cm where the orange clay base is present.
Tr1 Sq3	30	Dark brown humic topsoil to 5 cm, then mid-brown sandy loam to 22 cm. Light brown sandy loam present between 22cm and 30 cm where the orange clay base is present.
Tr1 Sq4	28	Dark brown humic topsoil to 5 cm, then mid-brown sandy loam to 22 cm. Light brown sandy loam down to 28 cm overlying an orange clay base.
Tr1 Sq5	20	Dark brown humic topsoil to 5 cm, then mid-brown sandy loam to 15 cm. Light brown sandy loam down to 20 cm overlying an orange clay base.
Tr1 Sq6	20	Dark brown humic topsoil to 4 cm, then mid-brown sandy loam to 18 cm. Light brown sandy loam present between 18 cm and 20 cm where the orange clay base is present.

Table 6-14. Area 9: Excavation log.

Figure 6-37. Test excavation Area 9. Stratigraphy.



<u>Area 10</u>

Squares within Tr1 at Area 10 were excavated in 10 cm spits. **Table 6-15** provides detail on the soil profiles at Area 10 and **Figure 6-38** shows a sample of excavated soil profiles from Tr1 at Area 10.

At Area 10, a typical profile was for a 4 to 5 cm mid-brown, humic layer of topsoil then a light brown, sandy loam down to between 10 and 14 cm and then a mid-brown loamy clay overlying an orange clay base.

In general, soil depths were shallow across Area 10 with only one excavation square extending beyond 20 cm. While there was some variation in the colouring of the soil with some areas retaining more humic matter (making the soils darker), the same general sequence of soils was observed: namely, very thin A1-Horizon (often only extending to the depth of grass roots), a relatively thin A2-Horizon (sometimes containing gravels) and a consistent, culturally sterile B-Horizon clay.

All three artefacts recovered during excavations at Area 10 were recorded in spit 2 (10–20 cm). Two artefacts were recorded in Sq 2 and the remainder in Sq5.

Transect/Square	Total depth of square (cm)	Soil profile description
Tr1 Sq1	20	Mid-brown humic topsoil to 5 cm. Light brown sandy loam to 12 cm then loamy clay to 20 cm overlying orange clay base.
Tr1 Sq2	16	Mid-brown humic topsoil to 4 cm. Light brown sandy loam to 10 cm then loamy clay to 16 cm overlying orange clay base.
Tr1 Sq3	17	Mid-brown humic topsoil to 4 cm. Light brown sandy loam to 11 cm then loamy clay to 17 cm overlying orange clay base.
Tr1 Sq4	18	Mid-brown humic topsoil to 5 cm. Light brown sandy loam to 10 cm then loamy clay with some gravels to 18 cm overlying orange clay base.
Tr1 Sq5	20	Mid-brown humic topsoil to 4 cm. Light brown sandy loam to 14 cm then loamy clay with some gravels to 20 cm overlying orange clay base.
Tr1 Sq6	24	Mid-brown humic topsoil to 5 cm. Light brown sandy loam to 11 cm then loamy clay with some gravels to 24 cm overlying orange clay base.

Table 6-15. Area 10: Excavation log.

Figure 6-38. Test excavation Area 10. Stratigraphy.



<u>Area 11</u>

Squares within Tr1 at Area 11 were excavated in 10 cm spits. **Table 6-16** provides detail on the soil profiles at Area 11 and **Figure 6-39** shows a sample of excavated soil profiles from Tr1 at Area 11.

The excavated area at Area 11 is located on the eastern bank of Yorks Creek. The creek at this location has wide in-stream erosion and a deflated soil profile, although much of this area has revegetated. All excavation took place beyond the current erosion edge within the grassed and more level area to the east, on either side of an ephemeral drainage line/gully.

As shown in **Table 6-16**, most of the squares comprised mid-brown, silty loam before extending to basal clay. Most squares comprised dark brown topsoil (0–8 cm), then mid-brown loam above an orange clay base. Soils were relatively thin in this area (generally <17 cm), except for Sq3 which

reached a depth of 25 cm. Soils are likely thinner closer to the erosion edge where erosion has the stripped top soil. This is particularly case for Sq2 and Sq5 which retained no topsoil.

The only artefact recorded at Area 11, a broken silcrete flake, was in spit 1 (0–10 cm) of Sq4.

Transect/Square	Total depth of square (cm)	Soil profile description
Tr1 Sq1	17	Dark brown loam to 8 cm above mid-brown loam to 17 cm. Clay base at 17 cm.
Tr1 Sq2	10	Mid-brown loam to 10 cm overlying orange clay base.
Tr1 Sq3	25	Dark brown humic topsoil to 5 cm above mid-brown loam to 25 cm. Orange clay base at 25 cm.
Tr1 Sq4	12	Dark brown humic topsoil to 4 cm above mid-brown loam to 12 cm. Orange clay base at 12 cm.
Tr1 Sq5	7	Mid-brown loam to 7 cm overlying orange clay base.
Tr1 Sq6	15	Dark brown humic topsoil to 4 cm above mid-brown loam to 15 cm. Orange clay base at 15 cm.

Table 6-16. Area 11: Excavation log.

Figure 6-39. Test excavation Area 11. Stratigraphy.



<u>Area 12</u>

Squares within Tr1 at Area 12 were excavated in 10 cm spits. **Table 6-17** provides detail on the soil profiles at Area 12 and **Figure 6-40** shows a sample of excavated soil profiles from Tr1 at Area 12.

In general, most squares had a thin organic layer (4–5 cm) overlying a fine, light-brown alluvial loam. Basal clay (B-Horizon) was encountered at 20 cm depth on average. The two shallower squares (Sq1 and Sq15) retained no topsoil. Non-Aboriginal disturbances were evident within Sq6, which recovered a number of historic items including broken pieces of glass, ceramic and metal⁹. Due to the presence of the items, this square was not excavated down to basal clay.

Of the six artefacts recovered during excavations at Area 12, 83 per cent (n=5) were recorded within Sq2, two in spit 1 (0–10 cm) and three in spit 3 (10–20 cm). The remaining artefact was recorded in spit 1 (0–10 cm) of Sq5.

Transect/Square	Total depth of square (cm)	Soil profile description
Tr1 Sq1	19	Light brown loam (alluvium?) then orange clay at 19 cm.
Tr1 Sq2	28	Dark brown humic topsoil to 4 cm, then light brown loam (alluvium?) to 28 cm above. Orange clay at base.
Tr1 Sq3	23	Light brown loam (alluvium?) then orange clay at 23 cm.
Tr1 Sq4	20	Dark brown humic topsoil to 5 cm, then light brown loam (alluvium?) to 20 cm. Orange clay at base.
Tr1 Sq5	15	Dark brown humic topsoil to 5 cm, then light brown loam (alluvium?) to 19 cm. Orange clay at base.
Tr1 Sq6	20	Dark brown humic topsoil to 4 cm, then light brown loam (alluvium?) to 20 cm. Excavation stopped once non-Aboriginal items recovered at 20+ cm.

Table 6-17. Area 12: Excavation log.

Figure 6-40. Test excavation Area 12. Stratigraphy.



 $^{^{\}rm 9}$ All historic heritage items were passed on to Casey & Lowe.

6.4.2.2 Artefact distribution

Horizontal Distribution

There was no notable distribution pattern to the recorded artefacts.

Of the 180 artefacts recorded, the highest number of artefacts in one excavation square was 17 in both Tr5 Sq1 and Tr5 Sq5 at Area 1. The next highest numbers of artefacts in one excavation square was 14 at Area 4 Tr5 Sq1; 11 at Area 4 Tr4 Sq4 and 11 at Area 1 Tr5 Sq3.

Across the 12 areas excavated during the test excavation program, Tr5 at Area 1 recorded the highest number of artefacts (n=53 or 29 per cent of the overall artefact assemblage). While three squares at Tr5 recorded over 10 artefacts, no additional squares were excavated as the initial six squares confirmed that artefacts were relatively consistently present at the southern extent on the spur landform.

At two small clusters at Area 4, an additional three excavation squares were excavated in different directions spaced 5 m from Tr4 Sq4 and Tr5 Sq1 to determine whether they were part of a more extensive artefact scatter. One square (Sq8) surrounding Tr4 Sq4, recorded three artefacts while the other two squares (Sq7 and Sq9) recorded no artefacts. Similarly, at Tr5 Sq1, only one square (Sq9) located 5 m to the northwest recorded five artefacts, while Sq7 and Sq8 recorded no artefacts. Based on these results, it can be concluded that the density of artefacts at these two locations is isolated and not part of an extensive artefact scatter.

Vertical Distribution

Of those excavation squares containing artefacts, over half (58 per cent) came from spit 2 (10–20 cm). The second highest proportion of artefacts came from the top-most 10 cm of deposits (spit 1) with very few being recorded at depths greater than 20 cm (<10 per cent) (**Figure 6-41**). Two artefacts were recorded between 30–40 cm (spit 4) and only one artefact was recorded in spit 5 (40– 50 cm). There is little differentiation between spits 1 and 2 (0–20 cm) and the only conclusion that can be drawn from this vertical distribution is that artefacts, at the areas investigated, are located closer to the surface.



Figure 6-41. Test excavation. Vertical distribution of artefacts.

6.4.2.3 Artefact types

The most-numerous artefact type within the assemblage is the unmodified flake which accounted for 76 per cent of all artefacts recorded (**Figure 6-42**). The second most-numerous artefact type is 'shatter' defined as chips, chunks, and other undiagnostic pieces of raw material (nine per cent). Blades (eight per cent) are the only other sizeable category, with backed blades (two per cent), flaked pieces (defined as flakes which, in turn, have had flakes struck from them) (two per cent), cores (one per cent), microliths (0.5 per cent), side scrapers (0.5 per cent) and anvils/hammerstones (0.5 per cent) making up the remainder of the artefact assemblage.



Figure 6-42. Test excavation. Artefact type.

6.4.2.4 Raw materials

Most recorded artefacts come from either mudstone or silcrete sources. 49 per cent of artefacts were silcrete and 42 per cent were mudstone with negligible numbers from quartz, volcanic sources, quartzite, petrified wood, chert and 'other' materials (**Figure 6-43**). The 'other' materials recorded include chalcedony and porcellanite.



Figure 6-43. Test excavation. Artefact raw materials.

6.4.2.5 Artefact size

The most numerous size category of recorded artefacts is category 2 (10–20 mm) with 50.5 per cent of all artefacts (**Figure 6-44**). 24 per cent are size category 3 (20–30 mm), 13 per cent are size category 1 (0–10 mm), 11 per cent are size category 4 (30–50 mm), and less than two per cent are larger than 50 mm.



Figure 6-44. Test excavation. Artefact size.

6.4.2.6 Reduction Stage

80 per cent of all artefacts were at a tertiary stage of reduction and were without any cortex, 17 per cent were at a secondary stage of reduction and had between 1 and 50 per cent cortex and three per cent were at a primary stage of reduction with over 50 per cent of the artefact surface being cortex (**Figure 6-45**).





6.4.2.7 Integrity

Of the 160 artefacts where integrity was recorded, 89 artefacts or 56 per cent of artefacts were complete (**Figure 6-46**). Of the broken flakes (44 per cent of the artefacts in which integrity was recorded), the most were recorded as having lost the proximal section of the flake (distal fragment: 22.5 per cent), followed by flakes with the distal portion missing (proximal fragment: 13.75 per cent), flakes with both the proximal and distal portions missing (medial fragments: 6.25 per cent) and flakes broken down the axis of percussion (longitudinal breaks: 1.5 per cent).



Figure 6-46. Test excavation. Artefact integrity.

6.4.2.8 Artefact Assemblage: Area by Area

<u>Area 1</u>

93 artefacts were recorded at Area 1 with artefacts being recorded at all transects (**Figure 6-47**). The greatest concentration was from Tr5 Sq1 and Sq5 with 17 artefacts each. The most common artefact type was unmodified flakes (n=78) (**Figure 6-48**). Other artefact types were recorded in much smaller proportions including blades, shatter and flaked pieces. Four retouched artefacts were recorded, including three backed blades and one side scraper. The side scraper and one backed blade displayed steep and invasive retouch, while the remaining two backed blades have semi-steep and fine retouch. Mudstone was the most common raw material (n=50), followed by silcrete (n=34) and small amounts of quartz, quartzite, chert, and chalcedony (**Figure 6-48** and **Figure 6-49**). Of the 85 artefacts where integrity was recorded (i.e. excluding flaked pieces/shatter), 58 are complete and the remaining 27 are broken in some form, predominately distal fragments that have the proximal portion of the flake/blade missing.



Figure 6-47. Test excavation. Area 1 artefact types.

Figure 6-48. Test excavation. Area 1 Artefact raw material.





Figure 6-49. Test Excavation. Area 1 artefacts.



<u>Area 2</u>

No Aboriginal artefacts were recorded at Area 2. Some insignificant historic items (glass and ceramic fragments) were excavated, and these were passed on to Casey & Lowe for analysis (Casey and Lowe 2019: Section 3.9.1).

Area 3

Ten artefacts were recorded at Area 3; nine being unmodified flakes and the remaining being an unmodified blade (**Figure 6-50**). Silcrete and porcellanite were the most common materials (n=4 each) with two manufactured from mudstone. All artefacts were at a tertiary stage of reduction.



Figure 6-50. Test excavation. Area 3 artefacts.

<u>Area 4</u>

54 artefacts were recorded at Area 4 with the highest numbers of artefacts being recorded in Tr4 Sq4 (n=11) and Tr5 Sq1 (n=14). Across Area 4, 38 artefacts (70 per cent) of all artefacts were

silcrete with only 14 mudstone artefacts recorded and one each of quartz and volcanic sources (**Figure 6-51**). Of the 44 artefacts for which integrity was recorded, 18 were recorded as complete with the remainder (59 per cent) displaying a breakage of some sort: an equal number (n=11) are recorded as distal fragments, with 11 also recorded as proximal fragments.

Flakes were the most-common artefact type (**Figure 6-52**; n=26) and Area 4 recorded a high proportion of blades (n=9) and shatter (n=10). Compared with other test excavation areas, cores were more frequently recorded (n=2). One backed blade and one microlith was recorded (**Figure 6-53**). One anvil/hammerstone was also recorded in the same square and spit as a mudstone core (Tr1 Sq6 spit 3) (**Figure 6-53**).

Two cores were recorded. One was from silcrete and the other, mudstone, and both are multidirectional. Both cores had low portions of cortex remaining (less than 20 per cent).

The recorded silcrete backed blade was recorded as having steep and invasive retouch; and the silcrete microlith with steep and fine retouch.



Figure 6-51. Test excavation. Area 4 artefact raw material.



Figure 6-52. Test excavation. Area 4 artefact types.

Figure 6-53. Test excavation. Area 4 artefacts.







<u>Area 5</u>

No artefacts were recorded at Area 5.

<u>Area 6</u>

Only four artefacts were recorded at Area 6; a broken silcrete blade; two distal fragments of mudstone flakes and a broken silcrete flake (**Figure 6-54**).





<u>Area 7</u>

Seven artefacts were recorded at Area 7; six being unmodified flakes along with one flaked piece. 57 per cent of artefacts were recorded as silcrete, followed by mudstone (29 per cent) and quartz (14 per cent or n=1) (**Figure 6-55**). All but one artefact was at a tertiary stage of reduction, with one flake with up to 50 percent cortex remaining present.



Figure 6-55. Test excavation. Area 7 artefacts.

<u>Area 8</u>

Only one artefact was recorded at Area 8; a mudstone flaked piece (Figure 6-56).



Figure 6-56. Test Excavation. Area 8 artefact.

<u>Area 9</u>

Only one artefact was recorded at Area 9; a complete mudstone flake (Figure 6-57).



Figure 6-57. Test Excavation. Area 9 artefact.

<u>Area 10</u>

Three artefacts were recorded at Area 10; a piece of silcrete shatter; and two complete mudstone flakes (**Figure 6-58**).



Figure 6-58. Test Excavation. Area 10 artefacts.

<u>Area 11</u>

One artefact was recorded at Area 11; a broken silcrete flake (Figure 6-59).



Figure 6-59. Test excavation Area 11 artefacts.

<u>Area 12</u>

Six artefacts were recorded at Area 12; two broken and one complete silcrete flake; one broken and one complete mudstone flake and one complete chert flake (**Figure 6-60**). Some insignificant historic items (broken pieces of glass, ceramic and metal) were also excavated and were passed on to Casey and Lowe (2019) for analysis.



Figure 6-60. Test excavation Area 12 artefacts.



A full artefact catalogue of all test excavation areas is presented in Appendix 6.

6.4.3 Conclusion

The results of the test excavation program have allowed for the classification of areas of subsurface deposits within the areas identified during the survey as having PAD. It has also resulted in the site extent of several sites being increased from the extent initially identified. Each excavation area is discussed below to highlight where the associated site extent of the relevant site has been amended.

Aboriginal Site Impact Recording Forms (ASIRF) have been submitted to AHIMS to update the status of the sites to 'partially destroyed'.

6.4.3.1 Area 1

The test excavation program at Area 1 targeted a broad spur landform adjacent to Bowmans Creek where three Aboriginal sites are located: Glendell North OS5, Glendell North OS6 and Bowmans Ck 7. It also tested a secondary terrace identified as a Glendell North PAD1, to the north of the spur.

Glendell North OS5

12 0.5 m by 0.5 m excavation squares were excavated nearby Glendell North OS5: a total of threesquare metres. From this area of excavation, 13 artefacts were recovered; an average of 4.3 artefacts per square metre. The results of the test excavation program led to the extent of Glendell North OS5 being extended to the southeast. The area of subsurface deposits at Glendell North OS5 measures 75 m x 35 m and excludes the western edge of the spur where the surface artefacts are exposed as there is no A-Horizon soil present (**Figure 6-61**). The site is now 'partially destroyed' but has the potential to contain further subsurface artefacts at a very low density within the area of subsurface deposit highlighted.





Glendell North OS6

Six 0.5 m by 0.5 m excavation squares were excavated nearby Glendell North OS6: a total of 1.5 square metres. From this area of excavation, 53 artefacts were recovered; an average of 35.3 artefacts per square metre. The results of the test excavation program led to the extent of Glendell North OS6 being extended to the northeast. The area of subsurface deposits at Glendell North OS6 measures 75 m x 30 m and excludes the southwestern portion of the overall site extent which has been subject to high levels of erosion and retains no A-Horizon soil (**Figure 6-62**). The site is now 'partially destroyed' but has the potential to contain further subsurface artefacts at a moderate density within the area of subsurface deposit highlighted.



Figure 6-62. Area of subsurface deposit at Glendell North OS6.

Glendell North OS36

Six 0.5 m by 0.5 m excavation squares were excavated at the area identified formerly as Glendell North PAD1: a total of 1.5 square metres. From this area of excavation, three artefacts were recovered; an average of two artefacts per square metre. The results of the test excavation program led to the area of Glendell North PAD1 being re-defined as an artefact site, Glendell North OS36. The area of subsurface deposit at Glendell North OS36 includes the entirety of the site extent, measuring terrace measures 35 m x 30 m (**Figure 6-63**). The site is now 'partially destroyed' but has the potential to contain further subsurface artefacts at a very low density within the site extent.





Bowmans Ck 7

Six 0.5 m by 0.5 m excavation squares were excavated nearby Bowmans Ck 7: a total of 1.5 square metres. From this area of excavation, 24 artefacts were recovered; an average of 16 artefacts per square metre. The presence of subsurface artefacts nearby Bowmans Ck 7 led to the extent of the site being increased to the north and west. The area of subsurface deposits at Bowmans Ck 7 measures 60 m x 40 m and includes the entirety of the site extent (**Figure 6-64**). The site is now 'partially destroyed' but has the potential to contain further subsurface artefacts at a low-moderate density within the site extent.




6.4.3.2 Area 2

Only insignificant historic artefacts were recovered during the test excavation program at Area 2, as such, the area identified as a PAD is now redundant.

6.4.3.3 Area 3

12 0.5 m by 0.5 m excavation squares were excavated at the area surrounding York Creek 4: a total of three-square metres. From this area of excavation, 10 artefacts were recovered; an average of 3.3 artefacts per square metre. The presence of subsurface artefacts nearby York Creek 4 led to the boundary of the site being extended to the west. The area of subsurface deposits at York Creek 4 measures 45 m x 30 m and excludes eastern portions of the site extent which encompass the lower terrace and areas test on the upper terrace where no artefacts were recovered from the excavation squares (**Figure 6-65**). The site is now 'partially destroyed' but has the potential to contain further subsurface artefacts at a low density within the area of subsurface deposit highlighted.





6.4.3.4 Area 4

The test excavation program at Area 4 targeted the confluence of Bowmans and Yorks Creek and focussed on the upper terrace landform. Two previously recorded AHIMS sites, York Creek 7 and Yorks Creek 19 were recorded at Area 4, however, the test excavation resulted in an additional two sites, Glendell North OS34 and OS35 being recorded.

Glendell North OS34

15 0.5 m by 0.5 m excavation squares were at Glendell North OS34: a total of four-square metres. From this area of excavation, 25 artefacts were recovered; an average of 6.25 artefacts per square metre. The area of subsurface deposits at Glendell North OS34 measures 85 m x 40 m and excludes the northern portion of the overall site extent where no artefacts were identified during the subsurface investigations (**Figure 6-66**). The site is now 'partially destroyed' but has the potential to contain further subsurface artefacts at a low density within the area of subsurface deposit highlighted.



Figure 6-66. Area of subsurface deposit at Glendell North OS34.

Glendell North OS35

Nine 0.5 m by 0.5 m excavation squares were excavated at Glendell North OS35: a total of 2.25 square metres. From this area of excavation, 19 artefacts were recovered; an average of 8.4 artefacts per square metre. The area of subsurface deposits at Glendell North OS35 measures 50 m x 30 m and includes the entire site extent (**Figure 6-67**). The site is now 'partially destroyed' but has the potential to contain further subsurface artefacts at a low density within the area of subsurface deposit highlighted.





York Creek 7

Six 0.5 m by 0.5 m excavation squares were excavated at York Creek 7: a total of 1.5 square metres. From this area of excavation, six artefacts were recovered; an average of four artefacts per square metre. The presence of subsurface artefacts nearby York Creek 7 allowed for the designated of the area of subsurface deposit. This area measures 80 m x 45 m and includes the entirety of the site extent (**Figure 6-68**). The site is now 'partially destroyed' but has the potential to contain further subsurface artefacts within the area of subsurface deposit highlighted.



Figure 6-68. Area of subsurface deposit at York Creek 7.

Yorks Creek 19

Six 0.5 m by 0.5 m excavation squares were excavated to the south of York Creek 19: a total of 1.5 square metres. From this area of excavation, four artefacts were recovered; an average of 2.6 artefacts per square metre. The presence of subsurface artefacts nearby York Creek 19 allowed for the designated of the area of subsurface deposit. This area measures 60 m x 30 m and includes the entirety of the site extent (**Figure 6-69**). The site is now 'partially destroyed' but has the potential to contain further subsurface artefacts within the area of subsurface deposit highlighted.



Figure 6-69. Area of subsurface deposit at Yorks Creek 19.

6.4.3.5 Area 5

No artefacts were recovered during the test excavation program at Area 5, as such, the area identified as a PAD is now redundant.

6.4.3.6 Area 6

Four 0.5 m by 0.5 m excavation squares were nearby to Glendell North OS16: a total of one square metre. From this area of excavation, four artefacts were recovered; an average of four artefacts per square metre. The area of subsurface deposits at Glendell North OS16 measures 20 m x 15 m and excludes the northern portion of the overall site extent where surface artefacts are present on B-Horizon soils (**Figure 6-70**). The site is now 'partially destroyed' but has the potential to contain further subsurface artefacts at a very low density within the area of subsurface deposit highlighted.





6.4.3.7 Area 7

12 0.5 m by 0.5 m excavation squares were nearby to Glendell North OS19: a total of three-square metres. From this area of excavation, seven artefacts were recovered; an average of 2.3 artefacts per square metre. The area of subsurface deposits at Glendell North OS19 measures 55 m x 30 m and excludes the eastern portion of the overall site extent where high levels of ground surface disturbance were observed, including the foundations of a house (**Figure 6-71**). The site is now 'partially destroyed' but has the potential to contain further subsurface artefacts at a very low density within the area of subsurface deposit highlighted.





6.4.3.8 Area 8

Six 0.5 m by 0.5 m excavation squares were excavated at G11 Glendell: a total of 1.5 square metres. From this area of excavation, one artefact was recovered; an average of 0.6 artefacts per square metre. The presence of subsurface artefacts nearby G11 Glendell allowed for the designated of the area of subsurface deposit. This area measures 45 m x 20 m and includes the central portion of the site extent (**Figure 6-72**). The site is now 'partially destroyed' but has the potential to contain further subsurface artefacts at a very low density within the area of subsurface deposit highlighted.



Figure 6-72. Area of subsurface deposit at G11 Glendell.

6.4.3.9 Area 9

Six 0.5 m by 0.5 m excavation squares were excavated at the area identified as having PAD at Area 9: a total of 1.5 square metres. From this area of excavation, one artefact was recovered; an average of one artefact per square metre. The results of the test excavation program led to the area of PAD being included as an isolated find, Glendell North IF26. The area of subsurface deposit at Glendell North IF26 is a five-metre radius around the artefact location (**Figure 6-73**). The site is now 'partially destroyed' but with the possibility of further subsurface artefacts at a very low density within site boundary.

It should be noted that the single artefact that prompted the re-designation of the PAD to GN IF26 has been salvaged by the test excavation program and is no longer in the landscape.





6.4.3.10 Area 10

Six 0.5 m by 0.5 m excavation squares were excavated adjacent to Glendell North OS25: a total of 1.5 square metres. From this area of excavation, three artefacts were recovered; an average of two artefacts per square metre. The results of the test excavation program led to the extent of Glendell North OS25 being extended to the east and south. The area of subsurface deposits at Glendell North OS25 measures 35 m x 15 m and excludes the western portion that has been subject to high levels of erosion and retains no A-Horizon soil (**Figure 6-74**). The site is now 'partially destroyed' but has the potential to contain further subsurface artefacts at a very low density within the area of subsurface deposit highlighted.



Figure 6-74. Area of subsurface deposit at Glendell North OS25.

6.4.3.11 Area 11

Six 0.5 m by 0.5 m excavation squares were excavated at York Creek 11: a total of 1.5 square metres. From this area of excavation, one artefact was recovered; an average of 0.6 artefacts per square metre. The area of subsurface deposits at York Creek 11 measures 20 m x 8 m and excludes the northern portion that has been subject where no subsurface artefacts were found. It also excludes the lower terrace landform along the creek line (**Figure 6-75**). The site is now 'partially destroyed' but has the potential to contain further subsurface artefacts at a very low density within the area of subsurface deposit highlighted.



Figure 6-75. Area of subsurface deposit at York Creek 11.

6.4.3.12 Area 12

Six 0.5 m by 0.5 m excavation squares were excavated to the east of York Creek 18: a total of 1.5 square metres. From this area of excavation, six artefacts were recovered; an average of four artefacts per square metre. The results of the test excavation program have led York Creek 18 being re-designated from an isolated find to an artefact scatter. The area of subsurface deposits at York Creek 18 measures 50 m x 25 m and includes the entire site extent (**Figure 6-76**). The site is now 'partially destroyed' but has the potential to contain further subsurface artefacts at a low density within the area of subsurface deposit highlighted.





6.5 HISTORIC HERITAGE ARCHAEOLOGICAL TEST EXCAVATION PROGRAM

Over the course of three weeks, Casey & Lowe completed a historic heritage archaeological test excavation program at select locations within the Additional Disturbance Area with a primary focus around the Ravensworth Homestead (**Figure 6-77**). Prior to the use of the excavator, the OzArk archaeologist and RAPs walked proposed access routes to the trenches to inspect for surface artefacts. The OzArk archaeologist and RAPs also inspected the ground surface of the proposed trenches prior to any ground surface disturbance.

Five additional Aboriginal sites were identified during the historic test excavation program including three isolated finds and two artefact scatters (Glendell North IF27 to IF19 and Glendell North OS37 and 38). All newly recorded sites were managed in accordance with Section 6.2.2 of the MOC ACHMP.



Figure 6-77. Location of historic heritage test excavation areas.

7 DISCUSSION

This section reviews the results of both the survey and test excavation components of the assessment and places the results in the context of previous research that has taken place in the area.

7.1 DISCUSSION OF SURVEY RESULTS

7.1.1 Surface survey summary

The survey recorded 69 sites consisting of 39 artefact scatters, 29 isolated finds and one scarred tree (**Section 5.4**).

In addition, the survey inspected 55 previously recorded sites that are located within or immediately adjacent to the survey area (**Section 5.5**).

Of the 124 sites that are discussed in this assessment, 91 are within or closely adjacent to the Additional Disturbance Area (**Section 8.3**). 52 of these sites are newly recorded and 39 are previously recorded.

Management recommendations for all sites discussed in this assessment are presented in **Section** 9.

7.1.2 Discussion

The review of the landscape and archaeological contexts of the Additional Disturbance Area enabled a predictive model for site location to be made (**Section 4.5**).

This model was based on a large amount of archaeological research that has occurred over 30 years within and adjacent to the Additional Disturbance Area (**Section 4.3** and **4.4**). This research indicated that the landforms of the Additional Disturbance Area would likely contain sites with the following characteristics:

- Sites are commonly open artefact scatters or isolated finds;
- Sites are generally of low density;
- Most sites are situated close to drainage lines;
- Archaeological material is densest within 100 m of a creek edge but continues at a lower density away from a creek;
- The most common raw materials were indurated mudstone and silcrete with smaller quantities of chert, siltstone, quartzite and quartz also identified;
- Flakes and flaked pieces accounted for the bulk of assemblages. Proportions of cores and backed blades are low;
- There is evidence of heat-treated artefacts; and

• Many recorded artefacts are characteristic of Small Tool Tradition (Bondaian) of the late Holocene.

Considering the distribution of sites recorded during the assessment, three factors were previously examined as determinants of site location: proximity to water (**Section 4.5.1**); previous land use as it effects Aboriginal site preservation (**Section 4.5.2**) and landform (**Section 4.5.4**). Each of these will be examined in turn. This analysis will concentrate on the 52 newly recorded sites that are within the Additional Disturbance Area.

Proximity to water

21 (or 39%) of the newly recorded sites are within 100 m of a named waterway, while an additional five sites (10%) are within 50 m of an unnamed drainage line (**Figure 7-1**). Therefore 49% of all newly recorded sites are within what would be regarded as close proximity to waterways. However, when a 200 m buffer is applied to all waterways (major and minor), 41 sites (or 80%) are located within the buffer.

Of the 10 newly recorded sites outside of the 200 m buffer around all waterways, six are isolated finds and the four artefact scatters (GN OS11 [Id 11], OS12 [Id 12], OS15 [Id 15] and OS31 [Id 31]) recorded three, two, six and 15 artefacts respectively. GN OS31 was recorded along an artificial bund created for drainage and therefore is within a highly modified environment where artefacts have been accumulated both by the previous earthworks, as well as by water movement depositing artefacts in the drainage feature. As such, this site is artificial and not a true reflection of a 'site' as such. Therefore, if the results from OS31 are discounted, all sites recorded further than 200 m from a waterway have an extremely low artefact density.

Conversely, two sites that recorded some of the highest artefact densities, GN OS34 (Id 34) and GN OS35 (Id 35) are located at the confluence of Yorks and Bowmans Creeks within 100 m of those waterways. The other site that recorded a high artefact density was GN OS19 (Id 19) that is located on a major terrace that overlooks Bowmans Creek, and while the site is further than 100 m from the creek, it is clearly associated with Bowmans Creek.

These results support the predictive model in that a major determinant for Aboriginal site location in the area is proximity to water.





Historic land uses

An examination of historic land uses within the Additional Disturbance Area supports the observations made in **Section 4.5.2** that the past agricultural use of the area has affected the Aboriginal site patterning seen today. As shown on **Figure 7-2**, the formerly cultivated river flats on the east bank of Bowmans Creek and the west bank of Swamp Creek failed to record any sites. A similar situation was noted in **Section 4.5.2** with regards to previously recorded sites. This would indicate that this long-term disturbance has probably had the effect of removing any evidence of Aboriginal occupation from these areas, had it existed.

Also noticeable on **Figure 7-2** is the paucity of sites in the centre-east of the Additional Disturbance Area. Again, as noted in **Section 4.5.2** with regards to previously recorded sites, this result is probably an interplay between these landforms being distant to water, but also as a product of soil loss from the more-elevated landforms following vegetation clearing.

These results support the predictive model in that historic land uses have a profound effect on the observed distribution of Aboriginal sites. Those landforms in degrading environments fail to record many sites, while landforms in aggrading environments, principally along waterways, may have sites both in their primary context, but also sites in a secondary context following their deposition in these areas by water movement.

Landform

33 sites (62%) are in flat/floodplain landforms, 15 (29%) are located in slope landforms, and four sites are located in ridge landforms (**Figure 7-3**). Of the 19 sites located in slope and ridge landforms, 13 (65%) are isolated finds. If GN OS31 is taken out of the calculations as it is a highly artificial site (see above under 'proximity to water'), the remaining six artefact scatters in slope and ridge landforms have an average artefact density of 3.6 artefacts; a low artefact density.

This result supports the predictive model that assumed most sites would be recorded in flat/floodplain landforms. As noted in **Section 4.5.4**, this is probably because waterways are associated with flat/floodplain landforms and, as noted above, sites are closely associated with waterways. This patterning is also influenced by the fact that historic land use has led to soil loss within slope and ridge landforms thereby removing sites from these locations and potentially depositing artefacts to form new 'sites' in flat/floodplain landforms.









In conclusion, the survey results indicate that the average site in the Additional Disturbance Area will be:

- A low-density artefact scatter of less than 10 artefacts;
- A surface manifestation only without a subsurface component;
- Comprised of unmodified flakes primarily manufactured from mudstone and silcrete sources;
- Located within flat landforms associated with a waterway; and
- Located in an environment displaying considerable disturbance from anthropomorphic or natural agencies.

These results tend to support the view that the Additional Disturbance Area, being largely confined to flat or gentle gradient landforms, has undone considerable disturbance during the historic phase of land use leading to the dissipation or removal of archaeological sites across the area.

The average artefact density for sites within the Additional Disturbance Area is 3.6 artefacts per site (198 artefacts across 52 artefact sites). However, other sites, such as G12 (37-3-0688), located on the western bank of Bowmans Creek and just outside the Additional Disturbance Area, recorded 100s of artefacts. This would indicate that the area did support large sites in the past. However, because site G12 is located within a slope and bench landform where the terrain is unsuitable for cultivation, it may mean that remnants of this site have survived whereas potentially similar sites on the eastern, more-level, bank of Bowmans Creek within the Additional Disturbance Area have been removed/dissipated by agricultural activities.

The results of the current assessment agree in most instances with the regional archaeological context that has been established following 30 years of research. In brief, the following characteristics can be examined:

- Distribution of sites: The regional model shows a strong correlation between site size and distance to reliable water with larger, more complex, sites being located near reliable water. The current assessment shows that the largest site recorded (GN OS6) was associated with Bowmans Creek. However, even this site, recording 67 artefacts from both surface and subsurface contexts, would not be regarded as a large or complex site. Similarly, GN OS34, located at the confluence of Yorks and Bowmans Creeks, only recorded 29 artefacts from surface and subsurface contexts; again, a relatively low artefact density. However, larger sites, such a G12, located outside of the Additional Disturbance Area, support the observation that large sites tend to be associated with more permanent water bodies, in this case, Bowmans Creek. Remaining sites located away from water and were correspondently of a low artefact density and perhaps represent a single event rather than a site that has been used for camping and tool making in the long-term.
- <u>Site type</u>: The regional and predictive model suggested that artefact scatters and isolated finds would be the most common site type recorded and this is supported by the survey results. As the Additional Disturbance Area was almost completely cleared in the past, scarred trees were not predicted to occur, however, one was recorded. Grinding groove sites

were not predicted and none were identified. Further, the minor crests and ridges contained no evidence of ceremonial sites, and if these had consisted of stone arrangements, it is likely they have been removed due to past land use.

Section 4.2 notes that the Additional Disturbance Area could contain evidence of Aboriginal resource sites, and/or burials, and/or conflict sites. No evidence of any of these site types was noticed during the assessment. The distribution of sites does not indicate that a particular area was being exploited for its resources and the uniformly thin soils across much of the Additional Disturbance Area, and the lack of sandy soils, precludes the presence of burials. No evidence of colonial conflict sites was noted during the assessment.

- Artefact density: As only low or low-moderate artefact densities were recorded; this result does not accord with the regional model that sites in landforms containing substantial lengths of creek lines will be of a higher density. This indicates that the long history of agricultural land use in the area has potentially removed evidence of high-density sites, dissipating them across the landscape or removing them entirely due to erosion and water movement. As previous researchers have suggested, areas such as Swamp, Yorks and Bettys Creeks could have been no more than seasonal foraging locations where trips rarely involved overnight stays. This would indicate that most of the stone tools would be also carried into but then, also, out of the Additional Disturbance Area to areas affording greater resources to support locations for larger base camps. It was assumed in the predictive model that Bowmans Creek may have supported more longer-term occupation and the location of sites such as G12 that recorded a moderate-high artefact density on the western bank of Bowmans Creek (outside of the Additional Disturbance Area) tends to support this theory. However, no such sites have been recorded in the Additional Disturbance Area has of support this theory.
- <u>Types of raw material</u>: Regional studies show that the majority of sites will have a dominance of mudstone artefacts and a sizable minority of silcrete artefacts. Generally, the survey results agree with this model.
- <u>Artefact type</u>: Most artefacts recorded were unmodified flakes and this also accords with the regional model. While some backed blades, end scrapers and axe blanks were noted in the Additional Disturbance Area, their numbers were low, as was the frequency of cores and other specialist tools. Bearing in mind that many artefacts have been removed from the Additional Disturbance Area by, among other agencies, erosion, the sample remaining today is incomplete.

The features of representativeness, rarity and integrity of archaeological sites within the Additional Disturbance Area will now be discussed.

<u>Representativeness</u>: As seen above, the sites recorded during the survey are generally very representative of sites in the region, however, no high density or complex sites were recorded in the Additional Disturbance Area and this is an anomaly on a regional level for an area containing lengths of waterways that would have held permanent water for much of the year. In terms of raw materials available and artefact types, the results of the survey neatly complement the regional archaeological context.

<u>Rarity</u>: In the past sites such as the sites recorded in the Additional Disturbance Area would not have been rare and on a state-wide scale and low-density artefact scatters and isolated finds would remain the most common site type recorded. In the immediate vicinity of the Additional

Disturbance Area, however, there has been a large amount of archaeological salvage over the years that has removed many similar sites from the landscape. Although the sites recorded during this assessment are in no way remarkable, their presence alone, in albeit a much-modified landscape, remains a memory of the past in a landscape that is fast changing (or has changed). This raises the rarity of these remaining sites within the context of the greater Ravensworth area where mining has been concentrated.

<u>Integrity</u>: From the results of the survey, general site integrity is very low. As noted, the Additional Disturbance Area has been subject to intensive agricultural land use, as well as severe erosion in the past and much archaeological context has been lost: along with the A-Horizon soils at many locations. The majority of newly recorded sites were assessed to have no associated archaeological deposits and are therefore surface manifestations and possibly, on an individual artefact level, displaced.

7.2 DISCUSSION OF TEST EXCAVATION RESULTS

Section 6.4.2.8 provides a summary of the excavation assemblage at each of the 12 areas investigated. This section is to tie the test excavation program into some broader considerations of the data gained from the excavations.

No evidence of colonial conflict or skeletal remains was identified during the test excavation program.

7.2.1 Research questions

In **Section 6.2.2**, a number of research questions were posed for the test excavation program. These will be answered below.

- Do the results support previous findings that occupation appears denser along Yorks Creek when compared to Swamp Creek?
 - The findings are equivocal to this question as it seems that the sections of Yorks Creek and Swamp Creek within the Additional Disturbance Area both have very low artefact densities. Greater artefact densities were noted in areas associated with Bowmans Creek (Area 1) and at the confluence of Bowmans Creek and Yorks Creek (Area 4). However, all excavations along the main channel of both Yorks and Swamp Creeks recorded very few subsurface artefacts.
- Do elevated landforms associated with Bowmans Creek preserve subsurface archaeological deposits?
 - Yes, but in a variable manner. At both Area 1 and Area 4, the elevated terrace or spur landforms do preserve subsurface archaeological deposits, albeit at a low to moderate artefact density. However, at Area 7 located on a classic terrace landform on the eastern margin of the broad floodplain to Bowmans Creek, the subsurface investigations revealed a very low artefact count.

- Are additional archaeological features, such as hearths, present in the Additional Disturbance Area?
 - No, no archaeological stratigraphy or archaeological features such as hearths were recorded during the test excavation program.
- How do the findings in terms of raw material use compare to other investigations in the vicinity of the Additional Disturbance Area?
 - In Section 6.4.2.4 it was demonstrated that there are almost equal amounts of silcrete and mudstone artefacts in the excavation assemblage with a very small amount of other stone sources being represented. This patterning is identical, with slightly varying proportions between silcrete and mudstone, to most other excavations in upper Hunter Valley.

For example, during the MOCO Project test excavations undertaken in 2013 at site MOCO OS-4, 65 per cent of artefacts came from silcrete sources and 30 per cent came from mudstone sources. Other stone types such as quartz, quartzite, petrified wood and volcanics were at almost negligible numbers. The high silcrete count at MOCO OS-4 was attributable to the excavations encountering a knapping event based around a possible ground oven.

In 2017, further excavations took place at MOCO OS-4 as part of the MOCO Project salvage program (OzArk 2017f). In these excavations the majority of artefacts recorded come from either mudstone (69.8%) or silcrete (29.1%) sources. Very small numbers of artefacts from quartzite (1.1%) was recorded. This reversal in the proportions of silcrete to mudstone between the 2013 and the 2017 excavations shows the variabilities of data related to where pits are placed in an area with discrete knapping floors of both silcrete and mudstone materials.

At other (2005/2006) salvage programs along Bowmans, Swamp and Bettys Creeks the recorded raw materials were:

- Bettys Creek 10 (#37-3-0600; Umwelt 2013: 6.17). Mudstone (39.1%), followed by chert (26.3%), silcrete (22.3%), quartz (9.9%), quartzite (0.7%), silicified siltstone (0.7%), indeterminate (0.7%) and petrified wood (0.4%)
- Bettys Creek 9 (#37-3-0599; Umwelt 2013: 6.22). Silcrete (78.9%), followed by mudstone (10.5%), tuff (5.3%) and quartz (5.3%).
- Bettys Creek 2 (#37-3-0025; Umwelt 2013: 6.26). Mudstone (59.5%), followed by silcrete (33.7%), quartz (3.4%), silicified sandstone (1.3%), indeterminate (0.8%), tuff (0.3%), quartzite and chert (0.2%), silicified siltstone, chalcedony and volcanic (0.1%).
- Surface collection (Umwelt 2013: 6.9; 824 artefacts from 36 site areas associated with Bettys Creek, Bowmans Creek and Swamp Creek). Mudstone (58.5%), followed by silcrete (31.9%) quartz (5.6%), tuff (1.1%), chert (0.7%), silicified siltstone (0.6%), quartzite (0.5%), silicified sandstone (0.5%), chalcedony (0.2%), volcanic (0.1%), petrified wood (0.1%), porcellanite (0.1%) and indeterminate (0.2%).

 Grader scrapes (Umwelt 2013: 6. 43; 177 artefacts from 44 grader scrapes). Silcrete (46.3%), followed closely by mudstone (41.2%). The remaining 12.4% of the raw materials comprised quartz (4%), petrified wood (3.4%), volcanic (1.1%), indeterminate (1.1%), chert (0.6%), quartzite (0.6%), fine grained siliceous (0.6%), Hornfels (0.6%) and tuff (0.6%).

7.2.2 Research considerations

Section 6.3.2 provides some research considerations that need to be applied to any excavation. Some concluding remarks will be made in this section in reference to the considerations raised in **Section 6.3.2**.

Statistically useful sample size

152 0.5 m by 0.5 m excavation squares were excavated at 12 separate localities: a total of 38 square metres. From this area of excavation, 180 artefacts were recovered; an average of 4.7 artefacts per square metre or 1.18 artefacts per excavation square. This density of artefacts is extremely low and not robust enough for statistical analysis.

The area with the highest artefact concentration, Area 1, recorded 98 artefacts, while the second densest area, Area 4, recorded 54 artefacts. Combined, these two areas represent 84 per cent of the excavation assemblage, yet neither, in themselves, provide enough data in the form of artefact types, or differences in raw material, to meaningfully add to our knowledge concerning the archaeological context of the area.

Equally any analysis of vertical or horizontal distribution of artefacts is hampered by a lack of data. In terms of vertical distribution, no excavation square displayed archaeological stratigraphy and a clear majority of artefacts were confined to the two uppermost spits (**Section 6.4.2.1**). This allows limited opportunities to undertake a taphonomic analysis on how material has moved within the soil profile, and limited opportunities to study change in artefacts types or sizes through time.

It was also noted in **Section 6.4.2.1** that there was no discernible patterning in the horizontal distribution of artefacts. At Area 4, supplementary excavation squares were placed at a distance of 5 m from squares displaying a high artefact count. Yet none of these expansion squares indicated that the horizontal distribution of artefacts extended in any meaningful way from the squares where the original density was noted. While the cores, anvil, and backed blade make for an interesting corpus of artefact types, it would appear that these are isolated remnants without a spatial distribution which could be studied to understand more about the occupation patterns at the site.

Condition

Most of the excavation squares did not have overt evidence of disturbance, apart from Area 12 where historic items we recorded in one of the excavation squares. However, as most of the squares had what can be described as a very truncated A1-Horizon and a leached A2-Horizon, the implication is that the landscape has been subject to the stripping of the A1-Horizon and the

exposure of the A2-Horizon. The implicit conclusion is, therefore, that the landscape has undergone a high general disturbance from soil loss that has compromised the archaeological deposits across the Additional Disturbance Area. As such, the general condition of the archaeological landscape within the Additional Disturbance Area is assessed to be poor where a century and a half of poorly managed agricultural activities have resulted in soil loss and the inevitable disruption of any archaeological deposits that may have been present prior to the colonial occupation of the area.

7.3 RAP COMMENTS ON THE DRAFT AAIA

As part of the consultation process, all RAPs were sent a draft copy of this report for their consideration and comment. Full details of the consultation undertaken is set out in the accompanying ACHAR, as well as a record of all comments received in relation to the RAP review of the draft ACHAR and AAIA.

Only one response from Tocomwall specifically addressed an archaeological issue and this response will be discussed here:

After reviewing the report we concluded that it really did not offer any new knowledge for how the Aboriginal people used this part of the Hunter landscape. We were surprised that a study of this scale and duration offered nothing new. It seemed to just offer up the same conclusions of so many other reports for the area in terms of an increase in artefact numbers and density approaching water sources and the typical trends for raw materials for the area. Nothing else. The degree of reduction evident for many of the artefacts suggested that groups using the area were very mobile however there was no further analysis of this that might have provided some new insight or knowledge about the mobility of people in the area, or the reasons for what appears to be a high percentage of artefacts subjected to tertiary reduction. Generally a disappointing outcome from the perspective of learning something new for the area.

Tocomwall 13 November 2019

In light of this response, OzArk notes that the current study is just one in a corpus of studies that stretch back at least 40 years (**Section 4.3** and **4.4**). In their totality, these studies have established a very clear context for Aboriginal occupation in and near the Additional Disturbance Area.

The studies tend to indicate that the sites in the Yorks and Swamp Creek catchments are regarded as representative of occupational evidence in the small tributary valleys of the Hunter River (Resource Planning 1991: 5). Further, available evidence would indicate that Bettys Creek was more a node of occupation when compared to Swamp and Bowmans Creeks (Umwelt 2013); although this result is distorted by the lack of systematic investigation across all catchment areas, as well as variable levels of disturbance that tends to be greater adjacent to the larger waterways such as Bowmans Creek.

Large excavation programs such as that undertaken by Umwelt (2013) indicate that sites such as Bettys Creek 2, Bettys Creek 8 and Bettys Creek 10 retained a level of spatial integrity reflected by knapping events and raw material distribution patterns. Residue and use-wear studies indicate retooling, butchery and hafting were taking place at Bettys Creek 2 and Bettys Creek 10. These results clearly indicate that raw material reduction was taking place in landforms associated with Bettys Creek.

From the data provided in Umwelt 2013 Appendix 5, a majority of artefacts investigated during the Umwelt study were at a tertiary stage of reduction, and of those preserving cortex, most displayed less than 50 per cent cortex. This agrees with the findings from the Additional Disturbance Area where 80 per cent of all artefacts from the test excavation program were at a tertiary stage of reduction (**Section 6.4.2.6**).

The current investigation recorded an average artefact density for sites within the Additional Disturbance Area of 3.6 artefacts per site (**Section 7.1.2**) and the test excavation recorded an extremely low artefact density of 1.18 artefacts per excavation square (0.5 m by 0.5 m). This was noted to be insufficient to form a statistically useful sample size (**Section 7.1.2**).

With reference to the Tocomwall comments, OzArk agrees with the following statement because the correlation of data between the current investigation and previous investigations has been demonstrated in this AAIA and are supported by the results of the investigation:

It seemed to just offer up the same conclusions of so many other reports for the area in terms of an increase in artefact numbers and density approaching water sources and the typical trends for raw materials for the area.

Tocomwall also state:

The degree of reduction evident for many of the artefacts suggested that groups using the area were very mobile however there was no further analysis of this that might have provided some new insight or knowledge about the mobility of people in the area, or the reasons for what appears to be a high percentage of artefacts subjected to tertiary reduction.

OzArk do note in Section 7.1.2 that:

As previous researchers have suggested, areas such as Swamp, Yorks and Bettys Creeks could have been no more than seasonal foraging locations where trips rarely involved overnight stays. This would indicate that most of the stone tools would be also carried into but then, also, out of the Additional Disturbance Area to areas affording greater resources to support locations for larger base camps.

This conclusion is supported by previous investigations in the area, as Umwelt note:

When the assemblages are viewed as accumulating over a 2200 year period, the low artefact numbers suggest that the assemblages reflect sporadic visitation over an extended period of time by small groups of Aboriginal people, most likely single family groups. Differences in the degree of artefact patination and weathering were seen to reflect a long period of highly sporadic visitation.

Umwelt 2013: 7:36

In conclusion, the data indicates that the landforms of the Additional Disturbance Area display a low artefact density; both in surface and subsurface contexts. While the small number of artefacts recorded do not constitute a statically robust sample size, it is clear that past use of the area was limited to sporadic and/or short-term visitations where primary reduction of stone tools was not taking place. While there is evidence in the area of tool maintenance and localised knapping events, the overwhelming impression is that the Swamp and Yorks Creek catchments were not used for extended camping events and that people must have moved into the Additional Disturbance Area from larger and more complex base camps that were located outside of the area, possibly in association with the Hunter River.

8 ASSESSMENT OF SIGNIFICANCE

8.1.1 Introduction

The appropriate management of cultural heritage items is usually determined on the basis of their assessed significance as well as the likely impacts of any proposed development. Social (cultural), scientific (archaeological), aesthetic and historical significance are identified as baseline elements of significance assessment, and it is through the combination of these elements that the overall cultural heritage values of a site, place or area are resolved.

In this AAIA, only the scientific values of the Additional Disturbance Area will be considered. The social, aesthetic and historical values of the Additional Disturbance Area will be discussed in the ACHAR to which this AAIA is an appendix.

Archaeological/Scientific Value

Assessing a site in this context involves placing it into a broader regional framework, as well as assessing the site's individual merits in view of current archaeological discourse. This type of value relates to the ability of a site to answer current research questions and is also based on a site's condition (integrity), content and representativeness.

The overriding aim of cultural heritage management is to preserve a representative sample of the archaeological resource. This will ensure that future research within the discipline can be based on a valid sample of the past. Establishing whether a site can contribute to current research also involves defining 'research potential' and 'representativeness'. Questions regularly asked when determining significance are: can this site contribute information that no other site can? Is this site representative of other sites in the region?

8.1.2 Background to the assessment of scientific significance

This assessment will use the following terms where appropriate:

- High scientific significance or high archaeological values;
- Moderate scientific significance or moderate archaeological values; and
- Low scientific significance or low archaeological values.

This hierarchy is used to categorise the archaeological landscape of the Additional Disturbance Area based, in this report, on the assessed scientific or archaeological values at a particular location.

This is not to say that the author is unaware of possible social / cultural, aesthetic and historical values at a particular location, but the assessment here is of the scientific values alone while the other values will be examined in the ACHAR.

In terms of scientific significance, locations will primarily be assessed on their ability to add reliable archaeological information which can further our understanding of the archaeology at a local and

regional level or a site type's rarity within the landscape. This assessment has been informed through surface observations/survey, subsurface archaeological testing and review of previous site-specific reports.

Considerations taken in this scientific assessment include an understanding that a part of the archaeological value of a place is the general community's association to that place. This is often distinct from the social, aesthetic and historical criteria used to assess heritage significance as it relates to a person's relationship to the archaeology of the place. For the Aboriginal participants on the survey, for example, an archaeological site was appreciated as much for its archaeological values as it was for its cultural values. A site displaying either many artefacts or a number of interesting artefacts would engender fascination and discussion on purely archaeological grounds (Where did people live / eat? How did they live? How did they use the artefact and what does it tell us about the people who made it?).

It is therefore understood that many Aboriginal people, or people generally interested in pre-history, would see the sites recorded in this assessment to have higher archaeological values than may be given in this assessment. However, this assessment has attempted to distinguish between an artefact scatter with potential to yield further information (moderate-high scientific significance) and an artefact scatter in an eroded context that would yield little meaningful further information (low scientific significance).

Incorporating research on the rarity, representativeness and integrity or condition of a site, along with the considerations outlined above, this assessment defines the following categories when assessing scientific significance:

High scientific significance

Locations displaying this value would include one or more of the following features:

- The location would contain known areas of undisturbed archaeological deposits that are likely to add significantly to our knowledge concerning Aboriginal archaeology in the region;
- The site would contain archaeological information to address complex research questions about the region;
- The site contains outstanding features that can be appreciated by non-specialists / enthusiasts; and
- The site type is rare in the region and / or in danger of becoming unrepresented in the region.

Moderate scientific significance

Locations displaying this value would include one or more of the following features:

• The location would contain areas of archaeological deposits, sometimes disturbed, that are likely to add to our knowledge about the Aboriginal archaeology of the local area only;

- The site would contain archaeological information to address general research questions about the region;
- The site contains features that would be appreciated by a specialist / enthusiast; and
- Portions of the site have been lost due to erosion or the landscape context of the site has been impacted.

Low scientific significance

Locations displaying this value would include one or more of the following features:

- The location may contain areas of archaeological deposits, but they are likely to be disturbed and any information gained would only address limited research questions;
- The site is largely displaced by erosion;
- The landscape context of the site has been heavily modified;
- The site exists in areas where A-Horizon soil loss is extensive; and
- The site contains features that would be difficult to interpret in a meaningful way.

8.2 ASSESSED SIGNIFICANCE OF THE RECORDED SITES

8.2.1 Newly recorded sites

69 new sites were recorded during the survey consisting of 39 artefact scatters, 29 isolated finds and one scarred tree. Of the artefact scatters, 32 sites recorded less than 10 artefacts and no site contained of more than 70 artefacts. At nine locations it was assessed that there are subsurface deposits: Glendell North OS5, Glendell North OS6, Glendell North OS16, Glendell North OS19, Glendell North OS25, Glendell North OS34, Glendell North OS35, Glendell North OS36 and Glendell North IF26. Only one of these sites was determined to have a moderate artefact density (Glendell North OS6). None of the recorded sites was remarkable in its manifestation; either in terms of the types of artefacts recorded, the raw material the artefacts were manufactured from or the density and nature of the surface artefact manifestation. The recorded sites are also very representative of artefact sites in the upper Hunter Valley both in terms of the types of artefacts recorded and the raw materials from which the artefacts were manufactured.

As a result, most newly recorded sites have a low scientific significance as they generally have:

- A low artefact density;
- No associated subsurface deposits;
- No remarkable features and are generally representative of other artefact sites in the upper Hunter Valley;
- A high likelihood of being in a secondary context; and

• A limited ability to inform on the nature and spatial extent of past Aboriginal occupation in the Additional Disturbance Area.

Table 8-1 lists the newly recorded sites and their associated scientific significance. **Table 8-1** also provides a justification for the significance assessment. Sites outside of the Additional Disturbance Area are shown with a blue shade.

Figure 5-3 shows the location of all newly recorded sites.

ID	AHIMS ID	Site name	Site type	Potential for subsurface deposits	Scientific significance	Justification
1	37-3-1560	Glendell North OS1	Artefact scatter	Nil	Low	Low artefact density; lack of associated subsurface deposits; disturbed context
2	37-3-1559	Glendell North OS2	Artefact scatter	Nil	Low	Low artefact density; lack of associated subsurface deposits; disturbed context
3	37-3-1558	Glendell North OS3	Artefact scatter	Nil	Low	Low artefact density; lack of associated subsurface deposits; disturbed context
4	37-3-1557	Glendell North OS4	Artefact scatter	Nil	Low	Low artefact density; lack of associated subsurface deposits; disturbed context
5	37-3-1569	Glendell North OS5	Artefact scatter	Yes (low density)	Low-moderate	Low density with known subsurface deposits. Any information gained would only address limited research questions
6	37-3-1571	Glendell North OS6	Artefact scatter	Yes (moderate density)	Moderate	Moderate artefact density and high probability of further subsurface deposits present
7	37-3-1536	Glendell North OS7	Artefact scatter	Nil	Low	Low artefact density; lack of associated subsurface deposits; disturbed context
8	37-3-1549	Glendell North OS8	Artefact scatter	Nil	Low	Low artefact density; lack of associated subsurface deposits; disturbed context
9	37-3-1556	Glendell North OS9	Artefact scatter	Nil	Low	Low artefact density; lack of associated subsurface deposits; disturbed context
10	37-3-1555	Glendell North OS10	Artefact scatter	Nil	Low	Low artefact density; lack of associated subsurface deposits; disturbed context
11	37-3-1554	Glendell North OS11	Artefact scatter	Nil	Low	Low artefact density; lack of associated subsurface deposits; disturbed context

Table 8-1: Scientific significance of newly recorded sites.

ID	AHIMS ID	Site name	Site type	Potential for subsurface deposits	Scientific significance	Justification
12	37-3-1553	Glendell North OS12	Artefact scatter	Nil	Low	Low artefact density; lack of associated subsurface deposits; disturbed context
13	37-3-1552	Glendell North OS13	Artefact scatter	Nil	Low	Low artefact density; lack of associated subsurface deposits; disturbed context
14	37-3-1551	Glendell North OS14	Artefact scatter	Nil	Low	Low artefact density; lack of associated subsurface deposits; disturbed context
15	37-3-1550	Glendell North OS15	Artefact scatter	Nil	Low	Low artefact density; lack of associated subsurface deposits; disturbed context
16	37-3-1573	Glendell North OS16	Artefact scatter	Yes (low density)	Low-moderate	Low density with known subsurface deposits. Any information gained would only address limited research questions
17	37-3-1542	Glendell North OS17	Artefact scatter	Nil	Low	Low artefact density; lack of associated subsurface deposits; disturbed context
18	37-3-1541	Glendell North OS18	Artefact scatter	Nil	Low	Low artefact density; lack of associated subsurface deposits; disturbed context
19	37-3-1572	Glendell North OS19	Artefact scatter	Yes (low density)	Low-moderate	Low density with known subsurface deposits. Any information gained would only address limited research questions
20	37-3-1540	Glendell North OS20	Artefact scatter	Nil	Low	Low artefact density; lack of associated subsurface deposits; disturbed context
21	37-3-1539	Glendell North OS21	Artefact scatter	Nil	Low	Low artefact density; lack of associated subsurface deposits; disturbed context
22	37-3-1538	Glendell North OS22	Artefact scatter	Nil	Low	Low artefact density; lack of associated subsurface deposits; disturbed context
23	37-3-1537	Glendell North OS23	Artefact scatter	Nil	Low	Low artefact density; lack of associated subsurface deposits; disturbed context
24	37-3-1510	Glendell North OS24	Artefact scatter	Nil	Low	Low artefact density; lack of associated subsurface deposits; disturbed context
25	37-3-1570	Glendell North OS25	Artefact scatter	Yes (low density)	Low-moderate	Low density with known subsurface deposits. Any information gained would only address

ID	AHIMS ID	Site name	Site type	Potential for subsurface deposits	Scientific significance	Justification
						limited research questions
26	37-3-1548	Glendell North OS26	Artefact scatter	Nil	Low	Low artefact density; lack of associated subsurface deposits; disturbed context
27	37-3-1509	Glendell North OS27	Artefact scatter	Nil	Low	Low artefact density; lack of associated subsurface deposits; disturbed context
28	37-3-1508	Glendell North OS28	Artefact scatter	Nil	Low	Low artefact density; lack of associated subsurface deposits; disturbed context
29	37-3-1547	Glendell North OS29	Artefact scatter	Nil	Low	Low artefact density; lack of associated subsurface deposits; disturbed context
30	37-3-1546	Glendell North OS30	Artefact scatter	Nil	Low	Low artefact density; lack of associated subsurface deposits; disturbed context
31	37-3-1545	Glendell North OS31	Artefact scatter	Nil	Low	Low artefact density; lack of associated subsurface deposits; disturbed context
32	37-3-1544	Glendell North OS32	Artefact scatter	Nil	Low	Low artefact density; lack of associated subsurface deposits; disturbed context
33	37-3-1543	Glendell North OS33	Artefact scatter	Nil	Low	Low artefact density; lack of associated subsurface deposits; disturbed context
34	37-3-1574	Glendell North OS34	Artefact scatter	Yes (low density)	Moderate	Low density with known subsurface deposits
35	37-3-1567	Glendell North OS35	Artefact scatter	Yes (low density)	Low-moderate	Low density with low density subsurface deposits
36	37-3-1568	Glendell North OS36	Artefact scatter	Yes (low density)	Low-moderate	Low density with known subsurface deposits. Any information gained would only address limited research questions
37	37-3-1562	Glendell North OS37	Artefact scatter	Nil	Low	Low artefact density; lack of associated subsurface deposits; disturbed context
38	37-3-1565	Glendell North OS38	Artefact scatter	Nil	Low	Low artefact density; lack of associated subsurface deposits; disturbed context
39	37-3-1576	Glendell North OS39	Artefact scatter	Nil	Low	Low artefact density; lack of associated subsurface deposits as no A-Horizon present
40	37-3-1535	Glendell North IF1	Isolated find	Nil	Low	Isolated artefact without associated subsurface deposits.

ID	AHIMS ID	Site name	Site type	Potential for subsurface deposits	Scientific significance	Justification
						Likely in a secondary context
41	37-3-1534	Glendell North IF2	Isolated find	Nil	Low	Isolated artefact without associated subsurface deposits. Likely in a secondary context
42	37-3-1533	Glendell North IF3	Isolated find	Nil	Low	Isolated artefact without associated subsurface deposits. Likely in a secondary context
43	37-3-1532	Glendell North IF4	Isolated find	Nil	Low	Isolated artefact without associated subsurface deposits. Likely in a secondary context
44	37-3-1531	Glendell North IF5	Isolated find	Nil	Low	Isolated artefact without associated subsurface deposits. Likely in a secondary context
45	37-3-1530	Glendell North IF6	Isolated find	Nil	Low	Isolated artefact without associated subsurface deposits. Likely in a secondary context
46	37-3-1529	Glendell North IF7	Isolated find	Nil	Low	Isolated artefact without associated subsurface deposits. Likely in a secondary context
47	37-3-1528	Glendell North IF8	Isolated find	Nil	Low	Isolated artefact without associated subsurface deposits. Likely in a secondary context
48	37-3-1527	Glendell North IF9	Isolated find	Nil	Low	Isolated artefact without associated subsurface deposits. Likely in a secondary context
49	37-3-1526	Glendell North IF10	Isolated find	Nil	Low	Isolated artefact without associated subsurface deposits. Likely in a secondary context
50	37-3-1525	Glendell North IF11	Isolated find	Nil	Low	Isolated artefact without associated subsurface deposits. Likely in a secondary context
51	37-3-1524	Glendell North IF12	Isolated find	Nil	Low	Isolated artefact without associated subsurface deposits. Likely in a secondary context
52	37-3-1523	Glendell North IF13	Isolated find	Nil	Low	Isolated artefact without associated subsurface deposits. Likely in a secondary context
53	37-3-1522	Glendell North IF14	Isolated find	Nil	Low	Isolated artefact without associated

ID	AHIMS ID	Site name	Site type	Potential for subsurface deposits	Scientific significance	Justification
						subsurface deposits. Likely in a secondary context
54	37-3-1521	Glendell North IF15	Isolated find	Nil	Low	Isolated artefact without associated subsurface deposits. Likely in a secondary context
55	37-3-1520	Glendell North IF16	Isolated find	Nil	Low	Isolated artefact without associated subsurface deposits. Likely in a secondary context
56	37-3-1519	Glendell North IF17	Isolated find	Nil	Low	Isolated artefact without associated subsurface deposits. Likely in a secondary context
57	37-3-1518	Glendell North IF18	Isolated find	Nil	Low	Isolated artefact without associated subsurface deposits. Likely in a secondary context
58	37-3-1517	Glendell North IF19	Isolated find	Nil	Low	Isolated artefact without associated subsurface deposits. Likely in a secondary context
59	37-3-1515	Glendell North IF20	Isolated find	Nil	Low	Isolated artefact without associated subsurface deposits. Likely in a secondary context
60	37-3-1514	Glendell North IF21	Isolated find	Nil	Low	Isolated artefact without associated subsurface deposits. Likely in a secondary context
61	37-3-1516	Glendell North IF22	Isolated find	Nil	Low	Isolated artefact without associated subsurface deposits. Likely in a secondary context
62	37-3-1513	Glendell North IF23	Isolated find	Nil	Low	Isolated artefact without associated subsurface deposits. Likely in a secondary context
63	37-3-1512	Glendell North IF24	Isolated find	Nil	Low	Isolated artefact without associated subsurface deposits. Likely in a secondary context
64	37-3-1511	Glendell North IF25	Isolated find	Nil	Low	Isolated artefact without associated subsurface deposits. Likely in a secondary context
65	37-3-1566	Glendell North IF26	Isolated find	Yes (low density)	Low	Isolated subsurface artefact formerly present but now excavated during the test excavation program. Any information gained
ID	AHIMS ID	Site name	Site type	Potential for subsurface deposits	Scientific significance	Justification
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						would only address limited research questions
66	37-3-1564	Glendell North IF27	Isolated find	Nil	Low	Isolated artefact without associated subsurface deposits. Likely in a secondary context
67	37-3-1563	Glendell North IF28	Isolated find	Nil	Low	Isolated artefact without associated subsurface deposits. Likely in a secondary context
68	37-3-1575	Glendell North IF29	Isolated find	Nil	Low	Isolated artefact without associated subsurface deposits. Likely in a secondary context
69	37-3-1561	Glendell North ST1	Scarred tree	Nil	Moderate	Relatively rare site type within the Hunter Valley region

8.2.2 Previously recorded sites

There are 39 previously recorded sites within the Additional Disturbance Area. All these sites were re-assessed during the 2018 survey to determine their current condition and significance.

Table 8-2 lists the 39 previously recorded sites in the Additional Disturbance Area.

Figure 4-4 shows the location of the previously recorded and registered Aboriginal sites.

Table 8-2: Significance assessment of previously recorded sites.
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ID	AHIMS	Site name	Site type	Scientific significance	Justification
70	37-3-0294	Site 2; (MORL2)	Artefact scatter	Low	Artefacts unable to be located
73	37-3-0469	Bowmans/Swamp Creek Trench 1	Artefact scatter	Moderate	Moderate artefact density and high probability of associated subsurface deposits however these will be in a disturbed context
75	37-3-0521	MO-IF1	Isolated find	Low	Isolated artefact without associated subsurface deposits. Likely in a secondary context
76	37-3-0612	Bettys Creek 22	Isolated find	Low	Artefacts unable to be located
79	37-3-0689	G11 Glendell	Artefact scatter	Low	Low artefact density with low potential for further subsurface deposits
81	37-3-0744	York Creek 1	Artefact scatter	Low	Low artefact density; low potential for associated subsurface deposits; disturbed context
82	37-3-0745	York Creek 2	Artefact scatter	Low	Low artefact density; lack of associated subsurface deposits; secondary context
83	37-3-0746	York Creek 3	Artefact scatter	Low	Low artefact density; low potential for associated subsurface deposits; disturbed context

ID	AHIMS	Site name	Site type	Scientific significance	Justification
84	37-3-0747	York Creek 4	Artefact scatter	Low-moderate	Low density with known subsurface deposits. Any information gained would only address limited research questions
85	37-3-0748	York Creek 5	Artefact scatter	Low	Low artefact density; low potential for associated subsurface deposits; disturbed context
86	37-3-0749	York Creek 6	Artefact scatter	Low	Low artefact density; lack of associated subsurface deposits; disturbed context
87	37-3-0750	York Creek 7	Low-moderate	Low-moderate	Low density with known subsurface deposits. Any information gained would only address limited research questions
88	37-3-0751	York Creek 8	Isolated find	Low	Isolated artefact without associated subsurface deposits. Likely in a secondary context
89	37-3-0752	York Creek 9	Artefact scatter	Low	Low artefact density; lack of associated subsurface deposits; secondary context
90	37-3-0753	York Creek 10	Artefact scatter	Low	Low artefact density; lack of associated subsurface deposits; disturbed context
91	37-3-0754	York Creek 11	Artefact scatter	Low-moderate	Low density with known subsurface deposits. Any information gained would only address limited research questions
92	37-3-0755	York Creek 12	Artefact scatter	Low	Low artefact density; lack of associated subsurface deposits; disturbed context
93	37-3-0756	York Creek 13	Artefact scatter	Low	Low artefact density; lack of associated subsurface deposits; disturbed context
94	37-3-0757	York Creek 14	Isolated find	Low	Isolated artefact without associated subsurface deposits. Likely in a secondary context
95	37-3-0758	York Creek 15	Artefact scatter	Low	Low artefact density; lack of associated subsurface deposits; likely in secondary context
96	37-3-0759	York Creek 16	Artefact scatter	Low	Low artefact density and lack of associated subsurface deposits
97	37-3-0760	York Creek 17	Isolated find	Low	Isolated artefact without associated subsurface deposits. Likely in a secondary context
98	37-3-0761	York Creek 18	Artefact scatter	Low-moderate	Low density subsurface deposits present. Any information gained would only address limited research questions
99	37-3-0762	Bowmans Ck 6	Artefact scatter	Low	Low artefact density and lack of associated subsurface deposits
100	37-3-0763	Bowmans Ck 7	Artefact scatter	Low-moderate	Low density with known subsurface deposits. Any information gained would only address limited research questions
101	37-3-0764	Bowmans Ck 8	Artefact scatter	Low	Artefacts unable to be located

ID	AHIMS	Site name	Site type	Scientific significance	Justification
102	37-3-0765	Bowmans Ck 9	Artefact scatter	Low	Low density scatter without associated subsurface deposits. Likely in a secondary context
103	37-3-0766	Bowmans Ck 10	Artefact scatter	Low	Low artefact density; lack of associated subsurface deposits; secondary context
107	37-3-0773	Swamp Ck 10	Isolated find	Low	Low artefact density; lack of associated subsurface deposits; disturbed context
109	37-3-1155	MT OWEN ISOLATED FIND2	Isolated find	Low	Isolated artefact without associated subsurface deposits. Likely in a secondary context
110	37-3-1156	MT OWEN ISOLATED FIND1	Isolated find	Low	Isolated artefact without associated subsurface deposits. Likely in a secondary context
111	37-3-1158	RPS DLW IF1	Isolated find	Low	Isolated artefact without associated subsurface deposits. Likely in a secondary context
114	37-3-1198	MOCO OS-10	Artefact scatter	Low	Low artefact density; lack of associated subsurface deposits; disturbed context. Partially destroyed
115	37-3-1490	Swamp Creek IF-4	Isolated find	Low	Isolated find in a secondary context
116	37-3-1492	Swamp Creek IF-2	Isolated find	Low	Isolated find in a secondary context
117	37-3-1493	Swamp Creek IF-3	Isolated find	Low	Isolated find in a secondary context
118	37-3-1494	Swamp Creek IF-1	Isolated find	Low	Isolated artefact without associated subsurface deposits. Likely in a secondary context
122	37-3-1499	Swamp Creek-OS1	Artefact scatter	Low	Low artefact density; lack of associated subsurface deposits; disturbed context
124	37-3-1503	Yorks Creek 19	Artefact scatter	Low-moderate	Low density with known subsurface deposits. Any information gained would only address limited research questions

8.3 LIKELY IMPACTS TO ABORIGINAL HERITAGE FROM THE PROJECT

The preceding investigation has determined the following:

- 52 of the 69 newly recorded sites are within or in very close proximity to the Additional Disturbance Area; and
- 39 previously recorded sites are within the Additional Disturbance Area.

In total, 91 sites are located within the Additional Disturbance Area and will be impacted should the Project be approved. 55 of these sites are artefact scatters (15 of which have PAD) and 36 are isolated finds (one of which has PAD). In general, the artefact scatters have a low artefact density with most sites recording less than 10 artefacts.

 Table 8-3 lists the 91 sites within the Additional Disturbance Area and Figure 8-1 to Figure 8-3

 shows the location of the sites. The identifying IDs on Figure 8-1 to Figure 8-3 correspond to the

IDs in **Table 8-3**. Additionally, IDs with a yellow text buffer in **Figure 8-1** to **Figure 8-3** are newly recorded sites and IDs with a white text buffer are previously recorded sites. As shown in **Table 8-3**, most of the sites that will be impacted by the Project have a low scientific significance. 14 of these sites have either low–moderate or moderate scientific values due mostly to the potential presence of subsurface deposits.

Three newly recorded sites (Glendell North IF25, OS24 and OS27) were recorded outside of the Additional Disturbance Area within the DA 80_952 approved disturbed boundary for the Glendell Mine. As a result, these sites were salvaged on 12 November 2018 under the terms of Section 6.2.1.1 of the MOC ACHMP. All artefacts previously recorded, along with several newly identified, were successfully salvaged. Full details of the salvage are presented in **Appendix 3**.

These sites are not included in **Table 8-3** as they were located outside of the Additional Disturbance Area. The salvage of these sites does not alter the number of sites (n=91) that will be impacted should the Project be approved.

Table 8-3 shows that 89 sites will be totally impacted by the Project and two sites that will be partially impacted by the Project.

ID	AHIMS ID	Site name	GDA Zone 56 Easting	GDA Zone 56 Northing	Site type	Scientific significance	Consequence of harm (Total/Partial/No Loss of Value)
2	37-3-1559	Glendell North OS2	317930	6413515	Artefact scatter	Low	Total loss of value
3	37-3-1558	Glendell North OS3	317792	6413230	Artefact scatter	Low	Total loss of value
4	37-3-1557	Glendell North OS4	317761	6413127	Artefact scatter	Low	Total loss of value
5	37-3-1569	Glendell North OS5	316619	6413304	Artefact scatter with PAD	Low-moderate	Total loss of value
6	37-3-1571	Glendell North OS6	316443	6413081	Artefact scatter with PAD	Moderate	Total loss of value
8	37-3-1549	Glendell North OS8	316386	6412999	Artefact scatter	Low	Total loss of value
11	37-3-1554	Glendell North OS11	318126	6412284	Artefact scatter	Low	Total loss of value
12	37-3-1553	Glendell North OS12	316810	6412250	Artefact scatter	Low	Total loss of value
13	37-3-1552	Glendell North OS13	317915	6411844	Artefact scatter	Low	Total loss of value
14	37-3-1551	Glendell North OS14	317705	6411820	Artefact scatter	Low	Total loss of value
15	37-3-1550	Glendell North OS15	317055	6412013	Artefact scatter	Low	Total loss of value
16	37-3-1573	Glendell North OS16	317599	6410970	Artefact scatter with PAD	Low-moderate	Total loss of value
17	37-3-1542	Glendell North OS17	317850	6410521	Artefact scatter	Low	Total loss of value
18	37-3-1541	Glendell North OS18	317852	6410274	Artefact scatter	Low	Total loss of value

Table 8-3: All known sites within the Additional Disturbance Area.

ID	AHIMS ID	Site name	GDA Zone 56 Easting	GDA Zone 56 Northing	Site type	Scientific significance	Consequence of harm (Total/Partial/No Loss of Value)
19	37-3-1572	Glendell North OS19	317790	6410020	Artefact scatter with PAD	Low-moderate	Total loss of value
20	37-3-1540	Glendell North OS20	317856	6409957	Artefact scatter	Low	Total loss of value
21	37-3-1539	Glendell North OS21	318418	6410236	Artefact scatter	Low	Total loss of value
22	37-3-1538	Glendell North OS22	319293	6410281	Artefact scatter	Low	Total loss of value
23	37-3-1537	Glendell North OS23	318500	6410083	Artefact scatter	Low	Partial loss of value
25	37-3-1570	Glendell North OS25	318367	6408758	Artefact scatter with PAD	Low-moderate	Total loss of value
26	37-3-1548	Glendell North OS26	318224	6410798	Artefact scatter	Low	Total loss of value
29	37-3-1547	Glendell North OS29	318291	6408381	Artefact scatter	Low	Total loss of value
30	37-3-1546	Glendell North OS30	318530	6408206	Artefact scatter	Low	Total loss of value
31	37-3-1545	Glendell North OS31	318827	6407525	Artefact scatter	Low	Total loss of value
34	37-3-1574	Glendell North OS34	317447	6411053	Artefact scatter with PAD	Moderate	Total loss of value
35	37-3-1567	Glendell North OS35	317371	6411106	Artefact scatter with PAD	Low-moderate	Partial loss of value
36	37-3-1568	Glendell North OS36	316670	6413398	Artefact scatter with PAD	Low-moderate	Total loss of value
37	37-3-1562	Glendell North OS37	317843	6412369	Artefact scatter	Low	Total loss of value
38	37-3-1565	Glendell North OS38	317557	6411704	Artefact scatter	Low	Total loss of value
39	37-3-1576	Glendell North OS39	318028	6409888	Artefact scatter	Low	Total loss of value
41	37-3-1534	Glendell North IF2	317146	6413503	Isolated find	Low	Total loss of value
42	37-3-1533	Glendell North IF3	317120	6413414	Isolated find	Low	Total loss of value
43	37-3-1532	Glendell North IF4	316962	6412937	Isolated find	Low	Total loss of value
44	37-3-1531	Glendell North IF5	318054	6412783	Isolated find	Low	Total loss of value
47	37-3-1528	Glendell North IF8	316956	6412606	Isolated find	Low	Total loss of value
49	37-3-1526	Glendell North IF10	318745	6411655	Isolated find	Low	Total loss of value
50	37-3-1525	Glendell North IF11	317221	6411282	Isolated find	Low	Total loss of value
51	37-3-1524	Glendell North IF12	317765	6410903	Isolated find	Low	Total loss of value
52	37-3-1523	Glendell North IF13	317688	6410830	Isolated find	Low	Total loss of value
53	37-3-1522	Glendell North IF14	317752	6410825	Isolated find	Low	Total loss of value
54	37-3-1521	Glendell North IF15	317683	6410588	Isolated find	Low	Total loss of value

ID	AHIMS ID	Site name	GDA Zone 56 Easting	GDA Zone 56 Northing	Site type	Scientific significance	Consequence of harm (Total/Partial/No Loss of Value)
55	37-3-1520	Glendell North IF16	319072	6410845	Isolated find	Low	Total loss of value
56	37-3-1519	Glendell North IF17	317777	6409943	Isolated find	Low	Total loss of value
57	37-3-1518	Glendell North IF18	317723	6409918	Isolated find	Low	Total loss of value
59	37-3-1515	Glendell North IF20	318022	6409310	Isolated find	Low	Total loss of value
60	37-3-1514	Glendell North IF21	318328	6408936	Isolated find	Low	Total loss of value
61	37-3-1516	Glendell North IF22	317984	6410954	Isolated find	Low	Total loss of value
63	37-3-1512	Glendell North IF24	318253	6411466	Isolated find	Low	Total loss of value
65	37-3-1566	Glendell North IF26	318253	6408957	Isolated find with PAD	Low	Total loss of value
66	37-3-1564	Glendell North IF27	317260	6411851	Isolated find	Low	Total loss of value
67	37-3-1563	Glendell North IF28	317241	6411913	Isolated find	Low	Total loss of value
68	37-3-1575	Glendell North IF29	317613	6411755	Isolated find	Low	Total loss of value
70	37-3-0294	Site 2; (MORL2)	321168	6410327	Artefact scatter	Low	Total loss of value
73	37-3-0469	Bowmans/S wamp Creek Trench 1	318072	6409137	Artefact scatter with PAD	Moderate	Total loss of value
75	37-3-0521	MO-IF1	319123	6410319	Isolated find	Low	Total loss of value
76	37-3-0612	Bettys Creek 22	321138	6410296	Isolated find	Low	Total loss of value
79	37-3-0689	G11 Glendell	319223	6410211	Artefact scatter with PAD	Low	Total loss of value
81	37-3-0744	York Creek 1	317440	6411356	Artefact scatter	Low	Total loss of value
82	37-3-0745	York Creek 2	317577	6411112	Artefact scatter	Low	Total loss of value
83	37-3-0746	York Creek 3	317745	6411008	Artefact scatter	Low	Total loss of value
84	37-3-0747	York Creek 4	317373	6411322	Artefact scatter	Low-moderate	Total loss of value
85	37-3-0748	York Creek 5	317365	6411471	Artefact scatter	Low	Total loss of value
86	37-3-0749	York Creek 6	317501	6411813	Artefact scatter	Low	Total loss of value
87	37-3-0750	York Creek 7	317484	6412170	Artefact scatter with PAD	Low-moderate	Total loss of value
88	37-3-0751	York Creek 8	317496	6412805	Isolated find	Low	Total loss of value
89	37-3-0752	York Creek 9	317685	6411312	Artefact scatter	Low	Total loss of value
90	37-3-0753	York Creek 10	317865	6412266	Artefact scatter	Low	Total loss of value
91	37-3-0754	York Creek 11	317782	6412443	Artefact scatter with PAD	Low-moderate	Total loss of value

ID	AHIMS ID	Site name	GDA Zone 56 Easting	GDA Zone 56 Northing	Site type	Scientific significance	Consequence of harm (Total/Partial/No Loss of Value)
92	37-3-0755	York Creek 12	317846	6412581	Artefact scatter	Low	Total loss of value
93	37-3-0756	York Creek 13	318352	6411400	Artefact scatter	Low	Total loss of value
94	37-3-0757	York Creek 14	318417	6411813	Isolated find	Low	Total loss of value
95	37-3-0758	York Creek 15	317849	6411202	Artefact scatter	Low	Total loss of value
96	37-3-0759	York Creek 16	317827	6411497	Artefact scatter	Low	Total loss of value
97	37-3-0760	York Creek 17	317626	6412595	Isolated find	Low	Total loss of value
98	37-3-0761	York Creek 18	317712	6412158	Isolated find with PAD	Low-moderate	Total loss of value
99	37-3-0762	Bowmans Ck 6	317645	6410765	Artefact scatter	Low	Total loss of value
100	37-3-0763	Bowmans Ck 7	316542	6413142	Artefact scatter with PAD	Moderate	Total loss of value
101	37-3-0764	Bowmans Ck 8	317205	6412329	Artefact scatter	Low	Total loss of value
102	37-3-0765	Bowmans Ck 9	316878	6412410	Artefact scatter	Low	Total loss of value
103	37-3-0766	Bowmans Ck 10	316833	6412566	Artefact scatter	Low	Total loss of value
107	37-3-0773	Swamp Ck 10	319006	6411169	Isolated find	Low	Total loss of value
109	37-3-1155	MT OWEN ISOLATED FIND2	317854	6411236	Isolated find	Low	Total loss of value
110	37-3-1156	MT OWEN ISOLATED FIND1	318001	6410455	Isolated find	Low	Total loss of value
111	37-3-1158	RPS DLW IF1	317148	6412677	Isolated find	Low	Total loss of value
114	37-3-1198	MOCO OS- 10	317840	6409364	Artefact scatter	Low	Total loss of value
115	37-3-1490	Swamp Creek IF-4	318805	6407340	Isolated find	Low	Total loss of value
116	37-3-1492	Swamp Creek IF-2	318807	6407327	Isolated find	Low	Total loss of value
117	37-3-1493	Swamp Creek IF-3	318805	6407330	Isolated find	Low	Total loss of value
118	37-3-1494	Swamp Creek IF-1	318640	6407727	Isolated find	Low	Total loss of value
122	37-3-1499	Swamp Creek-OS1	318819	6407300	Artefact scatter	Low	Total loss of value
124	37-3-1503	Yorks Creek 19	317369	6411237	Artefact scatter with PAD	Low	Total loss of value



Figure 8-1: Potentially impacted sites in the northern portion of the Additional Disturbance Area¹⁰.

¹⁰ IDs with a yellow text buffer are newly recorded sites and IDs with a white text buffer are previously recorded sites.







Figure 8-3: Potentially impacted sites in the eastern portion of the Additional Disturbance Area.

8.3.1 Ecologically sustainable development principles

The goal of ecologically sustainable development (ESD) is:

Development that improves the total quality of life, both now and in the future, in a way that maintains the ecological processes on which life depends.

The Core Objectives of ESD are:

- To enhance individual and community well-being and welfare by following a path of economic development that safeguards the welfare of future generations;
- To provide for equity within and between generations; and
- To protect biological diversity and maintain essential ecological processes and life-support systems.

As such, the ESD principles have limited applicability to cultural heritage although the notion of intergenerational equity is relevant. This is understood to refer to future generations being able to enjoy, interact with and study aspects of cultural heritage that are available to current generations.

8.3.1.1 Applicability to the Project

The Project will result in impact to 91 recorded Aboriginal sites. How to quantify this loss of heritage value to future generations is difficult. To understand the overall impact to heritage values, an interplay between the nature and type of site, and its representativeness must be considered. Also, the cumulative harm of large-scale mining in the district must be considered.

While 91 sites sound like a large number, 97% of these sites are low density artefact scatters or isolated finds; and there are less than 500 artefacts associated with these sites. However, when added to the many sites that have been destroyed because of the existing MOC, let alone the hundreds more in the district from approved mining and infrastructure development impacts, the scale of the loss becomes more obvious. It is often stated that the piecemeal destruction of sites— project by project, modification by modification—mask the true nature of the cumulative impact. While this is true, it has also been noted in this report that the real harbinger of site destruction in the district is not mining but colonial agricultural practices and historical land use that have destroyed, dispersed or disturbed countless sites long before the local occurrence of mining.

Notwithstanding this observation, the current proposal to harm a further 91 sites cannot be summarily dismissed but needs to be acknowledged. While the sites themselves may be unremarkable in their manifestation, and while the site types are commonly represented across the district, their loss is a further diminution of the district's archaeological resource.

While this loss is palpable, most sites being destroyed have a very low artefact density and do not contain rare or unique features. Further, most have been previously disturbed, and the Project is certainly not harming any area that represents an undisturbed archaeological landscape.

While it is acknowledged that the loss of 91 sites is a diminution of inter-generational equity, the archaeological measures contained in this report (**Section 9**), and in the ACHAR that this AAIA accompanies, are designed to mitigate, as much as is possible, this loss of inter-generational equity.

9 MANAGEMENT AND MITIGATION: ABORIGINAL HERITAGE

9.1 GENERAL PRINCIPLES FOR THE MANAGEMENT OF ABORIGINAL SITES

This report will concentrate on the management of the archaeological values present within the Additional Disturbance Area, although given the cultural connection this archaeological landscape has for certain communities, an understanding of the RAPs cultural values in connection to the area is also embedded in the archaeological management recommendations that follow.

For example, from a purely archaeological perspective, much of the Additional Disturbance Area is so altered from the area's agricultural phase that further archaeological investigation would only be able to address very basic research questions (i.e. artefacts found on a dam wall are obviously displaced, and apart from saying that there were once artefacts in the area, they do not have the ability to tell researchers much more). As no meaningful archaeological information could be gained from these sites, a purely archaeological recommendation should be that no further investigation is justified.

However, the basis of the following proposed archaeological management will be to understand that, even if a site is diminished in its archaeological values, that its physical manifestation may still have cultural value to certain communities. Therefore, the task of the management recommendations in this report will be to frame research questions that will enable a thorough study of all the Additional Disturbance Area's remaining archaeological values: not only those locations displaying high archaeological values.

9.2 EXISTING ARCHAEOLOGICAL MANAGEMENT AT THE MOC

9.2.1 Background

The ACHMP is one of a series of Environmental Management Plans that together form the Environmental Management System for the MOC. Current and approved operations within the MOC include:

- Mount Owen North Pit;
- Ravensworth East (Bayswater North Pit); and
- Glendell Pit.

The ACHMP documents procedures for management for Aboriginal cultural heritage values within the approval area for Mount Owen and Ravensworth East (SSD-5850), incorporating the Glendell Mine (DA 80/952). A modification, 'MOCO MOD 1', of SSD-5850 was approved by the then Department of Planning and Environment in 2017 and approves the construction and operation of a water pipeline from Integra Underground to the MOC. A further modification, 'MOCO MOD 2' was approved by the Department of Planning, Industry and Environment (DPIE) in 2019 and allows access to an additional approximately 35 Mt of ROM coal from the North Pit and the extension of the mine life by an additional six years (through to 2037). A modification, 'Glendell MOD 4', of DA 80/952 is currently being assessed. This modification would allow a minor extension to the Barrett Pit at the Glendell Mine.

The MOC incorporates several management areas set aside for their Aboriginal cultural and/or ecological values. The management areas include Yorks Creek VCA area, the Bettys Creek Habitat Management Area (HMA) and the Bowmans Creek and Swamp Creek landscape.

The MOC supports a project to study the archaeological values in non-impact areas. The study focuses on the AHIMS registered sites in the ACHMP area and involves survey to ground-truth the location and monitor the condition of all previously recorded sites. The aim of this survey is to recommend procedures to ensure that these sites are preserved in the landscape. In most cases, this preservation will involve fencing and signage, although if erosion threatens a site, broader erosion controls may be needed. The MOC has committed funding to review and monitor these sites, including remediation activities.

9.2.2 Aboriginal Party Consultation

The Glencore *Protocol for Aboriginal Cultural heritage – NSW* outlines the Glencore's policy of engagement with Aboriginal people in all aspects of cultural heritage assessment, reporting and conservation.

9.2.2.1 Aboriginal Cultural Heritage Working Group

The MOC Aboriginal Cultural Heritage Working Group (ACHWG) oversees the implementation of the ACHMP and actively contributes to the development of cultural heritage management options and recommendations for Aboriginal objects or places associated with the operation. This is achieved by:

- Providing relevant information about the cultural significance and values of the Aboriginal object(s) and/or place(s);
- Providing for ongoing communication of information on mining operations and cultural heritage management;
- Providing advice on how to address community relationships; and
- Commenting on draft assessment reports and management plans before they are submitted to regulatory authorities.

The ACHWG comprises the following representatives:

- Two representatives of the Wonnarua Nation;
- Two representatives of the Plains Clans of the Wonnarua People;
- Two representatives of the Wanaruah Local Aboriginal Lands Council; and

• At least three representatives of the MOC who may be employees, or suitably qualified heritage professionals.

9.2.3 Protection measures for cultural heritage sites

The following general Aboriginal heritage management measures have been implemented at MOC:

- A significant area of the MOC has been previously surveyed by archaeologists and Aboriginal community groups;
- A geographic information system (GIS) database of Aboriginal sites has been established;
- MOC maintains an up to date mine plan which minimises mining in areas of high Aboriginal significance;
- Inclusion of an Aboriginal heritage section within the MOC site induction. This makes contractors aware of responsibilities under NPW Act and location of known sites;
- Pre-clearance surveys are undertaken prior to any ground disturbance through the Ground Disturbance Permit (GDP) process;
- Verification, photographic and site condition monitoring of Aboriginal sites takes place in areas outside approved disturbance areas; and
- Fencing of sites within management areas, including Yorks Creek VCA, Biodiversity Offset Areas and the Bettys Creek HMA and the Bowmans Creek and Swamp Creek landscape.

9.2.4 Discovery of new Aboriginal sites

In the event of discovery of new Aboriginal sites which are more than 50 m from previously recorded boundaries of Aboriginal sites, all work close to the discovery will cease and an area of 10 m around the site fenced with temporary construction fencing. An archaeologist and members of RAPs will be contacted to determine the significance of the Aboriginal objects(s) present. New sites will be registered in the AHIMS database.

9.2.4.1 Management of newly discovered sites within currently approved operations

Any new Aboriginal sites identified within the approved disturbance areas will be temporarily fenced as quickly as possible. Signage on the fencing is to state that the area is subject to environmental protection, where no ground disturbance is allowed, and will include relevant contact details for MOC staff. The minor impact to the ground surface during installation of fence posts is permissible only on condition that no soil is to be removed off site. The following procedure will be implemented for any newly identified sites:

- The site will be assessed by a qualified archaeologist and members of the RAPs;
- The site will be considered for fencing;
- The site location will be registered with AHIMS and a site card submitted;

- The site location will be entered on to the MOC GIS database;
- Depending on the Aboriginal cultural heritage values at the site and the degree of immediate threat to the site, the site will be salvaged according to the methodology in Section 6.2.1.1. and 6.2.1.2 of the MOC ACHMP;
- A brief report of the salvage will be produced to record the findings;
- On completion of the salvage at such sites, an AHIMS ASIRF will be completed (Section 7.2.3). Copies of the forms will be archived. Digital copies will be submitted to the AHIMS registrar soon after the completion of salvage fieldwork. The form will be lodged within a reasonable time of fieldwork completion and certainly within six months; and
- All artefacts salvaged will be stored in the artefact storage facility (MOC ACHMP Section 5.5).

9.2.4.2 Management of newly discovered sites outside of the currently approved operations

Any new Aboriginal site identified outside the approved disturbance areas will be managed in accordance with the following procedure:

- The site will be assessed by a qualified archaeologist and members of the RAPs;
- The site will be considered for fencing;
- The site location will be registered with AHIMS and a site card submitted;
- The site location will be entered on to the MOC GIS database;
- If the site contains Aboriginal objects of interest such as many artefacts or rare features such as a hearth that is located in an area of active and destructive erosion, the site may be subject to limited salvage excavation in accordance with the methodology set out in MOC ACHMP Section 6.2.1.2. The aim of any salvage undertaken in this instance would be to prevent the loss of information from ongoing erosion and will only be undertaken in extreme and obvious circumstances with the full consultation and participation of the RAPs;
- On the completion of salvage at such sites, an AHIMS ASIRF will be completed (see MOC ACHMP Section 7.2.3). Copies of the forms will be archived. Digital copies will be submitted to the AHIMS registrar soon after completion of salvage fieldwork. The form will be lodged within six months from the completion of fieldwork; and
- Outside of emergency situations as set out above, any impact to sites outside of the approved disturbance area will require an AHIP.

9.2.4.3 Human skeletal remains

In the event known or suspected Aboriginal skeletal remains are encountered during the course of development the following procedure will be followed:

• All work will cease immediately and an area of 10 m radius around the find will be cordoned off with temporary construction fencing;

- The find will be immediately reported to the work supervisor who will immediately advise the Environment and Community Manager, or another nominated senior staff member;
- MOC will promptly notify the police (as required for all human remains discoveries);
- MOC will contact BCD for advice on identification of the skeletal material as Aboriginal and management of the material; and
- If the remains are Aboriginal ancestral remains, the RAPs will be contacted within two working days and consultative arrangements will be made to discuss ongoing care of the remains, including advice on recommended forensic anthropologists.

9.3 MANAGEMENT OPTIONS

The management of any archaeological landscape must include the consideration of all available options and an evaluation of the viability of these options to achieve the best archaeological outcome.

In brief there are three main options available and the archaeological merits of each option will be discussed below.

9.3.1 Option A: Do Nothing

This option is a real possibility because if the Project is not approved then a 'do nothing' option will be followed probably with little more management of the archaeological landscape than is happening at present. A 'do nothing' option, in its purist sense, will mean no 'extra' management of the archaeological landscape.

Whilst no sites would be deliberately destroyed and would be captured as part of the existing site GIS database and GDP processes, this option will not stop the on-going natural deterioration of sites in the Additional Disturbance Area, and as a result, this option would contribute to the cumulative loss of sites in the region.

Option A makes a small contribution to intergenerational equity as, in theory, the landscape is preserved (albeit with on-going erosion) and would be available for future generations to visit.

However, all the Additional Disturbance Area is on MOC owned land. This does not allow, in the short term at least, for free access and use of any areas. Additionally, as discussed above, without management there will be a landscape surviving but one continuing to be denuded of A-Horizon soils and a landscape without, in all likelihood, many archaeological sites in good condition.

9.3.2 Option B: Modify project design to avoid harm

Another option that can be considered is that certain areas, now within the Additional Disturbance Area, could be excluded from the Project design and the areas conserved as archaeological / cultural zones.

However, no individual artefact scatter, or group of artefact scatters, within the Additional Disturbance Area was assessed as of high enough archaeological significance that would justify major design changes to avoid particular areas.

While it is possible in theory to avoid mining activity in certain areas, the following questions need to be borne in mind:

- What is being saved?
- Does the item have high enough social or archaeological values to justify saving?
- What is the long-term advantage of saving such an item?
- How will the item ultimately be managed and used?
- Would the benefit of doing these works from an archaeological perspective be outweighed by other archaeological mitigation strategies?

Given the nature of the current recordings (low-density artefact scatters), the past loss of archaeological landscape context and the impact of on-going erosion, it is difficult to justify major Project design changes on archaeological grounds alone.

Should Option B be followed, the Project would contribute less to the cumulative loss of sites in the region by permanently preserving a number of sites. The Project could also add to intergenerational equity by following Option B as the preserved areas would potentially be available, at some time when mining concludes, for future generations to use and enjoy.

Elsewhere in the main volume of the EIS, the rationale behind the need to mine or modify areas within the Additional Disturbance Area are discussed. Given the condition and context of the sites, the history of past impacts in their vicinity and their location in areas vital for the successful operation of the Project, the current assessment does not see an Option B approach for archaeological management as practical and therefore this option is not recommended.

9.3.3 Option C: No design change and mitigate archaeological impacts

If the Project is granted development consent in its current form, then there is likely impact to 91 Aboriginal sites within the Additional Disturbance Area.

Under the scenario of Project approval, Option C should be followed and the loss of archaeological value to the 91 impacted sites will be mitigated. This option would be carried out with the advice and involvement of the RAPs under the terms of an approved ACHMP. It would also follow all appropriate guidelines pertaining to the NPW Act. This option is also supported in Article 28 of *The Burra Charter* (Australia ICOMOS 2013) that reads:

Article 28. Disturbance of fabric

28.1 Disturbance of significant fabric for study, or to obtain evidence, should be minimised. Study of a place by any disturbance of the fabric, including archaeological excavation, should only be undertaken to provide data essential for decisions on the conservation of the place, or to obtain important evidence about to be lost or made inaccessible.

28.2 Investigation of a place which requires disturbance of the fabric, apart from that necessary to make decisions, may be appropriate provided that it is consistent with the policy for the place. Such investigation should be based on important research questions which have potential to substantially add knowledge, which cannot be answered in other ways and which minimises disturbance to the fabric.

The Burra Charter (2013) is the primary guideline policy document for the conservation and protection of Australian cultural heritage. According to the Burra Charter, the destruction of fabric is to be avoided although it is recognised that destruction of fabric is sometimes unavoidable. *The Burra Charter* recommends that mitigation studies be undertaken to offset the loss of fabric.

In the face of widespread disturbance, Option C is justified: "to obtain important evidence about to be lost or made inaccessible". This loss of fabric (i.e. archaeological sites) will be minimised in the sense that only areas within the Additional Disturbance Area will be investigated and all archaeological investigations will be framed within research questions that will allow as much information to be captured before the sites are further impacted by erosion and "lost" forever. The "policy" to oversee and control this "destruction of fabric" would be an ACHMP that would be developed in consultation with the RAPs following Project approval.

Option C contributes to the cumulative loss of sites from the region because the relatively large Additional Disturbance Area would be subject to archaeological salvage works. Option C also does not add substantially to intergenerational equity: apart from the fact that the salvage program, if conducted as described below, will capture further information about the archaeological landscape within the Additional Disturbance Area that will be available to future generations and scholars seeking information about the area.

Should the Project be approved in its present form, Option C will form the basis of the management recommendations that follow.

9.4 MANAGEMENT AND MITIGATION OF RECORDED ABORIGINAL SITES

9.4.1 Archaeological salvage

Because of the current and previous assessments, 91 sites have been recorded within the Additional Disturbance Area.

As listed in **Table 9-1**, the most common management strategy recommended on archaeological grounds alone is for the salvage of a site through the recording and collection of surface artefacts. This recommendation is made due to:

- The nature of the recorded sites (97% of sites are isolated finds, low-density artefact scatters with no associated subsurface deposits, or contain low-density subsurface deposits);
- Generally thin A-Horizon soils that preclude subsurface archaeological deposits;
- Generally high previous disturbance from a range of factors including erosion and land use practices; and
- The low archaeological values assigned to the sites.

Sites designated for surface artefact collection have a very limited ability to further inform the community about the history and culture of the area. While any potential research questions are limited, some information can nevertheless be gained.

Table 9-1 sets out the recommended archaeological management of all sites within or adjacent to the Additional Disturbance Area. The four sites highlighted with a blue shade include limited archaeological excavation as a management recommendation.

AHIMS ID	Site name	Site type	Scientific significance	Degree of harm	Comment	Management strategy
37-3-1559	Glendell North OS2	Artefact scatter	Low	Total	Low density artefact scatter	Mapping, description and collection of surface artefact
37-3-1558	Glendell North OS3	Artefact scatter	Low	Total	Low density artefact scatter	Mapping, description and collection of surface artefact
37-3-1557	Glendell North OS4	Artefact scatter	Low	Total	Low density artefact scatter	Mapping, description and collection of surface artefact
37-3-1569	Glendell North OS5	Artefact scatter with PAD	Low - moderate	Total	Low density artefact scatter Further archaeological excavation deemed unwarranted due to very low density of subsurface artefacts	No action required as no surface artefacts present
37-3-1571	Glendell North OS6	Artefact scatter with PAD	Moderate	Total	Moderate density artefact scatter with subsurface deposits	Mapping, description and collection of surface artefacts Archaeological excavation to gain a better understanding of the nature of deposits on the spur landform adjacent to Bowmans Creek (Section 9.5.2).
37-3-1549	Glendell North OS8	Artefact scatter	Low	Total	Low density artefact scatter	Mapping, description and collection of surface artefact

Table 9-1: Management recommendations for sites within the Additional Disturbance Area.

AHIMS ID	Site name	Site type	Scientific significance	Degree of harm	Comment	Management strategy
37-3-1554	Glendell North OS11	Artefact scatter	Low	Total	Low density artefact scatter	Mapping, description and collection of surface artefact
37-3-1553	Glendell North OS12	Artefact scatter	Low	Total	Low density artefact scatter	Mapping, description and collection of surface artefact
37-3-1552	Glendell North OS13	Artefact scatter	Low	Total	Low density artefact scatter	Mapping, description and collection of surface artefact
37-3-1551	Glendell North OS14	Artefact scatter	Low	Total	Low density artefact scatter	Mapping, description and collection of surface artefact
37-3-1550	Glendell North OS15	Artefact scatter	Low	Total	Low density artefact scatter	Mapping, description and collection of surface artefact
37-3-1573	Glendell North OS16	Artefact scatter with PAD	Low - moderate	Total	Low density artefact scatter Further archaeological excavation deemed unwarranted due to very low density of subsurface artefacts	Mapping, description and collection of surface artefact
37-3-1542	Glendell North OS17	Artefact scatter	Low	Total	Low density artefact scatter	Mapping, description and collection of surface artefact
37-3-1541	Glendell North OS18	Artefact scatter	Low	Total	Low density artefact scatter	Mapping, description and collection of surface artefact
37-3-1572	Glendell North OS19	Artefact scatter with PAD	Low - moderate	Total	Low density artefact scatter Further archaeological excavation deemed unwarranted due to very low density of subsurface artefacts	Mapping, description and collection of surface artefact
37-3-1540	Glendell North OS20	Artefact scatter	Low	Total	Low density artefact scatter	Mapping, description and collection of surface artefact
37-3-1539	Glendell North OS21	Artefact scatter	Low	Total	Low density artefact scatter	Mapping, description and collection of surface artefact
37-3-1538	Glendell North OS22	Artefact scatter	Low	Total	Low density artefact scatter	Mapping, description and collection of surface artefact
37-3-1537	Glendell North OS23	Artefact scatter	Low	Total (although only part of the site extent is within the Additional Disturbance Area, it is recommended that the entire site be salvaged)	Low density artefact scatter	Mapping, description and collection of surface artefact

AHIMS ID	Site name	Site type	Scientific significance	Degree of harm	Comment	Management strategy
37-3-1570	Glendell North OS25	Artefact scatter with PAD	Low - moderate	Total	Low density artefact scatter Further archaeological excavation deemed unwarranted due to very low density of subsurface artefacts	Mapping, description and collection of surface artefact
37-3-1548	Glendell North OS26	Artefact scatter	Low	Total	Low density artefact scatter	Mapping, description and collection of surface artefact
37-3-1547	Glendell North OS29	Artefact scatter	Low	Total	Low density artefact scatter	Mapping, description and collection of surface artefact
37-3-1546	Glendell North OS30	Artefact scatter	Low	Total	Low density artefact scatter	Mapping, description and collection of surface artefact
37-3-1545	Glendell North OS31	Artefact scatter	Low	Total	Low density artefact scatter	Mapping, description and collection of surface artefact
37-3-1574	Glendell North OS34	Artefact scatter with PAD	Moderate	Total (although only part of the site extent is within the Additional Disturbance Area, it is recommended that the entire site be salvaged)	Low density artefact scatter with known subsurface deposits	Mapping, description and collection of surface artefacts Archaeological excavation to gain a better understanding of the nature of deposits associated with the confluence of Yorks and Bowmans Creek (Section 9.5.2).
37-3-1567	Glendell North OS35	Artefact scatter with PAD	Moderate	Total (although only part of the site extent is within the Additional Disturbance Area, it is recommended that the entire site be salvaged)	Low density artefact scatter. Further archaeological excavation deemed unwarranted due to very low density of subsurface artefacts	No action required as no surface artefacts present
37-3-1568	Glendell North OS36	Artefact scatter with PAD	Low - moderate	Total	Low density artefact scatter Further archaeological excavation deemed unwarranted due to very low density of subsurface artefacts	No action required as no surface artefacts present
37-3-1562	Glendell North OS37	Artefact scatter	Low	Total	Low density artefact scatter	Mapping, description and collection of surface artefact
37-3-1565	Glendell North OS38	Isolated find	Low	Total	Low density artefact scatter	Mapping, description and collection of surface artefact
37-3-1576	Glendell North OS39	Artefact scatter	Low	Total	Low density artefact scatter	Mapping, description and collection of surface artefact

AHIMS ID	Site name	Site type	Scientific significance	Degree of harm	Comment	Management strategy
37-3-1534	Glendell North IF2	Isolated find	Low	Total	Isolated artefact	Mapping, description and collection of surface artefact
37-3-1533	Glendell North IF3	Isolated find	Low	Total	Isolated artefact	Mapping, description and collection of surface artefact
37-3-1532	Glendell North IF4	Isolated find	Low	Total	Isolated artefact	Mapping, description and collection of surface artefact
37-3-1531	Glendell North IF5	Isolated find	Low	Total	Isolated artefact	Mapping, description and collection of surface artefact
37-3-1528	Glendell North IF8	Isolated find	Low	Total	Isolated artefact	Mapping, description and collection of surface artefact
37-3-1526	Glendell North IF10	Isolated find	Low	Total	Isolated artefact	Mapping, description and collection of surface artefact
37-3-1525	Glendell North IF11	Isolated find	Low	Total	Isolated artefact	Mapping, description and collection of surface artefact
37-3-1524	Glendell North IF12	Isolated find	Low	Total	Isolated artefact	Mapping, description and collection of surface artefact
37-3-1523	Glendell North IF13	Isolated find	Low	Total	Isolated artefact	Mapping, description and collection of surface artefact
37-3-1522	Glendell North IF14	Isolated find	Low	Total	Isolated artefact	Mapping, description and collection of surface artefact
37-3-1521	Glendell North IF15	Isolated find	Low	Total	Isolated artefact	Mapping, description and collection of surface artefact
37-3-1520	Glendell North IF16	Isolated find	Low	Total	Isolated artefact	Mapping, description and collection of surface artefact
37-3-1519	Glendell North IF17	Isolated find	Low	Total	Isolated artefact	Mapping, description and collection of surface artefact
37-3-1518	Glendell North IF18	Isolated find	Low	Total	Isolated artefact	Mapping, description and collection of surface artefact
37-3-1515	Glendell North IF20	Isolated find	Low	Total	Isolated artefact	Mapping, description and collection of surface artefact
37-3-1514	Glendell North IF21	Isolated find	Low	Total	Isolated artefact	Mapping, description and collection of surface artefact
37-3-1516	Glendell North IF22	Isolated find	Low	Total	Isolated artefact	Mapping, description and collection of surface artefact
37-3-1512	Glendell North IF24	Isolated find	Low	Total	Isolated artefact	Mapping, description and collection of surface artefact
37-3-1566	Glendell North IF26	Isolated find with PAD	Low	Total	Isolated artefact with very low- density subsurface deposit Further archaeological	No action required as no surface artefacts present

AHIMS ID	Site name	Site type	Scientific significance	Degree of harm	Comment	Management strategy
					excavation deemed unwarranted due to very low density of subsurface artefacts	
37-3-1564	Glendell North IF27	Isolated find	Low	Total	Isolated artefact	Mapping, description and collection of surface artefact
37-3-1563	Glendell North IF28	Isolated find	Low	Total	Isolated artefact	Mapping, description and collection of surface artefact
37-3-1575	Glendell North IF29	Isolated find	Low	Total	Isolated artefact	Mapping, description and collection of surface artefact
37-3-0294	Site 2; (MORL2)	Artefact scatter	Low	Total	Low density artefact scatter	Mapping, description and collection of surface artefact
37-3-0469	Bowmans/Swamp Creek Trench 1	Artefact scatter with PAD	Moderate	Total (already partially destroyed)	Moderate density artefact scatter	Mapping, description and collection of surface artefact Archaeological excavation to gain a better understanding of the nature of deposits associated with Bowmans and Swamp Creek (Section 9.5.2).
37-3-0521	MO-IF1	Isolated find	Low	Total	Isolated artefact	Mapping, description and collection of surface artefact
37-3-0612	Bettys Creek 22	Isolated find	Low	Total	Isolated artefact	Mapping, description and collection of surface artefact
37-3-0689	G11 Glendell	Artefact scatter with PAD	Low	Total	Low density artefact scatter Further archaeological excavation deemed unwarranted due to very low density of subsurface artefacts	Mapping, description and collection of surface artefacts
37-3-0744	York Creek 1	Artefact scatter	Low	Total	Low density artefact scatter	Mapping, description and collection of surface artefacts
37-3-0745	York Creek 2	Artefact scatter	Low	Total	Low density artefact scatter	Mapping, description and collection of surface artefacts
37-3-0746	York Creek 3	Artefact scatter	Low	Total	Low density artefact scatter	Mapping, description and collection of surface artefacts
37-3-0747	York Creek 4	Artefact scatter	Low - moderate	Total	Low density artefact scatter Further archaeological excavation deemed unwarranted due to very low density of	Mapping, description and collection of surface artefacts

AHIMS ID	Site name	Site type	Scientific significance	Degree of harm	Comment	Management strategy
					subsurface artefacts	
37-3-0748	York Creek 5	Artefact scatter	Low	Total	Low density artefact scatter	Mapping, description and collection of surface artefacts
37-3-0749	York Creek 6	Artefact scatter	Low	Total	Low density artefact scatter	Mapping, description and collection of surface artefact
37-3-0750	York Creek 7	Artefact scatter with PAD	Low - moderate	Total	Low density artefact scatter Further archaeological excavation deemed unwarranted due to very low density of subsurface artefacts	No action required as no surface artefacts present
37-3-0751	York Creek 8	Isolated find	Low	Total	Isolated artefact	Mapping, description and collection of surface artefact
37-3-0752	York Creek 9	Artefact scatter	Low	Total	Low density artefact scatter	Mapping, description and collection of surface artefact
37-3-0753	York Creek 10	Artefact scatter	Low	Total	Low density artefact scatter	Mapping, description and collection of surface artefact
37-3-0754	York Creek 11	Artefact scatter with PAD	Low- moderate	Total	Low density artefact scatter Further archaeological excavation deemed unwarranted due to very low density of subsurface artefacts	Mapping, description and collection of surface artefacts
37-3-0755	York Creek 12	Artefact scatter	Low	Total	Low density artefact scatter	Mapping, description and collection of surface artefact
37-3-0756	York Creek 13	Artefact scatter	Low	Total	Low density artefact scatter	Mapping, description and collection of surface artefact
37-3-0757	York Creek 14	Isolated find	Low	Total	Isolated artefact	Mapping, description and collection of surface artefact
37-3-0758	York Creek 15	Artefact scatter	Low	Total	Low density artefact scatter	Mapping, description and collection of surface artefact
37-3-0759	York Creek 16	Artefact scatter	Low	Total	Low density artefact scatter	Mapping, description and collection of surface artefact
37-3-0760	York Creek 17	Isolated find	Low	Total	Isolated artefact	Mapping, description and collection of surface artefact
37-3-0761	York Creek 18	Artefact scatter with PAD	Low	Total	Low density artefact scatter Further archaeological excavation deemed unwarranted	No action required as no surface artefacts present

AHIMS ID	Site name	Site type	Scientific significance	Degree of harm	Comment	Management strategy
					due to very low density of subsurface artefacts	
37-3-0762	Bowmans Ck 6	Artefact scatter	Low	Total	Low density artefact scatter	Mapping, description and collection of surface artefacts
37-3-0763	Bowmans Ck 7	Artefact scatter with PAD	Moderate	Total	Moderate density artefact scatter with known subsurface deposits	Mapping, description and collection of surface artefacts Archaeological excavation to gain a better understanding of the nature of deposits on the spur landform adjacent to Bowmans Creek (Section 9.5.2).
37-3-0764	Bowmans Ck 8	Artefact scatter	Low	Total	Low density artefact scatter	Mapping, description and collection of surface artefacts
37-3-0765	Bowmans Ck 9	Artefact scatter	Low	Total	Low density artefact scatter	Mapping, description and collection of surface artefacts
37-3-0766	Bowmans Ck 10	Artefact scatter	Low	Total	Low density artefact scatter	Mapping, description and collection of surface artefacts
37-3-0773	Swamp Ck 10	Isolated find	Low	Total	Isolated artefact	Mapping, description and collection of surface artefact
37-3-1155	MT OWEN ISOLATED FIND2	Isolated find	Low	Total	Isolated artefact	Mapping, description and collection of surface artefact
37-3-1156	MT OWEN ISOLATED FIND1	Isolated find	Low	Total	Isolated artefact	Mapping, description and collection of surface artefact
37-3-1158	RPS DLW IF1	Isolated find	Low	Total	Isolated artefact	Mapping, description and collection of surface artefact
37-3-1198	MOCO OS-10	Artefact scatter	Low	Total (already partially destroyed). Although only part of the site extent is within the Additional Disturbance Area, it is recommended that the entire site be salvaged.	Low density artefact scatter	Mapping, description and collection of surface artefacts
37-3-1490	Swamp Creek IF-4	Isolated find	Low	Total	Isolated artefact	Mapping, description and collection of surface artefact
37-3-1492	Swamp Creek IF-2	Isolated find	Low	Total	Isolated artefact	Mapping, description and collection of surface artefact
37-3-1493	Swamp Creek IF-3	Isolated find	Low	Total	Isolated artefact	Mapping, description and collection of surface artefact
37-3-1494	Swamp Creek IF-1	Isolated find	Low	Total	Isolated artefact	Mapping, description and collection of surface artefact

AHIMS ID	Site name	Site type	Scientific significance	Degree of harm	Comment	Management strategy
37-3-1499	Swamp Creek-OS1	Artefact scatter	Low	Total	Low density artefact scatter	Mapping, description and collection of surface artefacts
37-3-1503	Yorks Creek 19	Artefact scatter with PAD	Low - moderate	Total	Low density artefact scatter Further archaeological excavation deemed unwarranted due to very low density of subsurface artefacts	Mapping, description and collection of surface artefacts

9.4.2 Sites requiring specific management to prevent harm

There are three sites that are closely adjacent to the Additional Disturbance Area and may be unintentionally harmed by the Project unless specific management is undertaken to avoid impacts (**Table 9-2**). Due to their close proximity to proposed works, these sites are at greater risk of unintentional impact when compared to sites located further away (**Figure 9-1** to **Figure 9-3**). These sites should be permanently fenced and signed prior to works beginning to provide adequate protection.

It is noted that Glendell IF23 is located within the approved disturbance area for the Glendell Mine and can be salvaged according to Section 6.2.1.1 of the MOC ACHMP. If this is done prior to works associated with the Project commencing, then there is no requirement to protect the site as set out here.

AHIMS ID	Site name	GDA Zone 56 Easting	GDA Zone 56 Northing	Site type	Scientific significance	Figure
37-3-0343	Mt Owen (1996) 1; MTO1;	318524	6414512	Artefact scatter	Low	Figure 9-1
37-3-1560	Glendell North OS1	316820	6413702	Artefact scatter	Low	Figure 9-2
37-3-1513	Glendell IF23	318833	6407204	Isolated find	Low	Figure 9-3

Table 9-2: Sites requiring specific management to ensure conservation.



Figure 9-1: Aerial showing the location of Glendell North OS1

Figure 9-2: Aerial showing the location of Glendell North IF23.





Figure 9-3: Aerial showing the location of 37-3-0343 (Mt Owen (1996) 1; MTO1;).

9.4.3 Sites located on LCO owned land west of Bowmans Creek

There are six new and seven previously recorded sites that are on land owned by LCO to the west of Bowmans Creek. These sites were within the survey area and were recorded or re-assessed during the survey, however, they are not within the Additional Disturbance Area. **Table 9-3** lists the sites and **Figure 9-4** shows the location and extent of these sites. To ensure that these sites are appropriately managed, GIS data and the site cards have been provided to LCO.

These sites are not at risk of impact from the Project. Therefore, there are no management recommendations provided here regarding these sites as they would be more appropriately managed under a revised LCO ACHMP.

AHIMS ID	Site name	GDA Zone 56 Easting	GDA Zone 56 Northing	Site type	Notes
37-3-0686	Bowmans Ck 13	315983	6412942	Artefact scatter	
37-3-0688	G12	315806	6412691	Artefact scatter	
37-3-0768	Bowmans Ck_13	315982	6412940	Artefact scatter	Duplicate of 37-3-0686
37-3-0770	Bowmans Ck 11	315824	6412493	Artefact scatter	Same site as 37-3-0688

Table 9-3: Sites located on LCO owned land to the west of Bowmans Creek.

AHIMS ID	Site name	GDA Zone 56 Easting	GDA Zone 56 Northing	Site type	Notes
37-3-0771	Bowmans Ck 15	315825	6412677	Artefact scatter	Same site as 37-3-0688
37-3-1166	LIDEE - IF3	315930	6413149	Artefact scatter	
37-3-1503	Yorks Creek 19	317369	6411237	Artefact scatter	
37-3-1536	Glendell North OS7	316412	6413195	Artefact scatter	
37-3-1556	Glendell North OS9	315698	6412992	Artefact scatter	
37-3-1555	Glendell North OS10	315557	6412542	Artefact scatter	
37-3-1530	Glendell North IF6	315966	6412883	Isolated find	
37-3-1529	Glendell North IF7	315514	6412657	Isolated find	
37-3-1561	Glendell North ST1	316124	6412405	Scarred tree	

Figure 9-4: Aerial showing the location of sites located to the west of Bowmans Creek.



9.4.4 Management of Bowmans Creek 16 (37-3-0772)

Bowmans Creek 16 is an engraving site etched into a low cliff on the western bank of Bowmans Creek (**Figure 9-5**). The site is within the Project Area, but outside of the Additional Disturbance Area (**Figure 9-6**).

The site is managed under the Ravensworth Operations ACHMP and this has included laser scans of the site on two occasions, most recently in 2019, to ensure the site's preservation in the landscape.

The shift of the confluence point of Yorks and Bowmans Creeks upstream as part of the Yorks Creek Realignment works will increase flows in Bowmans Creek at Bowmans Creek 16 relative to existing approved conditions. Increased peak flow velocities at this location may result in enhanced erosion.

The flood modelling results indicates that no significant changes to peak velocities are expected as a result of the Project under all flood scenarios modelled. The Project is therefore not expected to increase impacts on this site any more than would occur due to flow conditions associated with currently approved operations.

To ensure that the integrity of the site is maintained, the site should continue to be monitored as part of the annual monitoring program undertaken by Ravensworth Operations. The laser scan completed in 2019 should be regarded as a baseline with which to compare any future deterioration, and should any deterioration be noted, action should take place to assess the likely impact and to devise a solution in consultation with the Ravensworth Operations RAPs.



Figure 9-5: Photographs showing Bowmans Creek 16 in 2019.

1. View of Bowmans Creek 16 (arrow) on the west bank of Bowmans Creek.

2. Detail view of Bowmans Creek 16.



Figure 9-6: Aerial showing the location of Bowmans Creek 16.

9.4.5 Management of Glendell North ST1 (37-3-1561)

As Glendell North ST1 is a rare site type in the region, it is recommended that an arborist inspect the tree to provide an option on:

- Whether, in their specialist opinion, the scar has a cultural origin;
- Whether it is possible to determine the age of the scar; and
- Strategies for conserving the site in the landscape as the tree bearing the scar is dead.

9.4.6 Protocols related to the discovery of new sites

The protocols related to the discovery of any new Aboriginal sites contained in Sections 6.2.1 of the MOC ACHMP are deemed sufficient to cover this eventuality and will be implemented for the Project. The policy within the current ACHMP relating to new discoveries is set out in **Section 9.2.4** and these will be carried into the updated ACHMP.

9.4.7 Protocols related to the discovery of human skeletal material

Protocols related to the discovery of human skeletal material will be set out in the MOC ACHMP. However, the protocols contained in Section 6.1 of the current ACHMP are deemed sufficient to cover this eventuality. These protocols are discussed in **Section 9.2.4.3** and these will be carried into the updated ACHMP.

9.4.8 Protocols for the conversation of sites outside the Additional Disturbance Area

Protocols related to the conservation of sites recorded outside of the Additional Disturbance Area will be set out in the approved ACHMP. However, the protocols regarding the quarterly site condition monitoring contained in Sections 3.5.2 and 3.5.3 of the current ACHMP are deemed sufficient to cover this eventuality. These protocols are discussed in **Section 9.2.3** and these will be carried into the updated ACHMP.

9.4.9 Care of salvaged artefacts

MOC has agreed to house all artefacts from the MOC at the Wollombi Brook Conservation Area artefact storage facility at the Bulga Coal Complex. This decision has been made in consultation with the ACHWG. This purpose-built facility will house artefacts from several Glencore mines in the Hunter Valley. All artefacts from the MOC will be stored in separate archive boxes to artefacts from other mine sites.

The materials will be retained at the artefact storage facility for the life of the mine unless otherwise approved by a Section 85 Care and Control Permit (NPW Act).

9.5 MANAGEMENT PROCESS

9.5.1 Archaeological salvage: surface artefact collection

<u>Research aim</u>: Is there any variation, on a macro level, in the distribution of certain artefact attributes such as raw material type and artefact type across the Additional Disturbance Area?

<u>Action</u>: To conduct an analysis of the raw materials and basic artefact features to determine whether there is site to site variation across the Additional Disturbance Area, particularly in sites located away from water.

<u>Aim</u>: Archaeological data obtained will allow a local level analysis of distribution patterns within the Additional Disturbance Area.

<u>Research Design</u>: All visible artefacts would be flagged in the field. On hand-held GIS units, the location, artefact class and artefact type will be catalogued in the field. A representative sample of artefacts and views of site and *in situ* artefacts will be photographed. When recorded, all artefacts from the surface of the site will be collected.

Stone artefact sites managed under this archaeological salvage will contribute to the research aim in that the sites will have surface artefacts mapped, catalogued, selectively photographed, collected and moved to a safe storage location situated at the Wollombi Brook Conservation Area. It is envisioned that these investigations would include the following methodology although the final form of any investigation would be done in consultation with the RAPs as part of development of the updated ACHMP.

To fulfil the research aim, the following program is suggested:

- All visible artefacts at a site should be flagged in the field;
- The site should be photographed after flagging and before recording;
- All artefacts should have the following artefact information recorded:
 - o Location;
 - Artefact class;
 - o Artefact type;
 - o Size;
 - Reduction level;
 - o Raw Material; and
 - o Notes.
- A selection of indicative and / or unusual artefacts from each site will be photographed;
- A sketch plan of the site will be completed should this help explain artefact distribution;
- Once all recording is complete, the artefacts will be collected with artefacts from each site being kept separate;
- Should the collection team encounter a human burial, all work should cease in the area and advice from authorities and RAPs (should the remains be Aboriginal) sought (see Section 9.2.4.3);
- The recording of the artefacts recovered will largely be completed in the field and this data would be incorporated into a report; and
- Analysis will attempt to answer the research aim which is to record a statistically valid artefact assemblage from across the Additional Disturbance Area to better understand inter-site variations.

9.5.2 Archaeological salvage: limited manual excavation

Although the test excavation program did not encounter subsurface deposits of conservation value, the excavations did record some discrete concentrations of artefacts. At a few locations, such as in Area 4 of the test excavation program, supplementary squares were excavated to determine the horizontal extent of these artefact concentrations. The limited manual excavation proposed here is to add further supplementary excavation squares next to, or near, known concentrations of artefacts

to confirm that the concentrations are indeed isolated and not part of a broader archaeological deposit.

At the sites recommended for subsurface excavation in **Table 9-1**, it is recommended that the surface collection of artefacts occur first (**Section 9.5.1**) followed by the manual excavation.

The sites where additional manual excavation is to take place are GN OS6, GN OS34, Bowmans Creek 7 and Bowmans/Swamp Ck Trench 1. The rationale for further excavation at these locations falls into two categories:

- GN OS6, GN OS34, Bowmans Creek 7: these sites were investigated during the test excavation program and recorded the higher artefact densities of the program. The aim of the additional excavation is therefore to confirm that the concentrations of artefacts at these sites are isolated occurrences and that they are not part of a broader archaeological site. In addition, it allows further archaeological understanding of the two areas displaying the greater archaeological sensitivity within the Additional Disturbance Area: the elevated spur along Bowmans Creek in the north of the Additional Disturbance Area (Area 1 in the test excavation program): GN OS6 and Bowmans Creek 7, and the confluence of Bowmans and Yorks Creek (Area 4 in the rest excavation program): GN OS34.
- Bowmans/Swamp Ck Trench 1 has been previously investigated (**Section 4.4.2.1**) and continues to show many surface artefacts. Although in an area of high general disturbance, further subsurface investigation is warranted to tie in with the 2001 investigations. It also provides a further opportunity to investigate the flat floodplain between Bowmans and Swamp Creeks in the southern portion of the Additional Disturbance Area.

The manual excavation at these locations should follow the following framework.

Archaeological Salvage: focused subsurface investigations

<u>Research Aim</u>: sites with low-moderate or moderate scientific significance. Are artefact concentrations isolated from each other or part of a broader archaeological deposit?

Action: To conduct targeted, limited archaeological excavations at the site.

<u>Aim</u>: Archaeological data obtained will provide further certainty on the nature of archaeological deposits within the Additional Disturbance Area.

<u>Research Design</u>: Adjacent to known artefact concentrations up to ten 0.5 m x 0.5 m excavation squares should be excavated. The excavation squares should be grouped to maximise information in one area. These squares, in 0.5 m x 0.5 m increments, could be expanded if finds or deposits indicate that it would be advantageous. Location details and a proposed methodology for subsurface investigations are given in **Table 9-1**. In the proposed salvage methodology, there are listed triggers that allow investigation to expand within a focused area.

The methodology for the possible salvage by manual excavation at these sites is as follows:

- All surface artefacts should be collected and moved to a place of safe-keeping under the methodology set out in **Section 9.5.1**. This is to ensure that the artefacts are not harmed during the following excavation process;
- The results of the artefact collection, and discussions between archaeologists and RAPs, will determine where further archaeological salvage is to take place within a given area. At sites GN OS6, GN OS34 and Bowmans Creek 7, this will examine areas around known concentrations of artefacts that were recorded in the test excavation program. At Bowmans/Swamp Ck Trench 1 it will be to examine the nature of remnant deposits in this landform. Previous investigations at Bowmans/Swamp Ck Trench 1 have shown that areas to the north of the trench are less disturbed and that surface artefacts appear more numerous towards the east. Therefore, it is recommended that a linear arrangement of excavation squares be utilised at Bowmans/Swamp Ck Trench 1 to more broadly examine the nature of the landform;
- A minimum of ten 0.5 m x 0.5 m excavation squares (2.5 square metres) would be excavated to culturally sterile soil levels within one investigation area. Should basal clays be too deep to be reasonably reached by manual excavation, the decision as to whether sufficient excavation has occurred will rest with the Excavation Director;
- The ten excavation squares could be grouped together or spaced at no more than 5 m apart. Thus a 45 m transect could be investigated, or a 2.5 square metre contiguous area excavated.
- Spits at each area would start in 5 cm increments although 10 cm increments could be used once it is established it is archaeologically prudent to do so;
- All deposits would be dry sieved at location;
- All recording will be done in the field in standard context sheets and the archaeologist will ensure that all necessary photographs, section drawings and soil analysis shall take place;
- A maximum area of 2.5 square metres shall be excavated at any one area unless deposits and finds warranted a further expansion (see below);
- The decision to expand from the initial two square metres shall be determined by the results
 of the ten 0.5 m by 0.5 m squares and would be done in consultation between the
 archaeologists and RAPs present. The final decision on whether expansion is desirable will
 rest with the Excavation Director;
- The grounds for expansion would include:
 - The complete excavation of a feature (such as a hearth) that may have been intersected by an excavation square; and
 - The complete excavation of a concentration of artefacts such as a knapping floor that may have been intersected by an excavation square.
- Any expansion beyond the 2.5 square metres would include areas totalling no more than 40% of the original area (i.e. an additional four 0.5 m x 0.5 m squares [one square metre] would be permissible);

- In what is assessed as an unlikely event, should excavations encounter high value archaeological deposits, it should be possible to even further expand the archaeological salvage at that location. Deposits or features that would characterise high value deposits include:
 - o Undisturbed deposits showing discernible archaeological stratigraphy;
 - Any exceptional finds (unusual materials, rare preservation, rare artefact type) believed to have archaeological context; and
 - A high density of artefacts¹¹ (more than 60 per square metre) in undisturbed contexts.
- Should the excavations encounter a human burial, all work should cease in the area and advice from authorities and RAPs (should the remains be Aboriginal) sought (see Section 9.2.4.3);
- All excavated material (stone tools, bone, shell etc) will be fully analysed and a report of the findings prepared; and
- Analysis will attempt to answer the research aim which is to record a statistically valid artefact assemblage from the site to better understand intra-site variations.

¹¹ An artefact is defined here as being larger than 15 mm. Therefore, a concentration of small debitage or shatter would not constitute an 'artefact concentration' unless the archaeologist and RAPs present felt that this had archaeological merit.
10 CONCLUSION



Excavation underway at Area 7 overlooking the Bowmans Creek floodplain.

The fieldwork component of this assessment was undertaken by OzArk, RAPs and Wonnarua Knowledge Holders over the course of several weeks in April, May, September, October and November 2018. The survey, test excavation and historic heritage test excavation programs during this time involved 40 field days in total. The 15 days of historical heritage test excavation was directed by Casey & Lowe; although an OzArk archaeologist and two RAP representatives (which included a representative from the PCWP) were present during the excavations to manage any Aboriginal cultural heritage finds.

69 sites were recorded during this assessment consisting of:

- 39 artefact scatters;
- 29 isolated finds; and
- One scarred tree.

Of the artefact scatters, 32 sites recorded less than 10 artefacts and no site contained more than 70 artefacts. At nine locations it was assessed that there are subsurface deposits. One of these sites was determined to have a moderate artefact density (Glendell North OS6), however, none of the

recorded sites was remarkable in its manifestation; either in terms of the types of artefacts recorded, the raw material the artefacts were manufactured from or the density and nature of the surface artefact manifestation. The recorded sites are also very representative of artefact sites in the upper Hunter Valley both in terms of the types of artefacts recorded and the raw materials from which the artefacts were manufactured. The exception to this is the recording of GN ST1—a scarred tree—which is a rare site type in the upper Hunter Valley due to the widespread vegetation clearing that has taken place.

The results of the test excavation program were surprisingly sparse. 152 0.5 m by 0.5 m excavation squares were excavated at 12 separate localities: a total of 38 square metres. From this area of excavation, 180 artefacts were recovered; an average of 4.7 artefacts per square metre or 1.18 artefacts per excavation square. This density of artefacts is extremely low and only two excavation squares recorded greater than 15 artefacts.

No evidence of colonial conflict or skeletal remains was identified during the survey or test excavation programs. While the evidence of colonial conflict in the general area is known from written sources, nothing in the current archaeological assessment was able to corroborate or extend the scant information the written sources provide.

With regards to the Additional Disturbance Area that includes all areas not previously approved for disturbance where Project impacts are proposed:

- 52 of the 69 newly recorded sites are within or in very close proximity to the Additional Disturbance Area; and
- 39 previously recorded sites are within the Additional Disturbance Area.

In total, 91 sites are located within or very close to the Additional Disturbance Area and will be impacted should the Project be approved. 55 of these sites are artefact scatters (15 of which have PAD) and 36 are isolated finds (one of which has PAD). In general, the artefact scatters have a low artefact density with most sites recording less than 10 artefacts.

Undertaking an assessment of scientific significance for all sites within the Additional Disturbance Area shows that 84.6% of sites (n=77) have a low scientific significance as they are either isolated finds or low-density artefact scatters. Nine sites have low–moderate scientific significance, five sites have moderate scientific significance, and no sites have been assessed as having high scientific significance.

To manage and mitigate this impact, three main archaeological recommendations are made in this AAIA, although additional recommendations to mitigate the loss of cultural heritage are made in the ACHAR. The archaeological recommendations are:

• To conserve all sites outside of the Additional Disturbance Area by extending the current site monitoring and verification protocols contained in the MOC ACHMP (see **Section 9.2.3**);

- To undertake a collection and recording of all surface artefacts at all sites within the Additional Disturbance Area where there is a surface manifestation of artefacts (see **Section 9.5.1**); and
- To undertake limited manual archaeological excavation at four locations to confirm the nature of the archaeological deposits (see **Section 9.5.2**).

While it is acknowledged that the loss of 91 sites is a diminution of inter-generational equity, the archaeological measures contained in this report, and in the ACHAR that this AAIA accompanies, are designed to mitigate, as much as is possible, this loss of inter-generational equity.

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APPENDIX 1: SURVEY METHODOLOGY

The following survey methodology is the finalised document correct as of April 2018. Any project descriptions, impact areas etc. are as they were in April 2018; although these may have changed since that time.

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OzArk Environmental & Heritage Management

1 INTRODUCTION

OzArk Environmental & Heritage Management Pty Limited (OzArk) has been engaged by Umwelt Australia Pty Limited (Umwelt) (the Client) on behalf of Glendell Tenements Pty Limited (Glendell) (the Proponent) to prepare a survey methodology for the Glendell Continued Operations Project (the Project). This methodology is in accordance with Stage 3 of the *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (ACHCRs).

1.1 PROJECT OVERVIEW

The Mount Owen Complex (MOC), which includes the Project Area, is located within the Hunter Coalfields in the upper Hunter Valley of New South Wales (NSW), approximately 20 kilometres (km) northwest of Singleton, 24 km southeast of Muswellbrook. The MOC is situated in the Singleton Local Government Area (LGA) (Figure 1-1).

The MOC includes approved open cut operations in three pit areas, the Bayswater North Pit and North Pit (both approved under the Mount Owen Continued Operations Project consent [SSD-5850]) and the Barrett Pit, approved under the Glendell Mine consent (DA 80/952). The MOC Coal Handling and Preparation Plant (CHPP) washes coal from all three pit areas. The water management system for the MOC is integrated, as well as being linked to the broader Glencore Greater Ravensworth Area Water and Tailings Scheme (GRAWTS). The MOC is approved to process up to 17 million tonnes per annum (Mtpa) run of mine (ROM) coal through the CHPP with production at each of the three pits approved as follows:

- Mount Owen (North Pit) up to 10 Mtpa;
- · Ravensworth East (Bayswater North Pit) up to 4 Mtpa; and
- · Glendell (Barrett Pit) up to 4.5 Mtpa.

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The Project seeks to extend the life of Glendell Mine to 2043, with an increase in extraction rate over the life of the Project up to 10 Mtpa from the current approved 4.5 Mtpa.

Key aspects of the Project include the continuation of the Barrett Pit to the north, the realignment of Hebden Road, the diversion of Yorks Creek and relocation of Ravensworth Homestead (Figure 1-2). The major Project components are summarised in Table 1-1.

-	able 1.1: Summary of Key Broject Components			
	able 1-1. Summary of Key Project Components			
Project Component	Description			
Extraction limit	Overall increase in extraction rate from current approved 4.5 Mtpa up to 10 Mtpa. It is noted that this will ramp up over the life of the Project as mining operations progress further to the north and as operations at Mount Owen ramp down in accordance with current approvals.			
Project life	Extension of the life of Glendell Mine to 2043 – this presents an extension of 19 years based on the current approved mine life.			
Additional ROM extracted	Approximately 145 Mt.			
Mining areas	Continuation of open cut mining to the north of the existing Glendell Mine.			
Mining method	Open cut using excavator and truck.			
Interactions with other mining operations	Continued integration with MOC in relation to coal handling and transport, water and tailings management, and surface infrastructure.			
Key mine infrastructure	New mine infrastructure area (MIA) to be established or use of existing Liddell MIA. Construction of a heavy vehicle access road to the new MIA or the Liddell MIA.			
Infrastructure relocations	Relocation of part of Hebden Road Relocation of sections of transmission lines and other utilities as required for mine progression.			
Coal handling and processing (CHPP)	Use of existing MOC CHPP infrastructure in the current location. No change to approved CHPP throughput of up to 17 Mtpa ROM coal. Size and location of ROM and product stockpile areas will remain unchanged. Given that the current Mount Owen Continued Operations Project consent authorises the use of the CHPP and associated infrastructure to 2031 (2037 sub to MOD 2 currently under assessment) this Project will need to consider and se approval for oneoine use of this infrastructure through to 2043.			
Coal Transport	No increase in train movements of up to 1636 trains per year.			
Equipment fleet	Use of existing and additional mining fleet to reflect increase in production and length of mine extension.			
Water management System (WMS)	Extension of existing MOC WMS to Project Area and continued integration with regional water management scheme (GRAWTS).			
Overburden, coarse reject and tailings management	Emplacement of overburden in-pit with areas up to 200 metres to provide variability in the final landform. Out-of-pit emplacement to assist with incorporation of natural landform design elements in final landform. Tailings emplacement within Ravensworth East (West Pit) and regional tailings management scheme (GRAWTS).			
Creek Diversions	Diversion of part of Yorks Creek Swamp Creek catchment diverted to Bettys Creek in final landform.			
Final void	No additional void in final landform although change in size and location of final void. Final void located to the north of approved Barrett Pit void.			
Rehabilitation and final landform	Final landform to be in line with current design standards (e.g. incorporation of natural landform design elements) and regulator expectations for similar recent projects such as the Mount Owen Continued Operations Project and the United Wambo Project.			

Project Component	Description
Workforce	Operational workforce expected to increase as production rate increases but wi remain within the current approved employment levels associated with MOC. Some short term increases in workforce associated with key infrastructure construction periods.
Operating hours	No change, 24 hours, 7 days per week.
Mine access	From the realigned Hebden Road.
Built heritage	Dismantling and relocation of Ravensworth Homestead to enable continued mi progression.





1.2 PROJECT AREA

All proposed impacts related to construction and operation of the Project will be confined to the Project Area shown on Figure 1-3. The Project Area comprises approximately 2929 hectares (ha) the majority of which is already cleared or is approved for disturbance as part of existing approvals. A large proportion of the Project Area within MOC has been subject to salvage programs.

The topography of the Project Area is characterised by a number of low ridges with spurs and low to moderate gradient slopes. Lower topographic areas are associated with Bowmans, Swamp, Yorks and Bettys Creeks (Figure 1-3). The creek lines generally flow from the north to the south. Portions of Swamp, Yorks and Bettys Creek have been diverted and/or lost within the Project Area as a result approved mining activities. The Project Area also contains a number of unnamed tributaries associated with the previously listed creek lines which flow between the spurs. In the portions of the Project Area that are outside of approved mining areas, the topography is generally flat ranging between around 60 meters (m) above sea level to small rises that are around 140 m above sea level.

The Project Area has been subject to agricultural land uses, including intensive grazing and pasture improvement, as well as mine related activities. All woodland in the Project Area is regrowth and mature trees are very rare. Figure 1-4 shows the Project Area superimposed on an aerial photo dating from 1958. This shows the almost complete nature of the clearing across the Project Area and large areas of visible sheet wash erosion. Woodland regrowth tends to be thick stands of Casuarina along creek lines and open Eucalyptus woodland on slopes. Other extensive areas within the Project Area have been previously cleared and are still open grasslands currently used for cattle grazing.

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1.3 CONSULTATION ON THIS METHODOLOGY

During December 2017 the Aboriginal Cultural Heritage Consultation Requirements for Proponents (ACHCRs) was initiated by Umwelt (Australia) on behalf of the Project. Undertaking Stage 1 of the ACHCRs resulted in 26 Registered Aboriginal Parties (RAPs) expressing an interest to be consulted regarding the Project (Table 1-2).

A draft of this survey methodology was sent to all RAPs on 19–20 February 2018 as part of Stages 2/3 of the ACHCRs. The 28 day consultation period for responses ended on 19 March 2018. At the conclusion of this period, four responses were received (Table 1-3). The responses of all RAPs were considered and noted but none necessitated an amendment of the survey methodology. Scott Franks (Tocomwall) was sent a reply stating that his concerns would be addressed in the Aboriginal Cultural Heritage Assessment that is being conducted concurrently with the Aboriginal Archaeology Impact Assessment that is the focus of the survey methodology.

Table 1-2. Registered Aboriginal Parties for the Project.

Name of individual/group	Contact name	
Aboriginal Native Title Elders Consultants	John & Margaret Matthews	
AGA Services	Ashley, Gregory & Adam Sampson	
Allera French Trading	Aliera French	
	Donna & George Sampson	
Crimson-Rosie	Jeffery Matthews	
Culturally Aware	Tracey Skene	
D F T V Enterprises	Denrick Vale Sr	
Didge Ngunawal	Paul Boyd & Lilly Carrol	
Gomery Cultural Consultants	David Horton	
Hunter Valley Cultural Surveying	Luke Hickey	
Hunter Valley Environment Land & Mining Services	Des Hickey	
JLC Cultural Services	Jenny-Lee Chambers	
Lower Hunter Aboriginal Incorporated	Les Ahoy	
Lower Hunter Wonnarua Council Inc.	Thomas Miller	
Murra Bidgee Mullangari Aboriginal Corporation	Ryan Carroll Johnson & Darleen Johnson-Carrol	
Muragadi Heritage Indigenous Corporation	Jesse Carroll - Johnson	
Smith Dhagaans Cultural group	Tim Smith	
Ungooroo Aboriginal Corporation	Alan Paget & Sarah Hail	
Valley ELM corp	Irene Ardier	
Wallagan Cultural Services	Maree Waugh	
Wanaruah Local Aboriginal Land Council	Noel Downs	
Wattaka Wonnarua C.C. Service	Des Hickey	
Wonn 1 Contracting (Kawul Pty Ltd)	Arthur Fletcher	
Wonnarua Culture Heritage	Gordon Griffiths	
Wonnarua Nation Aboriginal Corporation	Laurie Perry	
Yarrawalk (a division of Tocomwall Pty Ltd).	Scott Franks	

				OzArk Environmental & Hentage Manage
Name of individual/group Conta		Contact name		
on behalf of the Plains Clan of the Wonnaru People NSD1680/2013		has	Z ARCHAEOLOGICAL CONTEXT	
Yinarr Cultural Services		Kathleen Steward Kinchela	2.1 INTRODUCTION	
-			Kevin Duncan	The Project Area is located in an area where the archaeological values are largely known du
Tabl	e 1-3. RAP comme	ents on	the draft survey methodology.	the high amount of previous assessment either within the Project Area or in immediately adjace
Name of individual/group	Contact name		Response to the draft survey methodology	landorna.
		Email ren Good ev I have vir point of I Please k look forw Thanks	seived from Tracey Skene 20/2/18 ening Bridie, ewed methodology and familiar with the Survey location, at It met have no concerns in regards to the proposed methodol eep me updated on the progress of the upcoming fieldwork a ard to the next step of this Assessment.	This survey methodology will limit itself to those studies that are directly applicable to the Pro Area although the predictive model for site location will consider the broader archaeolog context of the district. 2.2 ANTIQUITY OF ABORIGINAL OCCUPATION
Sulturally Aware	Tracey Skene	Hi Hi	kene	The Aboriginal occupation of Australia begins prior to 40,000 BP (years before present)
Lower Hunter Aboriginal Incorporated	Les Ahoy	On beha no furthe Thank Y	If of LHAI J endorse the Glendell ACHA survey methodology r comments to add. ou David Ahoy	possibly earlier than 50,000 BP. Dates exceeding 20,000 years occur in almost all parts
Yarrawalk (a division of Tocomwal Pty Ltd), Tocomwal Pty Ltd on behalf of Scott Franks and Anor on behalf of the Plains Clan of the Wonnaru People NSD1680/2013	Scott Franks	Scott Fra Sorry for regarding simply his backgrow land sca complete draft pro- location of really, process, science I attached under thi Kevin Du Hi Bridle Operation througho connection our peop projects .spiritual allow or I everythin commen hope my Thank yo	Inks responded via email 29/3/18 the delay in responding to the comments I raised with you glie Dizark Methodology, in short, the proposed methodolog as know (sic) value or worth in understanding my people's after reading the draft if was clear to me that know (sic) real and research has be done or any understanding of the cultur be or any of the more recent assessments that have been id on adjoining mining operalions owned by Glencore coal. T vides an isolated attempt to box in our heritage to a single using a mining EL boundary, this type of assessment falls sh giving our heritage a fair and real viole in any assessment I cannot support the approach as by its own design is I a based assessment and clearly know real cultural assessment to it, this process fall very short of the current required appro to it, this process fall very short of the current required appro to this process fall very short of the current required appro to this process fall very short of the current required appro to this region and our people having a long continuous on these lands are always have been very special and sacre feels i'm adamant in my decision for our lands a locar beilefs in the presexpation and protection of our lands 1. can be a party to such destructive practices as it loves against give are as Aboriginal people. In saving this I will like my is to be noted as a registred takkeholder for this project and comments are taken seriously and respectively in this decis u Kevin. Durcen	Australia resulting in the expectation that most areas should have a Pleistocene (>12,000 occupational signature. However, such dates remain relatively rare due to a range of factors, to behavioural and post-depositional. These factors include a possible low density of occupation the Pleistocene period, poor preservation of archaeological materials (particularly dates organic materials) and significant coastline change over the past 18,000 years. In 1986, Koettig undertook an archaeological survey approximately 6 km southeast of the Proverse between Glennies Creek and Singleton (cited in Umwelt 2003). Following that sum Koettig carried out several excavations at six locations along Glennies Creek. Koettig consider artefacts found in Site SGCD 16 (about one metre deep in Unit B of on an old alluvial terra were 'markedly different' to artefacts recovered from the artefacts in Unit A. Her conclusion of formed on the basis of the raw material used, large number of cores, the large percentage cortex remaining on artefacts and larger sizes of artefacts. Artefacts from Unit B were f volcanic rocks while those in Unit A were predominantly mudstone and silcrete. Later, a dat >20,200 BP was obtained from a hearth associated with the artefacts placing the site well the Pleistocene.
				There have been numerous archaeological investigations in the local area and a number with the Project Area itself. The results of these investigations provide an archaeological context the current assessment and were used in the preparation of a predictive model of Aboriginal location (Section 3). This section refers to archaeological investigations that were entirely partially within the Project Area and Section 2.4 reviews the salvage programs that have ta place at the MOC.
Aboriginal Cultural Heritage Surve	y Methodology Glendell C	Continued C	Operations Project	Abonninal Cultural Maritana Survey Mathedology: Glandall Continued Operations Preset

2.3.1 Glendell Mining Lease Area (Brayshaw 1982)

The first survey to interact with the Project Area was by Helen Brayshaw in 1982 (Brayshaw 1982). Brayshaw's survey area included areas within the southern portions of the Project Area including the southern 6 km of Bettys Creek and 5 km of Bowmans Creek. As a result of this assessment, three open sites and two isolated artefacts were recorded. The three open sites (artefact scatters) were recorded as follows:

- Site A: Artefact Scatter. 30 m west of Bettys Creek, principally on the southern bank of a tributary. 43 artefacts were recorded, occurring at an average density of 1/17 square metres (m²). Raw materials present included indurated mudstone 75%, siltstone 2.5%, quartz 2.5% and silcrete 20%;
- Site B. Artefact scatter. On the western bank of Bettys Creek, about 300 m north of the main northern railway. Four flakes were found here at an average density of 1/30 m²; and
- Site C. Artefact scatter. East of a tributary of Bettys Creek about 200 m north of the confluence. Five artefacts recorded, occurring at an average density of 1/24 m².
- 2.3.2 A Preliminary Assessment of Aboriginal Relics on the area of Foybrook Power Station Project (Dyall 1982)

To the northwest of the Project Area, along the northern reaches of Bowmans Creek, Len Dyall (Dyall 1982) recorded 18 artefact scatters and two grinding groove sites. The artefact scatters were small with the exception of one that contained over 150 artefacts. One grinding groove site was suggestive of a seed processing location rather than for axe grinding. Both grinding groove sites are outside of the Project Area.

2.3.3 Archaeological Survey of Pikes Gully Colliery Area, Liddell, NSW (Haglund 1982)

In the same area of Bowmans Creek and to the northwest of the Project Area, Laila Hagland (Hagland 1982) recorded two artefact scatters:

- Site 1: Aboriginal stone artefacts were noted in a number of exposures within, and along, the edge of a river terrace west of Bowmans Creek. It was noted that the artefacts recorded varied in type, size range and density between the exposures. Small thin flakes and small, well-made artefacts such as bondi points were noted only close to the southern end. Artefact density appeared greater in this part. These observations may reflect real distribution trends, but may also result from the smaller and more shallow areas of exposure further north; and
- Site 2: Aboriginal stone artefacts were noted in two exposures along the northeast bank
 of Bowmans Creek, northwest of its junction with Stringybark Creek, and within a minor
 erosion gully on the slope above.

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2.3.4 Environmental Impact Statement Mount Owen Coal Project Hebden - New South Wales (Resource Planning 1991)

In 1991 Resource Planning undertook a large assessment for the Mount Owen Coal Project that was focussed on Swamp and Yorks Creeks, located immediately north of the Project Area (Resource Planning 1991), This study included 25 km of drainage line (including left and right banks) along Swamp Creek and Yorks Creek. Traverses were also made across side slopes and along ridge lines. The survey area totalled 370 ha. 98 Aboriginal archaeological sites, ranging from isolated artefacts to dense concentrations of more than 100 pieces of flaked stone, were mapped and recorded. Table 2-1 presents the artefact densities recorded by Resource Planning and this shows clearly that Swamp Creek displays a lower artefact density when compared to Yorks Creek. In the case of Swamp Creek over 75% of sites were isolated finds or very low density artefact scatters while along Yorks Creek 54% of sites recorded over 50 artefacts at each site (a moderate artefact density). Resource Planning noted that the sites in the Swamp Creek catchment are regarded as an excellent representative assemblage of occupational evidence in the small tributary valleys of the Hunter River (Resource Planning 1991: 5). This report recommends, based on the survey evidence "that part of the Yorks Creek drainage line would be set aside as an archaeological conservation zone" (Resource Planning 1991: 5); a recommendation that was followed as the northern reaches of Yorks Creek are now within a permanent Voluntary Conservation Area (VCA). The Yorks Creek VCA is located outside the Project Area.

Table 2-1: Artefact densities at sites recorded by Resource Planning 1991.

Artefact Numbers	Swamp Creek (%)	Yorks Creek (%) 9	
Isolated Artefact	27.6		
<10 Flakes	50.0	18	
10-20	14.5	18	
20-50	6.6	27	
50-100	1.3	18	
>100		9	

2.3.5 Proposed Mt Owen Extension, Archaeological survey of Bettys Creek (Resource Planning 1993)

In 1993 Matthew Barber, archaeologist with Resource Planning, surveyed areas along Bettys Creek: locations that are now within the current Mount Owen disturbance area to the northeast of the Project Area (Resource Planning 1993). The western boundary of Barber's survey area was defined by the drainage divide between Bettys Creek and Swamp Creek (now no longer extant but can be seen in historic aerial photographs (Figure 1-4). The southern boundary was formed by the proposed lease extension boundary. The proposed extension resulted in the disturbance of an additional 260 ha of land, including approximately 100 ha of the then Ravensworth State Forest.

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The survey recorded 39 archaeological sites, of which 34 were recorded in detail. It was found that the majority of sites were situated close to the drainage lines and that their location represented a verifiable distribution and was not a bias of survey coverage. It was, however, noted that erosion plays a vital role in the identification of sites. This is because, the report argued, the majority of sites are actually subsurface in origin.

All of the sites recorded were open artefact scatters although their content varied from one artefact to several hundred artefacts. The artefact types appear in the main to be the product of backed blade manufacture (Resource Planning 1993: 4). There were some sites, in the report's opinion, which had a high potential for further archaeological investigations due to their potential to contain subsurface deposits and the quantity of artefacts present. A number of artefacts revealed retouch, the majority of which were classed as part of the backed blade industry. As with other sites in the Swamp Creek area, and other parts of the Hunter Valley, the dominant raw material was indurated mudstone/tuff followed by silcrete.

2.3.6 Aboriginal Archaeological Assessment - Glendell Open Cut Mine (Umwelt 2004)

Unwelt conducted an Aboriginal Archaeological Assessment for the Glendell Open Cut Mine survey area involving survey during September, October and December 2001, as well as geomorphic investigations during May 2002.

The Glendell survey area incorporated sections of Bowmans Creek, Swamp Creek and Bettys Creek and included the southern portion of the Project Area. As part of the archaeological brief, a desk-top study and an in-field reconnaissance were undertaken with the aim of identifying areas within the Glendell survey area that contained Aboriginal resources. The resources sought for identification within the Glendell survey area included fresh water supplies, food and medicine plants, faunal prey species, stone suitable for implement manufacture, areas suitable for camping, areas that provided an extensive outlook, areas with major and minor creek confluences that had often been found to have Aboriginal camp sites and the terrain units that may have acted as pathways between resource locations.

The information compiled was then used to assist in the preparation of a predictive model related to the location and nature of sites within the then Glendell survey area. In addition, past land-use practices and geomorphic studies were used to determine areas where artefactual material may remain in a relatively undisturbed context. Geomorphic studies were also used to investigate a buried soil profile within the shared Bowmans Creek/Swamp Creek floodplain and to determine the likelihood of this soil profile containing artefactual material from the late Pleistocene to early Holocene periods.

As a result of the research it was concluded that the entire Glendell survey area would have supplied adequate resources for small groups of hunter-gatherers living a mobile lifestyle. Bowmans Creek was highlighted as an area that should have formed the focus of camping

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activities of longer duration, possibly by larger numbers of people, due to an increased abundance and reliability of the resource base.

Other areas, such as the lower western slopes adjacent to Bettys Creek were assessed as having attracted groups of people for short-term visits to harvest abundant seasonal foods. Bowmans Creek was therefore cited as likely to have the largest sites in terms of spatial extent and numbers of artefacts.

Such sites were predicted as likely to be found on the lower slopes, terraces and floodplains along Bowmans Creek, spreading further across the Bowmans Creek/Swamp Creek floodplain. Bettys Creek and Swamp Creek were listed as likely to have evidence of more sporadic and short-term use as overnight camping locations.

A pattern of site distribution was evident from the previously recorded sites in the locale with the majority of sites located along the watercourses (58%). More of these were associated with ephemeral tributaries (30%) than major creek lines and their associated floodplains and terraces (30%). A little more than half (54%) of the sites were within 30 m of the closest watercourse and 66% within 100 m. In relation to the slopes, sites were more commonly located on the foot slopes/lower slopes (18.5%), than the crest/upper slopes (16.6%) and mid slopes (8%).

A total of 37 previously unrecorded sites were located during the 2001 fieldwork survey of the Glendell survey area. The sites consisted of 30 artefact scatters, including one small quarry site with an associated artefact scatter, one scatter in an area with a buried soil profile and seven isolated finds. The Bowmans Creek 5 quarry site was recorded as having an associated artefact scatter as the majority of the artefacts in the site were manufactured from mudstone and silcrete rather than the quartz and quartzite materials available at the site.

The artefact scatter in the area with the buried soil profile (Bowmans Creek/Swamp Creek Trench) was located on the shared floodplain between Bowmans Creek and Swamp Creek. In this area a trench approximately 300 m in length was constructed during the 1980s to divert Swamp Creek into Bowmans Creek. At the time of the 2001 survey the trench was not connected to the creeks and it currently remains unconnected. The artefact scatter eroding from the A-Horizon of the floodplain was observed to be approximately one metre above the buried soil profile. This profile was later determined through geomorphic investigation to be of early Pleistocene to Tertiary age and did not contain any artefactual material (Mitchell 2002).

Artefact analysis of the salvage assemblage recorded:

- Flakes and broken flakes dominated the assemblage (78%), followed by flaked pieces (15%) and cores (3%). Within the flake category, 4% were retouched and half of the retouched flakes were backed. Heat shatter accounted for 3% of the artefacts;
- The mudstone and silcrete flakes were of similar size. Volcanic flakes were generally larger and heavier than flakes composed of other raw materials;

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- Volcanic flakes had a significantly higher percentage of cortex than silcrete or mudstone, and mudstone artefacts had a higher percentage of cortex than silcrete;
- Silcrete artefacts had a higher overall rate of retouch than mudstone artefacts (8.2% and 6.3% respectively), and silcrete retouched artefacts were more likely to be backed than retouched mudstone artefacts; and
- A number of artefacts relating to post-European occupation of the area were also
 recovered, including fragments of glass and pottery. The location of this material closely
 correlated with concentrations of Aboriginal stone artefacts. Additionally, at least one
 Aboriginal artefact manufactured from glass was salvaged, suggesting that the area was
 used by Aboriginal people in the post-contact period.
- 2.3.7 Environmental Assessment for Modification of Glendell Mine Operations (Umwelt 2007)

In 2007 an Environmental Assessment was undertaken to modify the Glendell Mine Development Consent (DA 80/952) to enable the integration of Glendell Mine operations with the approved MOC operations and the implementation of a revised mine plan.

The assessment noted that a range of surveys of the Glendell Mine site had been undertaken to identify areas and sites of significance in relation to Aboriginal archaeology. Appendix 10 of the Environmental Assessment lists a number of sites that had been previously identified at the Glendell Mine site and have been salvaged in accordance with a permit from the then Department of Environment and Conservation. The assessment stated that the remaining sites within the Glendell Mine site will be protected and managed in accordance with an Aboriginal Heritage Management Plan developed for the site.

2.3.8 Aboriginal Archaeological Values Assessment: Mount Owen Continued Operations (OzArk 2013)

The assessment area for the Mount Owen Continued Operations (MOCO) Project disturbance area covered approximately 500 ha with portions of the assessment area encompassing part of the southern portion of the Project Area.

Australian Cultural Heritage Management Pty Limited (ACHM) were engaged by Mount Owen to undertake Aboriginal community consultation for the MOCO Project and to author the Aboriginal Cultural Heritage Assessment Report (ACHAR) to which OzArk 2014 contributed (ACHM 2013). The ACHM report appeared as Appendix 13a (Parts 1 and 2) of the MOCO Project *Environmental Impact Statement* (EIS) (Umwelt 2015). ACHM 2013 contains the cultural, aesthetic and historic values of the area, while OzArk 2014 contains an examination of the scientific values of the area. OzArk Environmental & Hentage Management

2.3.8.1 Cultural values

ACHM 2013: 114 summarises the cultural values of the area in which the Project Area is located. What follows is an edited excerpt of the MOCO Project Statement of Significance (ACHM 2013: Section 5:10):

It is noted that the numerous Aboriginal stakeholders who participated in this cultural values assessment process hold values which relate to the wider Hunter Valley region generally, and less directly to the MOCO area specifically. However, one of the Knowledge Holder groups holds very strong values over the MOCO area. Other than the one group expressing strong connection to the MOCO area, there was very little other information presented in the disclosed material or values workshops which relates specifically to the MOCO area.

A common theme in many Aboriginal cultural heritage assessments is the proprietary interest members of the relevant Aboriginal communities hold in regard to the wider cultural landscape including archaeological sites or places within any given area. The project is no exception in this regard. Within the context of the current assessment, there are strong on-going connections to places created and used by ancestors alongside demonstrably strong interests in the manner in which those places are managed or harmed as a result of this project. These sentiments are not unique, and must certainly be considered in the overall assessment of the significance of the places in question. The connection to these places is noted as often being relatively unspecific and generally do not appear to relate to any surviving traditional knowledge or customary cultural practices, apart from one of the Knowledge Holder groups who express a strong connection to on-going cultural knowledge and customary lore in this location.

The cultural values expressed by the participants in this assessment have been consistent in voicing an over-arching concern for the wider landscape and criticism of the negative impact of mining on that landscape. Consistent in the material disclosed is a sense of 'outrage' and grief at the treatment of Aboriginal people since First Settlement (dispossession and genocide are mentioned repeatedly) through to more contemporary experiences (i.e. the Stolen Generation).

ACHM 2013: Section 5:10 concludes:

There is little doubt that the wider cultural landscape surrounding (and encompassing) the MOCO area is of high cultural and historical significance to Wonnarua people. The historical associations with early settlement, conflict, dispossession and survival are important, and the nature of the area as a surviving cultural landscape of significance to numerous members of the Wonnarua people makes this an area of

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regional and national significance. The regional archaeological record is also of high regional significance. Overall, the cultural significance of the wider region is considered to be high, and requires considerable additional research to fully understand.

2.3.8.2 Scientific values

The archaeological survey for the MOCO Project took place over two weeks from 26 November 2012 to 7 December 2012. The archaeological test excavation program for the MOCO Project took place over one week from 11 March 2013 to 15 March 2013. In 2014, the proposed disturbance area for the MOCO Project was expanded slightly necessitating a further one day of survey that took place on 29 April 2014. The results of these investigations are detailed in OzArk 2014 and contained in Appendix 13b of the MOCO Project EIS (Umwelt 2015).

Results

Large portions of the MOCO Project (223 ha) had been subject to previous Aboriginal Heritage Impact Permits (AHIPs) with extensive areas having already undergone archaeological assessment and salvage. Within the disturbance area, 18 sites had already been salvaged by manual excavation and more expansive additional areas have been subject to grader scrapes to salvage subsurface artefacts. Over the years, both from within the disturbance area and from adjacent landforms, over 11,000 artefacts had already been recovered as a result of these programs.

As a result of the scientific values assessment for the MOCO Project, 39 Aboriginal sites were recorded; consisting of:

- 11 artefact scatters (37-3-1189 to 37-3-1199);
- 25 isolated finds (37-3-1170 to 37-3-1188 and 37-3-1212 to 37-3-1216); and
- Three extensions to previously recorded sites (Extension to site 37-3-0649, Extension to site 37-3-0611 and Extension to site 37-3-0600).

In addition, the disturbance area contained three previously recorded sites, 37-3-0611, 37-3-0985 (low density artefact scatters) and 37-3-0527 (isolated artefact). Thus, 42 sites were known to exist within or close to the disturbance area.

At two locations within the disturbance area, test excavations were carried out under the NSW Office of the Environment and Heritage (OEH) Code of Practice for the Archaeological Investigation of Aboriginal Objects in NSW. At one location (37-3-1191), no artefacts were recorded during the test excavations, while at the second location (37-3-1192), 114 artefacts were recorded, with over 80% coming from one discrete concentration. As a result, it was determined that 37-3-1191 is a displaced site with no associated archaeological deposits, while 37-3-1192 is

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a low density artefact scatter along the banks of the 'eastern drainage' line with one known concentration of artefacts.

Three sites recorded during the survey, 37-3-1194, 37-3-1197 and 37-3-1198, remain partially extant in the Project Area.

Conclusion

Those archaeological sites in the disturbance area investigated revealed relatively sparse artefact concentrations in shallow and disturbed contexts. Archaeologically, all of the places located and/or identified conform to the Australian Small Tool Tradition¹, and most likely date to no more than the last 2,000 to 3,000 years.

The majority of the disturbance area had been subjected to varying degrees of land clearing and mining since first settlement, destroying the primary context of much of the physical cultural material present, and irretrievably altering the landscape itself.

Given the nature and extent of the archaeological sites identified, there was little additional knowledge which could be added to the archaeological record from any further investigation of this material. There is little probability for the presence of undisturbed and deeply stratified archaeological sites within the disturbance area.

In general, the archaeological sites in the MOCO disturbance area offered:

- Limited research potential in regard to regional and/or localised subsistence and resource procurement activities;
- · Limited research potential to address questions on stone tool technologies in the region;
- · Limited potential for radiometric dating methods to be applied to the sites;
- Limited research potential to address questions about the timing of the first occupation of this region of the Hunter Valley;
- Limited research potential to address questions about the timing of the Aboriginal settlement history of the Hunter Valley; and
- Limited potential to reveal further unique spatiotemporal patterning which would add to the archaeological record.
- 2.3.9 Mount Owen Modification 2 (OzArk 2017e)

OzArk was engaged by Umwelt, on behalf of Mt Owen Pty Limited to complete an Aboriginal Cultural Heritage Assessment Report for the Mount Owen Continued Operations Modification 2.

¹ The Australian Small Tool Tradition (also sometimes referred to as 'Bondaian') is a term applied to the Holocene period Aboriginal tool kit; distinguishing it from the earlier Australian Core Tool and Scraper Tradition generally dated to the Pleistocene period.

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The proposed modification disturbance area consisted of two portions: a smaller northern portion on both sides of, and south of, an existing diversion of Bettys Creek (Area A; approximately 9 ha); and a larger portion to the southeast of the current North Pit (Area B; approximately 37 ha). Both areas are to the east of the Project Area.

The fieldwork component of the assessment was undertaken by an OzArk archaeologist and representatives of Registered Aboriginal Parties (RAPs) and Wonnarua Knowledge Holder Groups on 31 August 2017.

No Aboriginal sites were recorded during the assessment. Further, no landform within the proposed disturbance area was seen as having potential to contain further, subsurface archaeological deposits due to the moderate level of disturbance across the proposed disturbance area and the generally thin soils.

MOCO IF-3 (37-3-1198) was the only valid previously-recorded site within the proposed disturbance area. This site was revisited during the site inspection, however, despite good areas of exposure, the artefact was unable to be located. One previously recorded site 37-3-0687 (MC-7) is located outside but close to the proposed disturbance area. This site may be harmed by future erosion stabilisation works along Main Creek and management recommendations regarding this site are made in OzArk 2017e.

2.3.10 Alluvium and Biophysical Strategic Agricultural Land Verification and Mapping (OzArk 2017b, c & d)

In mid to late 2017 and early 2018, OzArk completed five archaeological due diligence assessments of over 100 soil test pit and groundwater monitoring bore locations surrounding Bowmans, Swamp and Yorks Creek for alluvium and Biophysical Strategic Agricultural Land verification and mapping assessments within the Project Area (OzArk 2017b, c & d). Over the five assessments, two new Aboriginal sites (Bowmans Creek 6 and Yorks Creek 19) were recorded and the extent of one previously recorded artefact scatter was updated (#37-3-0748; York Creek 5).

Bowmans Creek 6 was located on a lower slope landform adjacent to a tributary of Bowmans Creek. A total of 12 artefacts were identified, consisting largely of unmodified flakes, with one end scraper and core also recorded. Yorks Creek 19 consists of two flakes recorded on an upper terrace landform near the confluence of Bowmans and Yorks Creeks. In addition to this, one complete flake was recorded along a grazing track in close proximity to #37-3-0748. Given its location on the same upper terrace landform, the artefact was assessed as being an extension to site #37-3-0748. An additional seven artefacts were recorded eroding from the edge of the upper terrace. Site #37-3-0748 was also initially recorded as having potential archaeological deposit (PAD), although it was considered likely to be disturbed by cultivation. Recorded materials

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across the three sites were consistent with the predominate materials of the region being mudstone and silcrete, with a volcanic flake also recorded at Yorks Creek 19.

2.3.11 Mt Owen Complex Aboriginal cultural heritage due diligence site inspection results - EL6594, EL8184, ML1629 and ML1415 (EMM 2017)

EMM Consulting Pty Limited (EMM) was engaged to prepare an Aboriginal cultural heritage due diligence assessment for the proposed exploration program across the Project Area. As part of this exploration program, a total of 20 drill holes were proposed.

A field survey of proposed drill locations was undertaken by EMM on 23 May 2017 and no artefacts were identified within the areas of proposed exploration disturbance. In addition, the proposed locations are considered to have low archaeological potential. No additional measures have therefore been recommended in relation to heritage for the proposed drilling program.

2.4 PREVIOUS SALVAGE PROGRAMS WITHIN OR NEAR THE PROJECT AREA

2.4.1 Ravensworth East Archaeological Investigation (ERM 2002)

In 2002 ERM conducted archaeological excavations and salvage grader scrapes over areas of the Ravensworth East Mine under Permit SZ323. These investigates were located in the northeastern portion of the Project Area, in areas along the former course of Swamp Creek (ERM 2002) (Figure 2-1). Table 2-2 lists the six sites salvaged within the Project Area under the 2002 ERM program.

Table 2-2. Sites salvaged within the Project Area under Permit SZ323.

AHIMS #	Site name
37-3-0399	Ravensworth 10
37-3-0398	Ravensworth 09
37-3-0400	Ravensworth 11
37-3-0401	Ravensworth 12
37-3-0402	Ravensworth 13
37-3-0403	Ravensworth 14

The combined geomorphological investigations undertaken by ERM highlighted the Swamp Creek valley as the key area likely to yield archaeological evidence of Aboriginal occupation within the ERM study area. However, these studies also showed that although buried land surfaces were apparent within the valley, evidence of Pleistocene Aboriginal occupation was unlikely to be recovered. Archaeological sampling of soil from these land surfaces failed to yield any archaeological material, confirming this view. In light of this, no further pursuit of Pleistocene archaeological deposits was undertaken within the scope of the excavation program.

The initial archaeological component of ERM's investigation, which included grader scrapes spread over three different landscapes across the valley, at varying distances from water sources,

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yielded little archaeological evidence. Of the three grader scrapes, three artefacts were recovered over a total area of 560 m².

A low rise adjacent to the swampy meadow channel west of Swamp Creek in the vicinity of surface sites RE 12–14, revealed substantial archaeological material with several artefact concentrations located approximately 40 m to 60 m away from the channel. Test pit excavation yielded an artefact spread up-slope of the channel from approximately 10 m from the current channel edge, extending across the rise in all directions. A total of 87 artefacts were recovered from the 11 test pits. Over a combined excavated area of 11 m², this represents an artefact density of 7.9 artefacts/m². The largest artefact concentration (44 pieces or 50.57% of the total assemblage) was excavated from Test Pit 4 located on the peak of the rise. Without the Test Pit 4 artefact concentration, artefact density would have been substantially lower, at 4.3 artefacts/m², as the majority of test pits contained five artefacts or less. 82.75% of the assemblage was mudstone and 17.25% was silcrete.

Open excavation of the site complex RE 12–14 recovered a concentrated artefact scatter across the peak of the rise within the very shallow A-Horizon soil. Open excavation on this rise was proposed by Margrit Koettig (then at the NSW Department of Environment and Climate Change) to define the apparent spread of artefacts from TP4, and to further establish the nature of this subsurface deposit, specifically to investigate whether it contained hearths and identifiable activity areas. The open area excavation of 86 m² (including TP4) was conducted in July–August 2001 by ERM. 1,168 artefacts were excavated in the open excavation and the investigations revealed a continuation of artefacts over the low rise, rather than what was originally recorded as three individual surface sites. Within this scatter, several distinct areas of artefact concentration were recorded, all with quantities of associated charcoal and burnt earth. The assemblage comprised backed artefacts and associated manufacturing debitage, mostly of mudstone.

Seven raw materials were represented in the open excavation. Mudstone was the dominant raw material observed, accounting for almost 80% of the total artefact numbers. This mirrored the initial trend set in testing phase. Silcrete was the next most common material and comprised nearly 20% of the assemblage. The remainder of the artefacts (less than 2%) was produced from six other raw material types.

Five artefact types were identified in the assemblage. The majority of artefacts were whole flakes accounting for more than 50% of the assemblage with broken flakes (almost 30%) and flaked pieces (approximately 15%) making up much of the remaining assemblage numbers. All modified artefacts, consisting of cores and retouched flakes, made up just under 2% of the assemblage.

2.4.2 Glendell Project Area (Umwelt 2013)

Salvage of the Glendell project area was undertaken under National Parks and Wildlife Services (NPWS) section 90 Consent #2267 and formed Part 4 of the salvage program for the Bettys

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Creek valley (Figure 2-1). This archaeological salvage within the Glendell project area was conducted by Umwelt and the Aboriginal community between November 2005 and February 2006. Table 2-3 lists those sites within the Project Area that were salvaged under Consent #2267.

Table 2-3. Sites within the Project Area salvaged under Consent #2267.

AHIMS	site name	Salvage methodology
37-3-0599	Bettys Creek 9	Surface Collection with Subsurface Investigation (manual excavation)
37-3-0601	Bettys Creek 11	Surface Collection with Subsurface Investigation (grader scrapes)
37-3-0602	Bettys Creek 12	Surface Collection with Subsurface Investigation (grader scrapes)
37-3-0604	Bettys Creek 14	Surface Collection with Subsurface Investigation (grader scrapes)
37-3-0605	Bettys Creek 15	Surface Collection with Subsurface Investigation (grader scrapes)
37-3-0606	Bettys Creek 16	Surface Collection with Subsurface Investigation (grader scrapes)
37-3-0607	Bettys Creek 17	Surface Collection with Subsurface Investigation (grader scrapes)
37-3-0608	Bettys Creek 18	Surface Collection with Subsurface Investigation (grader scrapes)
37-3-0609	Bettys Creek 19	Surface Collection
37-3-0610	Bettys Creek 20	Surface Collection
37-3-0618	Swamp Creek 1	Surface Collection
37-3-0619	Swamp Creek 2	Surface Collection
37-3-0620	Swamp Creek 3	Surface Collection with Subsurface Investigation (grader scrapes)
37-3-0621	Swamp Creek 4	Surface Collection with Subsurface Investigation (grader scrapes)
37-3-0622	Swamp Creek 5	Surface Collection
37-3-0623	Swamp Creek 6	Surface Collection
37-3-0624	Swamp Creek 7	Surface Collection
37-3-0026	Glennies Creek Site B / Bettys Creek - B	Surface Collection with Subsurface Investigation (grader scrapes)
37-3-0625	Swamp Creek 8	Surface Collection
37-3-0027	Glennies Creek Site C / Bettys Creek - C	Surface Collection with Subsurface Investigation (grader scrapes)
37-3-0626	Swamp Creek 12	Surface Collection
37-3-0592	Bettys Creek 1	Surface Collection with Subsurface Investigation (grader scrapes)
37-3-0627	Swamp Creek 13	Surface Collection with Subsurface Investigation (grader scrapes)
37-3-0593	Bettys Creek 3	Surface Collection with Subsurface Investigation (grader scrapes)
37-3-0773	Swamp Ck 10	Surface Collection with Subsurface Investigation (grader scrapes)
37-3-0594	Bettys Creek 4	Surface Collection with Subsurface Investigation (grader scrapes)
37-3-0595	Bettys Creek 5	Surface Collection with Subsurface Investigation (grader scrapes)
37-3-0596	Bettys Creek 6	Surface Collection with Subsurface Investigation (grader scrapes)
37-3-0597	Bettys Creek 7	Surface Collection with Subsurface Investigation (grader scrapes)
37-3-0598	Bettys Creek 8	Surface Collection with Subsurface Investigation (grader scrapes)

A total of 2,713 artefacts were recovered from the Glendell project area salvage including 824 (30.6%) from the surface collection, 274 (10.1%) from Excavation 1 (Bettys Creek 10), 19 (0.7%) from Excavation 2 (Bettys Creek 9), 1,414 (52.1%) from Excavation 3 (Bettys Creek 2) and 177 (6.5%) from the grader scrapes. A total of 2,604 (96%) of the artefacts were recovered from the Bettys Creek catchment, 52 (1.9%) from the Bowmans Creek catchment and 57 (2.1%) from the Swamp Creek catchment.

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Observations made from the surface collection assemblage are as follows:

- The highest number of artefacts were collected from Bettys Creek 14 (26.7% of the surface collection assemblage), followed by Bettys Creek 10 (19.5% of the assemblage);
- 60.6% of the artefacts were collected from lower slopes and floodplains associated with creek lines (56.7% from Bettys Creek; 3.3% from Swamp Creek and 0.7% from Bowmans Creek);
- Sites on low but elevated spurs in tributary confluences comprised 22.2% of the assemblage; ridge crests (7.5%); sites on lower slopes on tributary channels more than 150 m from the main creek channel (7.5%); mid slope sites (1.3%) and upper slopes (0.6%);
- The dominant artefact type was broken flakes (45%); followed by flakes (26.7%); flaked pieces (10.9%); retouched flakes (10%), cores (3.7%), heat shatter (3.4%) and grindstones (0.4%);
- A total of 31 cores were recovered from the surface collection. Of these, 21 were
 recovered from the Bettys Creek sites (17 from areas with tributary confluences with
 Bettys Creek); and
- Mudstone was dominant within the assemblage making up 58.5% of the artefacts, followed by silcrete (31.9%) with the remaining raw materials making up 9.6% of the total assemblage.

Excavation was targeted at Bettys Creek 2, Bettys Creek 9 and Bettys Creek 10 indicated the following:

- Bettys Creek 10 and Bettys Creek 2 retained a level of spatial integrity reflected by knapping events and raw material distribution patterns;
- Bettys Creek 9 contained artefacts in a secondary context;
- · All three locations contained backed flakes;
- · A ground oven identified at Bettys Creek 2 had an absolute date of 2188+/-39 BP;
- It was possible to obtain one radiocarbon date of 3077±40 BP (calibrated-Wk-20912) from Square K Spit 3 of Excavation 3 within the Mount Owen Extension Area. The date was relative in nature as it belonged to a large piece of burnt wood that was associated with artefacts both above and below it. Thus the artefacts above it must be dated to later than 3077±40 BP and those below it to earlier;
- Broken flakes (45.7%) dominated the artefact assemblage, followed by flakes (38.7%);
- Bettys Creek 10 and Bettys Creek 2 were dominated by mudstone while Bettys Creek 9 was dominated by silcrete. Overall, mudstone was dominate (55.7%) over silcrete (32.3%);
- A small knapping event was evident at Bettys Creek 10, with greater amounts of knapping noted at Bettys Creek 2; and

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 Core to flake ratios for Bettys Creek 10 were 1:28.7 and for Bettys Creek 2 were 1:27.4 suggesting knapping on site.

As a result of the Umwelt investigations outlined above, today's archaeological landscape, particularly along Bettys Creek, but also along Swamp Creek and Bowmans Creek in the vicinity of the Project Area, has been extensively studied.

2.4.3 Archaeological Salvage. Liddell Coal Operations Development Modification 5 (OzArk 2015)

OzArk was engaged by Liddell Coal Operations (LCO) to undertake the salvage of 15 Aboriginal archaeological sites for Development Modification 5 of DA 305-11-01 and was approved under Aboriginal Heritage Impact Permit (AHIP) #C0000623 (Figure 2-1). The salvage of the sites was undertaken on 28 January 2015 and 24 to 25 February 2015.

Artefacts were retrieved from seven of the 15 sites. A total of 46 artefacts were salvaged across all sites. The majority of the 46 artefacts recovered from the salvage were flakes (73.9%). Other artefact types included cores, flaked pieces, debitage, blades and a core fragment. Almost all artefacts were made from mudstone (56.5%) and silcrete (39.1%). Quartz and basalt artefacts were also present. Most artefacts were at a tertiary (65.2%) stage of reduction, with the rest secondary (34.8%). There were no artefacts at the primary stage of reduction.

The artefacts that were salvaged closely correspond to the regional context. The low proportion of formal tools (just one in 46) and the high percentage of flakes and debitage (76%) in the salvaged assemblage are typical of the region, but this is probably true in most sites across Australia. Mudstone has been recorded to be the most common raw material in the region, which was the case for the salvaged artefacts, and the other materials salvaged are also common.

Details of the two sites in this program that are within the Project Area are listed in Table 2-4.

Table 2-4. Details of sites within the Project Area salvaged under AHIP C0000623.

AHIMS #	Site name	Artefacts salvaged	Notes
37-3-0419	Rav 24 East	12	This site was salvaged by surface collection and grader-scrape salvage. The ground surface visibility (GSV) of 15% is based on pre-grader-scrape visibility. The grader-scrapes added an additional 20% GSV.
37-3-1152	LID 36	1	Rakes were used to remove wood chips from the ground and improve GSV.

2.4.4 Mount Owen Continued Operations Project Salvage Program (OzArk 2017)

In early 2017 the MOCO salvage program took place under the authority of the 2016 Mount Owen Complex Aboriginal Cultural Heritage Management Plan (ACHMP) (XMO SD PLN 0060). This program was completed in the approved disturbance areas associated with the MOCO Project (SSD-5850).

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This program included the collection of surface artefacts at 26 sites resulting in 163 artefacts being recorded (Figure 2-1). Included in the tally of 26 sites, were two sites where limited archaeological excavation took place resulting in a further 187 artefacts being recorded. An additional area on the east bank of Bowmans Creek proposed for impact by the new Hebden Road bridge was also subject to archaeological investigation by manual excavation but the area proved to be highly disturbed and no artefacts were recorded.

In addition, there were three sites that were unable to be salvaged, one as it was on land not owned by Mount Owen and two due to the fact that the area of the sites had previously been unintentionally impacted by mining activities². These unintentional impacts were self-reported to the OEH who issued an official caution to Mount Owen on 17 March 2016. Sites salvaged within the Project Area under SSD-5850 are listed in **Table 2-5**.

Table 2-5. Sites salvaged within the Project Area under SSD-5850.

Site ID	Site Name	Site Type	Number of Artefacts Salvaged	Salvage methodology
37-3-0611	Extension to Bettys Creek 21	Artefact Scatter	4	Surface collection only
37-3-1174	MOCO IF-5	Isolated Find	1	Surface collection only
37-3-1195	MOCO OS-7	Artefact Scatter	Ø	Surface collection only
37-3-1199	MOCO OS-11	Artefact Scatter	7	Surface collection only
37-3-1211	MOCO IF-18	Isolated Find	0	Surface collection only
	Bowmans Creek East Bank (Hebden Road)	PAD	0	Manual excavation.

Of all the sites investigated in the 2017 salvage program, 37-3-1192 recorded the highest artefact density with 71 surface artefacts (43.5% of all surface artefacts recorded during the salvage program) and 186 artefacts recorded in the excavation component of the program (constituting almost all of the artefacts recorded in the excavation component of the program). 37-3-1192 was located on an unnamed watercourse (termed the 'eastern drainage') approximately 2.5 km east of the Project Area. 37-3-1192 was located in area heavily affected by erosion and the investigation showed that while one concentration of artefacts remained *in situ*, the majority of the site had been displaced by the erosion.

Other sites that recorded more than 10 artefacts during the salvage program were 37-3-1191, 37-3-1197 and 37-3-1198. 37-3-1197 and 37-3-1198 remain partially extant within the Project Area. All other sites recorded very low artefact numbers supporting the conclusion reached in OzArk 2014 that the remaining archaeological values at MOC consist of low density, often displaced, artefact scatters.

² In addition, MOCO OS-3 was unintentionally partially impacted by mining activities and the remainder of this site was salvaged during the salvage program.

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2.5 ARCHAEOLOGICAL CONTEXT: CONCLUSION

The extensive and long running archaeological investigations within and in close proximity to the Project Area indicate that:

- Stone artefact sites (isolated finds and artefact scatters) are the most commonly recorded site types in the area and that other site types, such as culturally modified trees, are very rare or non-existent;
- At the current state of knowledge, only stone artefact sites will be impacted by the Project. Other site types such as grinding grooves or the Bowmans Creek engraving site (Bowmans Ck 16, 37-3-0772) are located outside of the Project Area. In addition, the Yorks Creek VCA is located outside of the Project Area;
- Artefacts tend to associated only with the A-Horizon soil layers indicating a date in the Holocene period (i.e. 10,000 BP to the present);
- The predominant raw materials used for stone artefact manufacture are locally sourced mudstone and silcrete;
- Excavations generally reveal a low artefact density but some spatial patterning has been observed: principally concentrations of artefacts interpreted as 'knapping areas'. Other archaeological features such as hearths are rare;
- Sites tend to be associated with waterways and a discernible pattern has been observed whereby larger sites are associated with larger waterways offering permanent water supplies; and
- While all waterways have been equally studied, Yorks and Bettys Creeks appear to have attracted past Aboriginal occupation more often than Swamp Creek. Bowmans Creek would have been a major focus of past occupation but much of the evidence of this occupation has been removed by major channel migrations or intensive historical land use disturbances such as cultivation.

3 PREDICTIVE MODEL

3.1 BACKGROUND

Across Australia, numerous archaeological studies in widely varying environmental zones and contexts have demonstrated a high correlation between the permanence of a water source and the permanence and/or complexity of Aboriginal occupation. Site location is also affected by the availability of and/or accessibility to a range of other natural resources including: plant and animal foods; stone and ochre resources and rock shelters; as well as by their general proximity to other sites/places of cultural/mythological significance. Consequently sites tend to be found along permanent and ephemeral water sources, along access or trade routes or in areas that have good flora/fauna resources and appropriate shelter.

In formulating a predictive model for Aboriginal archaeological site location within any landscape it is also necessary to consider post-depositional influences on Aboriginal material culture. In all but the best preservation conditions very little of the organic material culture remains of ancestral Aboriginal communities survives to the present. Generally it is the more durable materials such as stone artefacts, stone hearths, shell, and some bones that remain preserved in the current landscape. Even these however may not be found in their original depositional context since these may be subject to either (a) the effects of wind and water erosion/transport: both over short and long time scales or (b) the historical impacts associated with the introduction of European farming practices including: grazing and cropping; land degradation associated with exotic pests such as goats and rabbits and the installation of farm related infrastructure including waterstorage, utilities, roads, fences, stockyards and residential quarters. Scarred trees may survive for up to several hundred years but rarely beyond.

3.2 SETTLEMENT STRATEGIES

The large number of archaeological studies undertaken within, and in the vicinity of the Project Area provides information to obtain a sound understanding of the nature and distribution of archaeological sites within the area. Although there is some conjecture about the relationship between stream order, site numbers and densities, the general pattern is that the majority of sites are present within 30 m of watercourses (Dean-Jones 1992: 26–27; AMBS 1997: 29). Although sites are present in locations at a greater distance from water, these sites are limited in terms of both number and size, constituting a lower density scatter than is found along the creek lines (Dean-Jones 1992: 24; ERM 1999: 22–23). The majority of sites are small, with larger sites typically found in association with permanent watercourses. Reduced visibility has been proffered as an explanation for the higher number of sites and artefacts present along the more heavily eroded and less vegetated minor watercourses as compared to major creeks (Umwelt 2004: 7.7; ERM 1999: 84).

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3.3 PAST LAND USE

Crucial for the preservation of archaeological deposits is the history of past land use in a particular area. In particular, the European history of the Hunter Valley lowlands, where the Project Area is located, is a stark example of historic land mismanagement leading to wide-spread erosion as the dispersible soils were exposed to rain. On Figure 1-4, for example, the wide-spread sheet wash erosion is noticeable; particularly on the slopes that once existed in the south of the Project Area. While this portion of the Project Area contained more-sloping landforms compared to other areas, it remains indicative of the soil loss that has occurred across the Project Area.

Bowmans, Swamp, Yorks and Bettys Creek have deeply incised channels that are most likely the result of European land-use practices (especially vegetation clearance and overgrazing) in the area and previous studies of the soil profiles exposed in the banks of Swamp, Yorks and Bettys Creeks indicate that these creeks formerly had shallow channels with a chain of ponds morphology (Umwelt 2004).

The drainage depressions and second and third order drainage lines within the Project Area have all been subject to varying degrees of gully erosion. In some areas, erosion has formed gullies up to two metres deep. These destabilised areas have generally also been affected by sheet erosion. Consequently, there has been extensive downslope and downstream movement of topsoil (A-Horizon) and any archaeological deposits it may have contained. With such widespread soil movement it is also important to remember that accumulations of artefacts that may be termed a 'site' today may have, in fact, been washed into that location during the historic period and bear no relationship to past Aboriginal occupation patterns in the area.

Cultivation has impacted the floodplains and terraces of the creek lines and much of the lower slope landforms within the Project Area (see **Figure 1-4**). Cultivation acts to redistribute artefacts both horizontally and vertically within the soil profile and ultimately destroys the integrity of artefact assemblages within the top 50 centimetres of the soil profile.

More recently, approved coal mining activities, has been the major source of impact within the landscape. Coal mining activities have resulted in the loss of a large portion of Swamp Creek, Bettys Creek and surrounding landforms.

3.4 PREVIOUSLY RECORDED SITES

Due to the history of archaeological investigation in the vicinity of the Project Area, there have been a number of sites recorded either within the Project Area, or in close proximity. 62 sites remain extant within the Project Area (Figure 3-1).

As discussed in Section 2 and below in Section 3.4, the results of previous investigations would suggest that:

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- The most common site type will be stone artefact sites; either low density artefact scatters or isolated finds;
- Culturally modified trees will be extremely rare due to the level of historical clearing and the fact that they are a regionally rare site type;
- Grinding grooves will be unlikely to occur in the Project Area as the major creek lines have been subject to previous assessment and it would be expected that these site types would have already been recorded; and
- Other site types such as burials or stone arrangements will be very rare due to the longterm agricultural disturbances that have occurred in the Project Area.

3.5 LANDFORM MODELLING

In the portions of the Project Area that are outside of approved mining areas, the topography is generally flat ranging between around 60 m above sea level to small rises that are around 140 m above sea level. As such, while there are minor variations in the topography of the Project Area, these are not pronounced enough to be mapped in a way that is meaningful for the archaeological understanding of the Project Area.

Formerly, however, in areas that have been largely mined, the topography of the Project Area was comprised of a number of low, generally north-south trending ridges (elevation from 10 to 140 m) with east-west trending spurs and long slopes with a low to moderate gradient. Numerous drainage depressions flowed between each spur, forming first, second and third order ephemeral tributaries of Bowmans, Swamp, Yorks and Bettys Creeks (Figure 1-3).

Swamp, Yorks and Bettys Creeks are all tributaries of Bowmans Creek, which would have been the most reliable water source within the Project Area. The main channels of Swamp, Yorks and Bettys Creek and any associated swamps and billabongs would have provided semi-permanent water sources (Umwelt 2004). The tributary systems of these lower order streams (e.g. first and second order streams) would have only provided an ephemeral water source.

There are many minor creek confluences within the Project Area, however, the only major creek confluence in the Project Area is the confluence of Yorks and Bowmans Creek with the major confluences of both Swamp and Bettys Creek with Bowmans Creek in very close proximity, but to the south of the Project Area. All creeks within the Project Area have some floodplain development, however, only Bowmans Creek has a well-defined terrace sequence. Up to three terrace surfaces are associated with Bowmans Creek within the Project Area.

As such there are a variety of topographic features within the Project Area that would have encouraged past Aboriginal occupation; namely:

 The ridges and spurs would have provided good views along the creek valleys and would have been used as vantage points. However, as the Project Area is now largely devoid of

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crests, this landform feature will not influence the distribution or occurrence of archaeological sites in the Project Area.

 The landforms adjacent to Bowmans, Swamp, Yorks and Bettys Creeks have the capability of providing elevated landforms adjacent to water: landforms recognised in the area as having archaeological sensitivity. There is increased archaeological sensitivity at the confluence of Bowmans and Yorks Creeks.

Figure 3-1: Location of valid AHIMS sites within the Project Area.



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3.6 PREDICTIVE MODEL FOR THE PROJECT AREA

- <u>Isolated finds</u> may be indicative of: random loss or deliberate discard of a single artefact, the remnant of a now dispersed and disturbed artefact scatter, or an otherwise obscured or sub-surface artefact scatter. They may occur anywhere within the landscape but are more likely to occur in topographies where open artefact scatters typically occur.
 - As isolated finds can occur anywhere, particularly within disturbed contexts, it is predicted that this site type could be recorded within the Project Area. It is noted in Section 2.3 that isolated finds are commonly recorded in the vicinity of the Project Area.
- Open artefact scatters are here defined as two or more artefacts, not located within a rock shelter, and located no more than 50 m away from any other constituent artefact. This site type may occur almost anywhere that Aboriginal people have travelled and may be associated with hunting and gathering activities, short or long term camps, and the manufacture and maintenance of stone tools. Artefact scatters typically consist of surface scatters or sub-surface distributions of flaked stone discarded during the manufacture of tools, but may also include other artefactual rock types such as hearth and anvil stones. Less commonly, artefact scatters may include archaeological stratigraphic features such as hearths and artefact concentrations which relate to activity areas. Artefact density can vary considerably between and across individual sites. Small ground exposures revealing low density scatters may be indicative of background scatter rather than a spatially or temporally distinct artefact assemblage. These sites are classed as 'open', that is, occurring on the land surface unprotected by rock overhangs, and are sometimes referred to as 'open camp sites'.

Artefact scatters are most likely to occur on level or low gradient contexts, along the crests of ridgelines and spurs, and elevated areas fringing watercourses or wetlands. Larger sites may be expected in association with permanent water sources.

Topographies which afford effective through-access across, and relative to, the surrounding landscape, such as the open basal valley slopes and the valleys of creeks, will tend to contain more and larger sites, mostly camp sites evidenced by open artefact scatters.

This site type is likely to be located within landforms of a gentle gradient associated with the main channels of Bowmans, Swamp, Yorks and Bettys Creeks as these are likely to have been attractive camping areas. Smaller sites containing low density and low complexity assemblages are predicted near semi-permanent watercourses (Swamp, Yorks and Bettys Creeks), while the more permanent nature of Bowmans Creek suggests that this creek may have been the focus of more intensive (longer duration) camping which would have produced larger sites with higher density and more complex assemblages. Moderate to steeply sloping landforms are unlikely to have been utilised with lower gradient ridges and spurs being more attractive for camping. The lack of water in these elevated landforms would be smaller and contain low complexity assemblages. The high degree of impact from past agricultural practices along the floodplains i.e. cultivation, in the Project Area will probably mean that surface scatters and archaeological deposits are likely to have become displaced. It

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would be expected that most sites located would date to the late Holocene (i.e. less than 4,000 years old), the age attributed to the A-Horizon artefact bearing deposits. Although Pleistocene sites contained within B-Horizon sediments may also occur, there have been only one or two instances of Pleistocene deposits being identified in the district and this must be considered a rare eventuality. It is noted that the Project Area already has a number of artefact scatters recorded by investigations over the years. This suggests that many of the larger sites have probably been previously recorded and that the Project Area will probably not record many more large sites.

- Aboriginal scarred trees contain evidence of the removal of bark (and sometimes wood) in the past by Aboriginal people, in the form of a scar. Bark was removed from trees for a wide range of reasons. It was a raw material used in the manufacture of various tools, vessels and commodities such as string, water containers, roofing for shelters, shields and canoes. Bark was also removed as a consequence of gathering food, such as collecting wood boring grubs or creating footholds to climb a tree for possum hunting or bark removal. Due to the multiplicity of uses and the continuous process of occlusion (or healing) following removal, it is difficult to accurately determine the intended purpose for any particular example of bark removal. Scarred trees may occur anywhere old growth trees survive. The identification of scars as Aboriginal cultural heritage items can be problematical because some forms of natural trauma and European bark extraction create similar scars. Many remaining scarred trees probably date to the historic period when bark was removed by Aboriginal people for both their own purposes and for roofing on early European houses. Consequently the distinction between European and Aboriginal scarred trees may not be clear.
 - Due to the near-total clearance of trees from within the Project Area (see Figure 1-4), this site type is not predicted to occur. It is also noted that this site type is very rare at a regional level due to historical tree clearance.
- Quarry sites and stone procurement sites typically consist of exposures of stone
 material where evidence for human collection, extraction and/or preliminary processing
 has survived. Typically these involve the extraction of siliceous or fine grained igneous
 and meta-sedimentary rock types for the manufacture of artefacts. The presence of
 quarry/extraction sites is dependent on the availability of suitable rock formations.
 - This site type could be recorded within the Project Area should suitable rock outcroppings be available. One quarry site, Bowmans Creek 5, is located within the Project Area to the north of Swamp Creek (see Section 2.3.7).
- <u>Burials</u> are generally found in soft sediments such as aeolian sand, alluvial silts and
 rock shelter deposits. In valley floor and plains contexts, burials may occur in locally
 elevated topographies rather than poorly drained sedimentary contexts. Burials are also
 known to have occurred on rocky hilltops in some limited areas. Burials are generally
 only visible where there has been some disturbance of sub-surface sediments or where
 some erosional process has exposed them.
 - Although it is possible that this site type could be found within the Project Area in the alluvial landforms, it is considered a rare site type especially given the disturbance that has occurred within the Project Area.

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An examination of the landforms within the Project Area (Section 3.5) indicate that the northern portions of the Project Area is in a degrading environment where soils have been moved from the slopes towards the creek systems where aggrading landforms are evident. This would have the effect of displacing or impacting archaeological deposits had they existed in the north of the Project Area. Landforms adjacent to Bowmans Creek, in particular, are in an aggrading environment. This may mean that archaeological deposits may have become buried, or mixed with artefacts that have washed down from adjoining slopes.

3.7 RESEARCH QUESTIONS

A number of research questions can meaningfully be applied to the investigation of the Project Area. These research questions include:

- What resources were available to the Aboriginal people using the Project Area (food, stone and water)?
- How do the artefact assemblages from the sites along the slopes and ridge crests in the Project Area differ from sites that are located along Bowmans, Swamp, Bettys and Yorks Creeks?
- · What tasks were Aboriginal people undertaking at the sites?
- · Did the Aboriginal people use the Project Area at any particular time of the year?
- · Are there hearths in the area?
- If there are hearths, do they contain remains (animal/plant) that may indicate what people were cooking/eating?
- · Are there burials in the area?
- Is there evidence to suggest that Aboriginal people were using the area earlier than the mid to late Holocene?
- · Can dates be obtained for the Aboriginal use of the area?
- · What resources were transported to the area and where?

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The survey methodology set out in Section 4 will be framed to help answer these questions; should sites of sufficient significance be encountered within the Project Area. However, based on the results of previous assessments and past disturbances, it not expected that the Project Area will contain sites of sufficient significance to help answer those research questions that require a robust data set.

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4 SURVEY METHODOLOGY

4.1 ASSESSMENT APPROACH

The Aboriginal cultural heritage assessment of the Project Area will follow the Code of Practice for the Investigation of Aboriginal Objects in New South Wales (Code of Practice; DECCW 2010). The field inspection will follow the *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in New South Wales* (OEH 2011).

4.2 BACKGROUND

The following archaeological methodology is based on the understanding that portions of the Project Area have been previously surveyed and, in some areas, salvaged as a result of past archaeological assessments and works related to mining approvals. There is, therefore, significant knowledge for much of the Project Area regarding the likelihood of further unidentified Aboriginal objects or sites. In addition, data from previous reports, site cards and permits can be used to interpret the landscape if ground surface visibility is poor to ensure that the archaeological characteristics of the Project Area are understood.

In addition, sizeable portions of the Project Area have been heavily modified by approved mining activities.

All survey will be undertaken with the assistance of RAP/Wonnarua Knowledge Holder representatives. Apart from their valuable experience in recognising and recording archaeological sites, the RAP/ Wonnarua Knowledge Holder representatives will be able to acquaint themselves with the Project Area in order to inform their cultural value assessment of the Project Area. Any cultural values relating to the Project Area will be captured by the OzArk archaeologist (if such information is provided during the survey) and included in the ACHAR to be prepared as part of the EIS for the Project.

4.2.1 Survey methodology

Standard archaeological field survey and recording methods will be employed in this assessment (Burke & Smith 2004).

It should be noted that the aim of any archaeological survey is not to locate each and every artefact in a landscape but to undertake investigations so that the archaeological potential and archaeological characteristics of all landforms within a Project Area are known. Therefore the aims of the survey will be to:

 Reinspect the location of all 62 previously recorded sites that remain within the landscape within the Project Area so that their current condition and scientific heritage values can be assessed;

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- Conduct pedestrian transects across targeted landforms in the Project Area so that their archaeological potential can be determined;
- · Evaluate whether the predictive model set out in Section 3.6 is valid;
- Determine if the research questions set out in Section 3.7 can be answered;
- Determine if any portions of the Project Area require test excavation in order to understand the archaeological potential at a particular location;
- Undertake sufficient assessment in order to satisfy Sections 2.2, 2.4 (as it pertains to scientific values), 2.5, 2.6, and 2.7 in the Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in New South Wales (OEH 2011);
- Collecting sufficient data so that the results can be presented in an ACHAR as set out in Section 3 in the Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in New South Wales (OEH 2011); and
- Undertaking survey and record keeping to satisfy Requirements 1–13 of the Code of Practice.

It is envisioned that fieldwork for the survey would be completed in three weeks with two teams of surveyors consisting of two archaeologists and up to four RAP/Wonnarua Knowledge Holder representatives working concurrently for two weeks, and one team in the third week.

4.2.2 Survey zones

For the purposes of the archaeological survey, the Project Area has been divided into three zones of survey where differing levels of assessment will take place. These zones are set out in Sections 4.2.2.1 to 4.2.2.3.

Figure 4-1 shows a map displaying the various areas of survey priority ranging from areas so heavily modified that they do not require survey, areas of limited survey priority, and areas that warrant full survey. The proposed survey methodology in each area is as follows.

4.2.2.1 Area of high survey priority: 1,000 ha

This assessment area includes approximately 1,000 ha that is classified as 'high survey priority' on Figure 4-1. This constitutes approximately 34 per cent of the Project Area. In this area the major Project components such as the Barrett Pit continuation, the Hebden Road realignment, a potential new MIA, the heavy vehicle access road to the new MIA or Liddell MIA, and the diversion of Yorks Creek will be located (Section 1.1). Although a significant part of the high survey priority area has been subject to survey (over 10 years ago), much of this area is outside of land that has been systematically surveyed in the recent past.

This area includes approximately 2.5 km of Bowmans Creek, 3.5 km of Yorks Creek and 3.9 km of Swamp Creek; all drainage systems with known Aboriginal cultural heritage values. Although culturally modified trees will not be recorded (Section 3.6), this survey area includes the riparian

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corridors of Bowmans, Yorks and Swamp Creek areas as disturbance is predicted to be lower in these areas.

Field survey will, wherever possible, be conducted in transects of 100 m intervals (with up to six surveyors spaced 10 m apart). If field conditions do not allow straight transects some areas may be investigated more opportunistically where exposures and/or vegetation allow. Areas of higher archaeological potential such as the banks of waterways such as Bowmans, Yorks, Swamp and Bettys Creeks will be fully inspected by pedestrian transects along both banks. This will ensure that this survey zone is systematically assessed.

If areas have significant levels of ground cover and pedestrian survey is considered by the archaeologist and RAP/Wonnarua Knowledge Holder representatives to yield no results, then assessment will be made, based in part on knowledge gained from past archaeological research in the area, of the potential of the area to have Aboriginal artefacts present.

It is noted that the historic Ravensworth homestead is located within this zone. A thorough inspection of the immediate grounds of this homestead will be undertaken so that the potential for the presence of Aboriginal sites and/or subsurface deposits will be determined. This determination will be taken into account should historic archaeological test excavations be required at some time in the future in areas immediately adjacent to the homestead and its outbuildings.

4.2.2.2 Area of low survey priority: 208 ha

This area contains generally flat landforms surrounding Bettys Creek (Figure 4-1). This area constitutes approximately 7 per cent of the Project Area.

This area has been extensively surveyed in the recent past, including more recently for the MOCO Project. As this area has been extensively surveyed, the archaeological characteristics of this area are largely known. In addition, the Project does not propose to disturb extensive areas within this portion of the Project Area. The only planned disturbance in this area is in the northern portion of the low survey priority area and is to enable the final landform to drain into Bettys Creek (Figure 1-2).

This area will not be inspected by formal transects but will focus on areas of exposure where archaeological material may be visible. Further definition of the Project Design may also narrow the survey area within this area.

Survey in this area will use the experience of the archaeologist and RAP/Wonnarua Knowledge Holder representatives to target areas that they feel will yield the best information. Survey will also be concentrated in the area where the final landform drainage is planned. OzArk Environmental & Hentage Management

4.2.2.3 Area of modified landforms: 1,607 ha

This area has been highly modified by approved mining activities and includes open cut pits, waste emplacements, dams, buildings and other surface infrastructure (Figure 4-1). This constitutes approximately 55 per cent of the Project Area.

Due to the highly modified nature of these landforms, they are extremely unlikely to contain archaeological sites and no survey will take place in this area.

4.2.2.4 Approved disturbance areas: 110 ha

Small portions of land within the Project Area (approximately 110 ha or 4 per cent of the Project Area) are not included in any of the three zones described above as they are in areas where approval to disturb has been consented but the disturbance has not yet occurred (Figure 4-1). These approvals are either part of the Glendell Mine consent (DA 80/952) or the MOCO Project consent (SSD-5850). As these areas have been previously assessed and approval to disturb has already been consented, these areas will not be subject to survey.

4.2.3 Test excavation

It is possible that the survey may identify landforms where test excavation under the Code of Practice (Requirements 14–17) is required. Should such landforms be identified during the survey, the test excavation methodology will be prepared as a separate document that will be circulated to all RAPs for review and comment.



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APPENDIX 2: AHIMS SEARCH RESULT

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SitelD	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
7-3-0770	Bowmans Ck 11	GDA	56	315824	6412493	Open site	Valid	Artefact : 50		
	Contact	Recorders	Janio	e Wilson				Permits		
7-3-0771	Bowmany Cli 15	GDA	56	315825	6412677	Open size	Vallid	Arrelact: 55		
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	Contact	Recorders	Janie	e Wilson				Permits		1000000
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57-3-97 MI	TOTA LA CER A	MAYA.	- 10	at/.304	0411470	open ane	Tam	Potential Archaeological Deposit (PAD) : -		
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7-3-0749	Yorks Creek 6	GDA	56	317468	6411773	Open site	Valid	Artefact 5		
	Contact	Recorders	Janie	w Wilson, Oz	Ark Environme	ental and Heritag	Management, Miss.	Stephanie Rus Permits		
17-3-0750	Yark Creek 7	AGD	56	317378	6411979	Openalle	Valid	Artelact : 18		
	Contact	Recorders	Jank	e Wilson			-	Permits		
37-3-0751	Yark Creek B	AGD	56	317392	6411616	Open site	Valid	Arrefact : 1		
	Contact	Recorders	Janic	e Wilson				Permits		
17-3-0752	Vork Creek 9	AGD	50	317579	6411121	Open alte	Valid	Artefact: 6		102380
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37-3-0753	York Creek 10	AGD.	56	317759	6412075	Open size	Valid	Arnelact : 7		
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17-8-0754	Vork Chink 1 I	AGO	-56	317676	6412252	Dpan line	-Manipa =	Arnellact 59		
	Contact	Recorders	Lanie	w.Wilson			10.01	Permits		
37-3-0755	York Creek 12	AGD	56	317740	6412390	Opensite	Valid	Artelact : 3		
10.10.01.0.0	Contact	Recorders	Janio	e Wilson		-	- Mart	Permits		
7-3-1166	LIDEL-113	GDA	56	415430	6413149	Openene	Vanid	withher:1		
	Contact	Recorders	OzA	к Енунтанна	ental and Herit	cage Management	10	Permits		

Buffer of 0 meters. Additional Info : Background info. Number of Aboriginal sites and Aboriginal objects found is 91 This information is not guaranteed to be fire from error omission. Office of Environment and Hentinge (KSW) and its employees disclain liability for any act door or anison mode on the unformation and remsequences of such sets or omnome

itelD	SiteName	Datum	Zone Easti	ng Northing	Context	Site Status	SiteFeatu	res	SiteTypes	Reports
11-5 1 Huu	Contact	Recorders	OzArk Envir	umental and Her	itage Management	MENICHOLAS HAR	ROP	Permits	3765	
37-3-1169	LIDBE - IF2	GDA	56 31550	6413147	Open size	Destroyed	Arrelact: 1	Lorinica	arres .	
	Contact	Recorders	OzArk Envir	mmental and Her	itage Management	Mr.NICHOLAS HAR	non	Permits		
37-3-1164	LIDRE IF 1 duplicate of 37-3-1160 and 37-3-1163	GDA	\$6 31539	6413070	Open site	Deleted	Artefact :	1		
	Contact	Recorders	OzArk Envir	onmental and Her	itage Management	t ·	_	Permits		
37-301105	LIDKE OST daplicate of 37-3+1159 and 37+1-1162	CDA	56 31544	6413001	Open size	Deteted	Arielact = 1			
	Contact	Recorders	OAArk Envir	mmenial and Her	itage Management	t i		Permits		
\$7-3-1159	LIDEE-051 duplicate of 37-3-1162 and 37-3-1165	GDA	56 31544	6413001	Open site:	Destroyed.	Artefact :			
	Contact	Recorders	OzArk Envir	opmental and Her	itage Management	t.Mr.NICHOLAS HAR	ROP	Permits	3765	
37-3-1100	LIDBE - IFT MIPUCATE OF SY-9-1105 and 37-5-1109	GDA	50 31539	0413071	Open sue	Destroyed	Artelact	nimites		
27.3.1162	Linest of 37,7,1165 and 37,7,1150	CDA	56 31544	6413001	Onen site	Deleted	Astalart-	Permits	8000	
	Contact	Pasandane	Cadele Fault	in a state of the	itim University	Processo	in render .	Bernitte		
37-3-1161	LIDEE-IF1 dupitcate of 37-3-1160 and 37-3-1164	GDA	56 31539	6413070	Open site	Deleted	Arrefact	Lermos		
	Contact	Recorders	OZARK EUVID	onmental and Her	iture Management			Permits		
37-3:1158	RPS DLW IF1	GDA	56 31714	6412677	Upen site	Valid	Artefact :	1		
	Contact	Recorders	Ms.Gillian Go	ode, NPS Australia	East Pty Ltd -Han	nilton		Permits		
\$7-3-1349	REA351	GDA	36- 31613	6412234	Open size	Walid.	Artelact			
1	Contact	Recorders	Ms.Nodia Za	convisiti				Permits		
37-3-1237	REA 276	GDA	56 31651	6411832	Open filte	Valid	Artefact:			
	Contact	Recorders	Ms.Nadia Zal	urzewski			_	Permits		
37-3-1238	REA277	GDA	56 31673	6411403	Opersian	Wahid	Arrelant:-			
	Contact	Recorders	My Nadia Zai	drzewski	Sec. 10			Permiis		
37-3-1239	REA278	GDA	56 31724	6410956	Open site -	Dertroyed	Artefact :-	1.1.1.1		
27.2.1952	Contact	Recorders	Ms.Alison La	mond Ms. Nadia Z	akrzewaki	Busternust	Astelartic	Permits		
ar-a-16.34	Contrad	Recordure	Mc Alleren La	D412394	- colonia erre	ivesirbyen.	Artifiant :	Burnelle		
37-3-1221	REA 448 (Tower 22)	GDA	56 31676	6411453	Open Site	Destroyed	Artelact	COLUMNS.		
	Chutact	Recorders	Ms Alison La	mond Ms Alison'i	amond	Formation	10 croater (Permits		
37-3-1222	REA 446 (Tower 23)	GDA	56 31691	6411217	Open sile	Destroyed	Artelact :-	C.C.C.MACI		
	Contact	Recorders	McAllson La	mond.McAlison I	amond.			Permits		
37-3-1224	BEA 445 (Tower 21)	GDA	56 31653	6411702	Open site	Destroyed	Artefact :-	0.00		
	Contact	Recorders	Ms Alison La	mond,Ms.Alison L	amond			Permits		

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NSW	Environment & Heritage	Extensive search - Sit	te list report								Your Ref/	PO Number : GCOP 20 nt Service ID : 38073
SiteID	SiteName		Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatur	ws.	SiteTypes	Reports
17-3-1506	Restriction applied. Pl	ease contact					Open site	Not a Site				
	Centact	en de de la company de la compan	Recorders	Mr.S	ionii Franks,1	Coornewalt Pi	y Liti			Permits		
7-3-1502	Bowmany Creek 6		GDA	56	315509	6412710	Open site	Valid	Arrefact : -			
	Contact		Recorders	ÖzA	rk Environmi	ental and Herit	inge Managemen	Miss.Philippa Sokol		Permits		
7-3-1503	Yarks Creek 19		GDA	56	317369	0411237	Open site	Valid	Artefact :-			
	Contact		Recorders	OXA	ric Environme	ental and Herit	are Managemen	Miss.Philippa Sokol		Permits		
7-3-1512	Glendell North IF24		GDA	56	318253	6411466	Open size	Valid	Artefact : -	_		
	Cuntact		Recorders	OzA	rk Environme	ental and Herit	age Managemen	Miss Stephanie Ruse	len	Permits		
7-3-1516	Glendell North IF22		GDA	56	317984	6410954	Open site.	Walid	Artefact :-			
	Contact		Recorders	ÚxA)	k Environme	entai and Herit	tage Mitmapernen	MiniStephonie Rus	len	Permits		
7-3-1522	Glendell North IF14		GDA	56	317752	6410825	Open site	Valid	Artefact : -	L-Samuel		
	Contact		Recorders	OzA	rk Environme	ental and Nerth	age Managemen	Miss Stephanie Russ	len	Permits		
7.3.1523	Glendell North IF13		GDA	56	317608	6410830	Opensite	Valid	Arrefuct :-			
	Contact		Recorders	Ded	k Environm	antal and Herit	are Managemen	Miss Stenhanie Ilus	ten.	Permits		
7-3-1524	Glendell North IF12		GDA	56	317765	6410903	Open site	Valid	Artelact :-			
	Contact		Recorders	OzA	rk Environme	ental and Herit	are Managemen	Miss Stephanie Ruse	len.	Permits		
37-3-1525	Glendell North IF11		GDA	56	317221	6411282	Open site	Valid	Ariefact:-	Lecinita		
	Contact		Recorders	DrA	rk Environm	intal and Herit	an Managemen	Miss Stenhanie Russ	leri	Permits		
7-3-1527	Glendell North IF9		GDA	56	316545	6411891	Open site	Valid	Artefact : -	C. C		
	Contact		Recorders	DYA	rk Environni	ental and Horit	age Managemen	Miss Sterilianie Dun	lan	Permits		
7-3-1528	Glendell North IFB		GDA	56	316956	641260E	Onen size	Valid	Artylact :-	Lerning		
	Contact		Recordure	014	ck Fourieron	intal and Hertin	in Management	Mire Starthoods Bush	hin	Parmite		
7.3.1529	Glendell North IF7		GDA	56	315514	6412657	. Open site	Valid	Artefact : -	Letinus		
	Contact		Recordary	Or A	ek Environnu	antal and Harris	Sam Man around	Mire Stanhanie Buce	lan	Barmite		
7-3-1530	Glondell North (F6		GDA	56	315966	64128E1	Open site	Valid	Arrelact :-	Cermits		
	Contact		Bacardaes	014	- Future	mul million	the second second	Aline Crankonte Durri	Line.	December		
7.3.1531	Glonidall North IES		GDA	56	310054	6412783	Oran file	Valid	Artefact *-	remus		
1 3-1351	Forderet		Basedian	0.1	- Post	other and the st	opin me	All Plantanta Barris	in the second second	Hannahan		
7.4.1542	Glendall North IFA		GDA	56	316962	6412932	Linen site	Valid	Artelact	Permits		
C.S. Sector	Contract		Bernden	- Circle	di Vinnenana	orean of Hanis	Spon one	Allow Charle David	ru turita	-		
7.2.1572	Glandall North IFT		CDA	56	217120	GA17A1A	Drawn sitte	Vold	Artabet i -	Permis		
a de tang	Contract		Base	- mi	d. Paulan	and south a	- Manana	Affect Providence in Pr	-unyound ; *	O		
7 1 1534	Glandall North IFT		CDA	56	S17146	6413503	Open size	Consecteptianie Russ	Amplerta	cermits		
o-artaan	Cientien nocuents		Dun	30	1.17110	our of the second	open and	None -	Hittplact :-			
	Lontact		Recorders	OzA	ek Environnie	intal and Hern	oge Management	MissStephania Rus	Lette-	Permits		

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NSW Office of Environment & Heritage **AHIMS Web Services (AWS)** Your Ref/PO Number : GCOP 2018 Extensive search - Site list report Client Service ID : 380731 SiteID SiteName Datum Zone Easting Northing Context 56 319199 6414948 Open file SiteFeatures SiteTypes Reports Site Status 37-3-1535 Giendell North IF1 GDA Valid Artefact :en <u>Permits</u> Contact 37-3-0005 Costain; OzArk Environmental and Heritage Manager 56 315881 6410728 Open size ss.Stephar Valid Recorders Open Camp Sur-AGD Recorders ASRSVS AGD 56 315568 6414300 Permiis Contact 37-3-0452 1.103 **Open site** Partially Artefact :-100666,10088 Destroyed ú. Recorders Univelt (Australia) Pty Limited AGD 56 315874 6414104 Dpen size Contact Permits 3765 37-3-0453 1.02 Amelact:-Valid 100066-10088 Permits Artefact : 60 Contact Davies Site 5, same as 37-3-0193 Recorders Unwelt (Australia) Pro Limited AGD 56 316000 6411500 00 37-3-0462 Open site Valid 100566 Permits Aveslart = 10 Contact 37.3-0795 Newslell Junction (NJ1) Recorders Unweit (Australia) Pty Limited CDA 56 315966 6411656 Open site Valid Permits 0124 Arrefact : -Gentiact 37-3-0670 Liddell Pipelinu Hecorders Mr.Lennard Rinberts GDA 56 316646 6414630 Open site Partially Destroyed Permits Artefact : 5 Recorders Janice Wilson AGD 56 315877 6412751 Dpen size Contact 37-5-0086 Rowman Ch 13 Valid Mermils Artefact :-Recorders Unwell (Australia) Ply Landed AGD 56: 315700 6412500 Open site Contact TRouvell 37-3-0688 Valid 612 Contact TRussell Recorders Rex Silcox Permits Report generated by AHIMS Web Service on 05/11/2018 for Thomas Dooley for the following area at Datum iGDA, Zone : 56, Eastings : 315100 - 318450, Northings : 6410750 - 6415100 with a Buffer of 0 meters. Additional Info : Background Info. Number of Aboriginal sites and Aboriginal objects found is 91
This information is not guaranteed to be free from error uninsimo. Office of Exerninesci and Herizge (RSW) and its employees disclaim liability for any act done at animation ande not the teleformation and romsequences of web. more or contempore Particular
SiteID 37-3-0390	SiteName Ravensworth Massacre-	Datum AGD	Zone 56	Easting 317000	Northing 6409000	Context Open site	Site Status Valid	SiteFeatur Conflict :	DES .	SiteTypes Massacre	Reports 100865.10222 0.102380
	Contact	Recorders	Ms./	Adrienne H	owe-Piening	_			Permits		
37-3-0495	MO IP3	AGD	56	317569	6406213	Opension	Destroyed	Arrelact: -			102220/10261
	Contact	Recorders	ERM	4 - Thornto	Ms. Alison Line	bitot			Permits	342.0	-
37-3-0558	Ashton EWA 96	AGD	56	317074	6410250	Upen site	Desiroyed.	Artefact : -			98163/102617
	Contact	Recorders	Dan	Witter,Ms.	Alison Lamond				Permits	3436	
37-3.0496	Ashton Brunkers Line Kite	AGD	56	317811	6106519	Open Site	Descrived	Arrefact : 1 Potential Arctaeolog Deposit (P	Deni AD):-		101733,10261 T
	Contact	Recorders	Dan	Witter.hu	te Heritage Pty	Ltd,Ashton Conl O	perations Limited.M	Alizon Lamo	Permits	3428	
37-3-0960	REA58	GDA	56	317580	6410397	Open site	Wallaf	Artefact : -			103364
1910191	Contact	Recorders	Um	welt (Austr	alia) Pty Limiter	4	160.0	All and a second	Permits		1000.00
100000410	REA/3	GUA	- 20	017.944	Dennava	Openane	X 00 00	Automet 1 -			103364
17.3.0075	Contact	Recorders	Lim	alizera	ADCOLA	Theory office	Mala	Antoniore	Permits		103364
arrantar	READA	CLIDA Doctor	30	airaia	0403314	upen sue	Patta.	Attelact :-			104309
27.3.0076	Loniaci	CDA	56	3174H4	alia) Pty Limites	Onen file	Valid	Amelarte	Permits		101361
a) any in	Contract	Bucondara	Bas	outi Likunte	dist the Lindin.	culture aire	with the	ATTRACT.	Basenthe		103301
37-3-0995	REARD	GDA	56	317742	6409391	Open lite	Destroyed	Artefact :-	Letinus		103364
0.6644	Contact	Recorders	Um	wair (Austr	dia) Pro I houter	OrAck Environme	entil and Horitand h	Annanoment M	Permite		Seame (
37-3-1005	REA124	GDA	54	317982	6408615	Open size	Valid	Artwlact :-	Leannes		
	Contact	Recorders	Um	well LAustr	alia) Pty Limiter	1			Permits		
37-3-0920	Ravensworth Underground Mine (RUM) Open Camp Site No. 1	GDA	56	317298	6408018	Open site	Partially	Artefact : 5	7.		103364
	with PAD						Destroyed	Potential Archaeolog Deposit (P	gical AD) :		
	Contact	Recorders	Doc	tor.Jodie Be	nton,OzArk Env	pronmental and H	eritage Managemen	LMr.Jositua No	Permits	3465	
37-3-1009	(RA13)	GDA	56	313080	6408179	Djann Sife	Valid	Amenut:-			
	Centact	Recorders	Um	weli (Austr	ditti Ply Limites	1			Permits		
37-3-1010	KEA132	GDA	56	317660	6407881	Open site	Destroyed.	Artefact : -			
	Contact	Recorders	0 m	welt (Austr	alia) Pty Limited	1,M3,Alison Lamon	id		Permits		
37-3-1011	NKA133	GDA	56	317656	6407681	Open stor	Valid	Arislant :-			103364
	Contact	Recorders	Um	welt [Austr	alia) Pty Limitia	L.			Permits		
07-3-1012	ПЕА140	GDA	56	317599	6407405	Open site	Destroyed	Artefact :-			

NSW Office of Environment & Heritage **AHIMS Web Services (AWS)** Your Ref/PO Number : GCOP 2016_1 Extensive search - Site list report Client Service ID : 380733
 Datum
 Zenc
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 Site Status
 Site Features

 Recorders
 Unwelt (Australia) Pty Limited Ms.Alison Lamond
 Site Status
 Permits

 GDA
 56
 318206
 6407185
 Open sites
 Valid
 Armfact : SitelD SiteName Datum SiteTypes Reports Contact 37-3-1013 REA141 GDA 103364 Permits Recorders Unwelt (Australia) Pty Limited GDA 56 318192 6407007 Open site Cuntact 37-3-1014 REA142 Destroyed Artefact : -102617 Recorders Unwelt (Australia) Pty Limited,Ms.Alison Lamond GDA 56 3130066 6406896 Open 609 3420 37-3-1015 RKA143 Permits Destroyed Artelact : 102617.10336 Permits 3428
 Recorders
 Mrs.Angela Bissoni, Universit (Australia) Ply Limited

 GDA
 56:318003
 6406831
 Open site
 Contact 37-3-1016 REA144 Open site: Destroyed Artefact : 60 102617.10336
 Recorders
 Mrs.Angela Besant.Umwelt (Australia) Pty Limited.insite Heritage Pty Ltd

 GDA
 56
 317741
 6406403
 Open site
 Destroyed
 56
 Contact 37:3-1017 REA145 Permits 3420 Ariefact :-102617,10336
 Breamders
 Mrs. Angels Basant/Umweit (Adamtaliu) Py Limond/Javine Nerringte Pry Lind Ms. Almon. Permits
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 56
 317984
 6410443
 Open aire
 Valid
 Artelact : 3428
 Contact 37-3-1156 MT OWEN ISOLATED FIND1 Recorders Ms.Mary-Jean Satton,Virtus Heritage (DA 56 317468 6409734 Djam size Permits Contact 37/3-0013 Rowmans Creek 1 Destroyed 99019.100895. 102220.10238 Kugraves() / -Permits 2267 Contact 37-3-9614 Bowmans Creek 2
 Recorders
 Univert (Australia) Ply Limited

 GDA
 56
 317816
 6409176
 0
 Open site Artefact :-99019,100895, 102380 Destroyed Permits 2267 Recorders Janice Wilson AGD 56 317884 0408740 Open size Contact 37-3-0615 Bowmany Creek 3 Valid 99019/100895 Permits 2267 Contact Dowmans Creek 4
 Becorders

 GDA
 56
 317605
 6409676
 Open site
 99019,100895, 102300 37-3-0616 Destroyed Recorders Unwelt (Australia) Pty Limited GDA 56 314014 p409872 Dpen site Contact 37-3-0617 Bowmans Creek 5 Permits Artefact :- Stone Quarry :-, Potential Archaeological Deposit (PAD) :-Permits Permits 2267 99019 102380 Destroyed
 Recorders
 Unwelt (Autridia) Pty Limited

 GDA
 56
 319147
 6409247
 0
 Contact 37-3-0618 Swamp Creek 1 99019,100895. 102380 Open site Ariefact :-Destroyed. Univelt (Australia) Pty Limited 56 110327 6400928 Open site 2267 Recorders Ameracia-, Potential 47-3-0619 Swamp Greek 2 99019,100095, Detroyed GDA Archa 102300 Deposit (PAD): Report generated by AllIMS Web Service on 05/11/2018 for Thomas Dooley for the following area at Datum iGDA, Zone : 56, Eastings : 315100 - 318450, Northings : 6406400 - 6410750 with a Buffer of 0 meters. Additional Info : Background Info. Number of Aboriginal sites and Aboriginal objects found is 62. This infimization is not guaranteed to be fire from error unitation. Office of Environment and Herizage (NSW) and its employee disclaim liability for any act down or antissum mode no the toformation and roursequences of such as the original site or units of the company. acts or contration Page 2 of 5

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SiteID	SiteName	Datum 7	Zene	Easting	Northing	Context	Site Status	SiteFeatur	es	SiteTypes	Reports
	Contact	Recorders	Maw	elt (Australi	a) Pty Limited				Permits	2267	
37-3+0620	Swamp Greek 3	GDA	56	318178	6409390	Open site	Destroyed	Artifart : Archaeolog Deposit (P/	Potential (cal (D) : -		99019,100895. 102380
	Contact	Recorders	Umwa	elt (Australi	a) Pty Limited			_	Permits	2267	
7-3-0621	Swamp Creek *	GDA	56	319026	0409493	Operate	Dostroyed	Avteract : -	Durmile	7767	102380
7-4-0585	MG#1	AGD	56	317105	5410166	Onen sete	Destroyed	Appelant	Collins	and/	99021.100/89
	india.					-span and	possion of the	in the second			102380,10318
	Contact	Recorders	AECO	M Australia	Pty Ltd (previ	ously HLA-Envir	rosciences]		Permits	1982,2727,2728	
7-3-0589	MG#2	GDA	56	316950	6410359	Open size	Vallid	Actulant:-			99021.102300
	Contact	Recorders	OzArt	Enviranne	ental and Herit	age Managemen	d, Mice Stephanic Ros	alen	Permits	1982	
17-3-0591	Ravensworth RCUP PAD	AGD	56	315000	6409500	Open site	Valid	Potential Archaeolog Deposit (P)	ical iD) : ~		102220
-	Contact	Recorders							Permits	1982	
37-3-1107	M0C01F-19	CDA	50	317195	6409045	Dinne cite	Destroyed	Ariviact : T			
-	Contact	Recorders	OzAvk	Envirmm	mial and Herit	age Managemen	n.OvArk Environmen	ital anii Heritaj	Permits		
17-3-1186	M0C0/IF-20	GDA	56	317236	040830	Open site	Destroyed	Artefact : 1	-		
	Contact	Recorders	OzArk	c Environme	ental and Horit	age Managemen	LOzArk Environmen	tal and Herita	Permits		
11-201124	90000541	GDA	DC	310913	0408014	opensue	Destroyed	Artemer; 1	-		
7 7 1704	Contact	Recorders	OMATH E6	2175co	Mail and Heri	age Managemen	1.02Ark Environmen	dal and Heritar	Permits		
0.11101	Real Provide American Street P	ODM.	30	317307	110.0.0.7	open site	Destroyed	in dearer			
7-3-1785	LOBIALI UFA305	CDA	M5.00	317655	6AUZA IA	(Blog alla	Teathornal	Amplacta	Permits		
CONTRACT.	Contract	Bacandara	Health	annon Lannon	date double the	coper nue	Dontojeu	Mittanica-	Dermite		
27-3-1248	REA443 (Tower 20)	GDA	56	317598	6409776	Doen size	Desiroyed	Arislart -	Permas		
a la fa fa	Contact	Recorders	Me All	inne Lamon	d Me Alleun La	mound		in the first of the	Bormite		
7-1-1254	REA437	GDA	56	117427	6406595	Open size	Valid	Artelact :-	Lechus		
	Contact	Recorders	MLN	dia Ziferon	wald				Permits		
7-3-1296	REA379	GDA	56	317976	6406781	Open site	Destroyed	Artefact :-			
	Contact	Recorders	MAAD	Hon Lamon	d.Ms.Nadia Zal	krzewski			Permits		
7-3-1297	REA370	GDA	56	310134	6406942	Operr size	Destroyed	Arrelatt:-	Carmina		
	Contact	Recorders	Ms All	ison Lamon	d.Ms Nadia Za	larzuwski			Permits		
7-3-1253	REA438	GDA	56	317003	6410688	Open site	Destroyed	Artefact :-			

NSW Office of Environment **AHIMS Web Services (AWS)** Your Ref/PO Number : GCOP 2018_1 Extensive search - Site list report Client Service ID : 380733 Northing Context SiteID SiteNam Datum Zone Easting Site Status SiteFeatures SiteTypes Report Contact 37-3-1302 REA301 Recorders Ms.Alison Lamond.Ms.Nadia Zakrzewski Permits Anniat:-Desiroyed GDA 56 317767 6406486 Open site Recorders Ms Alison Lamond, Ms Nadia Zakrzewski Permits Cuniact 37-3-1225 REA 444 (Tower 31) GDA 56 317718 6409098 Open site Destroyed Artefact :nd Ms Alison Lamond Ms Alison Lamo Contact 37-3-1498 Swamp Creek-052 Recorders Permits Valid Arielant : 56 313006 6408201 Upen size GDA Contact 37-3-1510 Glendell North 0524 Recorders OzArk Environmental and Heritage Managem Permits nt, Mr. Hen Churcher 56-318346- 6409339 Open site GDA Valid Artelact : -OzArk Environmental and Heritage Managem 56 310341 0409244 Open site Stephanie Rusden Valid Artelact :-Contact 37-3-1511 Glendell North IF25 Recorders GDA Permits Recorders OxArk Environmental and Heritage Managem GDA 56 318328 6408936 Open site Contact 37-3-1514 Glendell North (F21 Stephinie Rusden Permits Valid Arrefact :-OzArk Environmental and Heritage Manager 56 310022 6409310 Opon site ent,MissStephanie Rusden Valid. Arronacta-Contact 37-3-1515 Glonitell North (F20 Recorders Permits GDA
 Recorders
 OxArk Environmental and Horitage Management Mill

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 56
 317723
 6409918
 Open site
 Valid. Artisfact : -Contact Glendell North (F19 37-3-1518 Contact 37-3-1519 Giendell North (F17 Recorders OzArk Environmental and Heritage Manager GDA 56 317777 6409943 Open size nt,Miss.Stephanie Russlen Volid Arrelact : -Permits Contact Glendell North IF15 Recorders OrArk Environmental and Heritage Manage GDA 56 317683 6410588 Open até ssStephonie Rusilen Permits Valid Artefact :-37-3-1521 Desiroyed Armlact :-Contact 37-3-0113 Godwin's Survey 5; Recorders OzArk Environmental and Heritage Managerr AGD 56 315050 A406400. Open size nt.Miss.Stephanie Rusden Open Camp Stie 1918,1950,102 320 Contact Bayswater Creek 5;Camberwell;Emuck Recorders Mr.Luke Godwin AGD 56 315014 6406940 Upen site Permits 219 115,919,1950,1 02220 37-6-0348 Artelact :-**Open Camp Site** Destroyed Helen Brayshaw, Doctor, In McDonald Contact 37-6-0353 Bayswater Crock A;Camberweil Recorders Permits Amelact:-Open Camp Sue 56 315040 6406440 Open size Destroyed 115,919,10222 AGD Contact Rayswater Creek Recorders Holen Brayshaw,Doctor Jo McDimuld. AGD 56 316120 6407715 Open lite Permits 24 37-3-0004 919,102220 Destroyed Artefact : Open Ca Contact 37 6-0262 Bayswater Greek B(Gambersvell, Len Dyall 56 315060 6406500 Open size Recorders Permits 24 Descenyesi Arrellart --Open Camp Sur 115,919,10222 Recorders Holen Brayshaw 24 Report generated by AHIMS Web Service on 05/11/2018 for Thomas Dooley for the following area at Datum :GDA, Zone : 56, Eastings : 315100 - 318450, Northings : 6406400 - 6410750 with a Buffer 0f 0 meters. Additional Info : Background info, Number of Aboriginal Sites and Aboriginal objects found is 62 This following in sub guaranted in the fire from error error iomism. Officier Burringen (Strategy RSW) and is complayed disclaim liability for any at these ne antissum made no the tubermation and rensequences of such acts or contraction Papel at 5

NSW	Environment & Heritage	Extensiv	web S e search	- Site list r	(AWS) eport								Your Ref/PO N Client	umber : GCOP 2018_ Service ID : 38073:
iteID 7-6-0283	SiteName Bayswater Creek C;Car	nberwell;			Datum AGD	Zone 56	Easting 315160	Northing 6406690	Context Open site	Site Status Destroyed	SiteFeatures Artefact : -	8	SiteTypes Open Camp Site	Reports 115,919,10222
	Contact				Recorders	Hele	n Brayshaw	Doctor Io McD	anald		Р	ermits	74	0
7-6-0294	Bayswarer Creek D;Ca	nberwell;			AGD.	56	315550	6407000	Open site	Destroyed	Artefact -		Open Camp Site	115,919,10222 0
	Contact				Recorders	Hele	n Brayshaw				P	ermits	24	
-3-0469	Bowmans/Swamp Cre	ek Trench 1			AGD	56	317967	6408948	Open site	Valid	Artefact : -			102380
-3-0798	Contact Liddell EW 15				GDA GDA	Janic 56	e Wilson 317877	6407170	Open site	Destroyed	Artefact : 21	ermits	1325	101420,10261
	Contact				Recorders	Mirc	Annala Bara	The star Wester		House an Des Lad	P		3428	,
						194 de	nugen besa	nt,insite Henti	ge Pty Ltd.Insite	derruge ray Lua		ermuts		
						(114.6*		ar insite rienta	ge Pty Ind.Insito	derrage ray La		ernuts		
Report ge Buffer of O	nerated by AHIMS Wet meters. Additional In inion is not guaranteed to b size.	 Service on 05/7 Background trackground 	11/2018 for 1 info. Number wiksion. Office of	Thomas Dooley fi of Aboriginal si Environment and k	or the follow tes and Abor feritage (NSW)	ing are iginal o	a at Datum bjects foun mplayees disc	:GDA, Zone : 5 d is 62 dam liability for	6, Eastings : 311	:100 - 318450, Nor	things : 6406406	9	0 with a ach	

NSW	Environment & Heritage	Extensive search - Site list re	port								Your Ref/PO No Client	mber : GCOP 20 Service ID : 380
SiteID 37-3-0584	SiteName BC40		Datum AGD	Zone 56	Easting 321600	Northing 6412200	Context Open lite	Site Status Destroyed	SiteFeatu Artefact :-	DES .	SiteTypes	Reports
	Contact		Recorders							Permits	1762	
37-3-0587	BC43		AGD	56	321600	6412200	Open size	Destroyed	Arrelant :-	Linin		
	Contact		Recorders							Permits	1762	
37-3-0727	Yorks Creek (Mt Owon	Mine) 2	AGD	56	318990	6414200	Open site -	Valid	Artefact :	12		100256
	Contact Searle		Recorders	Mr.E	Sarry Anders	00				Permits	2604	
37-3-0207	HVCC 16		GDA	56	321205	6414649	Dimers 610m	Destroyed	Arielact :	-	Open Camp Sile	204312206
	Contact		Recorders	Pare	Dean-fume.					Permits	361	
37-3-0399	Ravensworth 10		GDA	56	319865	6413543	Open site	Destroyed	Artefact :-		Isolated Find	98221
	Contact		Recorders	ERN	Australia Pt	v Ltd-Sydney	CHID			Permits		
37-3-0.198	Ravensworth 09		GDA	56	319743	0413684	Open-site	Destroyed	Artwhiet :-	C.S.C.	Loolated Find	98221
	Contact		Recorders	ERM	Australia Pr	+ Ltd- Sydney	CIIIO			Permits		
37-3-0400	Ravensworth 11		GDA	56	319972	6413482	Open site	Destroyed	Artelact :-	Carthane	Isolated Find	98221
	Contact		Recorders	ERM	Australia Pr	v Ltd-Swiney	CRD			Permits		
87-3-0401	Ravonsworth 12		GDA	56	319605	6413419	Open site	Destroyed	Arrefacta	L'ELINDA	Open Camp Site	98221
	Contact		Recorders	FRM	Australia Pr	v Ltd: Sudawy	000			Permits		
37-3 0402	Ravensworth 13		GDA	56	320014	6413444	Upen site	Destroyed	Articlact :-	Cathings	Open Camp Site	
	Contact		Recorders	ERM	Australia Pt	v Ltd. Svilnev	CHID			Permits	1.	
17.3.0403	Ravensworth 7.4		GDA	56	319636	6413346	Down size	Destroyed	Artelact*	L'ALIMAZ	Open Camp Site	
	Contact		Recorders	ERN	Australia Pr	v Ltd. Sydney	CHD			Permits		
37-3-0404	Raversworth east 2		GDA	56	3111969	6414024	Open (Ité	Destroyed	Artefact:		Isolated Find	
	Contact		Recorders	Mal	lison Nightir	ngale				Permits		
37-3-0405	Ravensworth east 3		GDA	56	318885	6414052	Operr siam	Descenyed	Arrelatt:-	Charman	Open Camp Ster	
	Cuntart		Recorders	Ned	lines Mishrie	shale				Permits		
37-3-0406	Rav east 6		GDA	56	319494	6413617	Open site	Destroyed	Artefact :-	L'SELINGS	isolated Find	
	Contact		Recorders	Ada	m Ford Adam	Ford				Permits		
37×3×0407	Kay past 7		GDA	56	319697	6413601	Dimere Gille	Destroyed	Arielant :	L'SZ MILSZ	Isolates14 md	
	Contact		Reconlers	vila	en Frank					Permits		
37-3-0408	Rav east 8		GDA	56	319747	6413714	Open site	Destroyed	Artefact:	Citolina	Isolated Find	
	Contact		Recorders	ada	m Ford Ma Al	ison Nichang	in .	C		Permits	A	
37-3-0409	Ray east 15		GDA	56	319669	6412759	Open ille	Destroyed	Arteluct :-	- county	Open Camp Site	
	Contact		Recorders	Adu	m Ford					Permits		
37-3-0410	ravensworth east 17		GDA	56	320000	6412975	Open site	Destroyed	Arrefact :-		Isolated Find	
	Contact		Recorders	Ms 2	lism Niehtin	male				Permits		
	Contact		HECOTOCT 3	143.3	maon mgnui	Banc				L'ermines		

NSW	AHIMS Web Ser Environment & Heritage Extensive search - S	vices (AWS) ite list report							Your Rel/PO No Client	umber : GCOP 201 Service ID : 380
SiteID	SiteName	Datum	Zone Easting	Northing	Context	Site Status	SiteFeatu	res	SiteTypes	Reports
37-3-0411	rave east 18	AGD	56 320707	6412019	Open site	Destroyed	Arteluct :-		Isolated Find	
	Contact	Recorders	Adum Ford					Permits		
37-3-0412	rav east 19	GDA	56 319996	6411762	Open site	Destroyed	Artefact :-	1000	Open Camp Site	
	Contact	Recorders	Adam Ford					Permits		
17.3.0413	ray out 30	GDA	56 310895	6414664	Open site	Dottroyed	Arrenter-		Lolated Find	
	Contact	Recorders	Adam Ford					Permits		
37-3 0414	rav east 29	GDA	56 319613	6414949	Dpen site	Destroyed	Artiefact :		Isolated Find	
	Contact	Recorders	Adam Ford					Permits		
37.3.0415	revioust 28	GDA	56- 319447	6414764	Open-site	Destroyed	Artelact :-		Isolated Find	
	Contact	Recorders	Adam Ford					Permits		
37-3-0416	ray east 27	GDA	56 319348	6414679	Open site	Destroyed.	Artefac(:-		Isolated Find	
	Contact	Recorders	Adam Ford					Permits		
37-3-0418	coversworth cove 26	GDA	56 319105	6414679	Open size	Distenyed	Www.fuct:-		Jonlared Funi	
	Contact	Recorders	Adam Ford					Permits		
37-3-0421	rav east 22	GDA	56 321124	6410757	Open site -	Derroyed	Artefact :-		Ixolated Find	
	Contact	Recorders	Adam Ford					Permits		
37-3-0422	Fav east 20	GDA	56 320368	6412622	Open size	Destroyed	Artelact :		tontated Find	
	Centact	Recorders	Adam Ford					Permits		
37-3-0423	rov east 21	GDA	56 319725	6412579	Open site	Destroyed	Artefact :-		Open-Camp Site	
	Contact	Recorders	Adam Ford					Permits		
37-3-0397	Ravensworth Last 1	GDA	56 319502	6414409	Open-stre	Destroyed	Artelact :-		boolated Find	
	Contact	Recorders	Ms Allson Nightin	ngale				Permits		
37+3-0394	Ravensworth East 4	AGD	56 318739	6413721	Open site	Valid	Artefact :-		Open Camp Sile	
	Contact	Recorders	Ms Alison Nightie	ngale				Permits		
17-3-0195	Ravonsworth East 5	GDA	56 319275	6411510	Open site	Dontroyed	Arrenter -		Lolared Find	
	Contact	Recorders	Ma Alison Nights	ngale				Permits		
37-3 0645	RC44a	GDA	56 321449	6410827	Dpen size	Destroyed	Artefact : 1			
	Contact T Russell	Recorders	Unwelt (Australi	a) Pty Limited				Permits		
37.1.0657	0063	GDA	56 321592	6411166	Opensite	Destroyed	Arteloct :)	0		
	Contact TAusseil	Recorders	Unweit (Australi	ar My Limned				Fermits		
37-3-0658	RC64	GDA	56 321712	6411072	Open site	Destroyed	Artélact :)	1		
	Contact T Russell	Recorders	Unwelt (Australi	a) Pty Limited				Permits		
37-3-4630	BC50	GDA	56 321407	6412896	Open site	Desiroyed	Arrelact -			
	Contact	Reconters	Unwelt (Australi	al Pty Limited				Permits	7131	

Report generated by AHIMS Web Service on 05/11/2018 for Thomas Dooley for the following area at Datum :GDA, Zone : 56, Eastings : 318450 - 321800, Northings : 6410759 - 6415100 with a Buffer of 0 meters. Additional Info : Background Info. Number of Aboriginal sites and Aboriginal objects found is 102 This information is not guaranteed to be free from error omission, office of Exernment and Heritage (NSW) and its employees disclaim liability for any act done or amission mode on the information and emmogramment of such art or omission.

Pier 2 of 7

NSW	Environment & Heritage	AHIMS Web Services (A Extensive search - Site list rep	wsj ort								Your Ref/PO N Client	umber : GCOP 2018 Service ID : 3807
SiteID 37-3-0631	SiteName RC49	C G	Datum iDA	Zone 56	Easting 321479	Northing 6412727	Context Open tite	Site Status Destroyed	SiteFeatur Artefact : -	DES .	SiteTypes	Reporta
	Contact	8	tecorders	Umw	elt (Australi) Pty Limited	1.1.1		-	Permits	2131	
7-3-0632	BC48	G	DA	56	321664	6412602	Open size	Destroyed	Arrelant:-			
	Contact		lecorders	Umw	eli (Australi	0 Pty Limited	A			Permits	2131	
\$7-3-0633	0C47	6	DA	50	320913	6412387	Open site	Destroyed	Artefact :-			
7. 4.0074	Contact	B.	tecorders	Umw	ett (Australi) Pty Limitod	There allow	Destation	Adapteria	Permits	2131.	
\$7730039	NE-10		IDA .	30	321018	0913159	Think eres	Destroyet	Artigiant : -			
7.3.0635	Contact BCAS		DA	56	J21020	6413260	Onen tite	Destroyed	Amelact	Permus	2131	
1.2.0025	Contact		hondare	Danie -	all (huntered)	Distinguis	oppin side.	pennoyea.	Mininer	Barmite	7121	
7-3-0219	DVCC 20		GD	56	320970	0414690	Open-stre	Valid.	Artubert :-	recours	Upen Cauro Site	2043.2206
	Contact	B	lucordan	Pam	Descultures	- Colored	Stere one			Permite	263	Se Contra
37-3-0773	Swamp Ck 10		GD	56	318900	6410978	Open site	Valid	Artefact: 1	Cooline		102380
	Contact		tecorders	lanic	e Wilson					Permits		
17.3.1173	MOCO (F-4	G	DA	56	320849	0413041	Open site	Valid	Artefact			
	Contact		tecorders	OXAL	k Environme	atal and Hort	tage Management	Mr.Ben Churcher		Permits		
37-3-1174	MOCO IE-5	- 0	:DA	56	320623	6412964	Open site	Destroyed	Artefact : 1			
	Contact	8	tecorders	OzAr	k Environme	ntal and Heri	age Management,	OzArk Environment	al and Heritar	Permits		
17-1-1175-	MOCO IE-6	đ	DA	56-	320749	6412208	Open size	Walid	Arteloct	1		
	Contact	B	tecorders	DicAr	k Environme	nul and Heri	age Management.	Mr.Ben Churcher		Permits		
37-3-1520	Glendell North (F16	6	DA	56	319072	6410845	Open tite	Valid	Artefact :-			
	Contact	B	tecorders	0zAr	k Environme	ntal and Heri	age Management.	Miss.Stephanie Rusi	len	Permits		
37-3-1526	Glendel) North IF10	0	DA	56	310745	0411658	Open size	Valid	Semilarr :-			
	Contact		tecorders	OzAr	k Environme	ntal and Heri	age Management	Miss Stephanie Iluni	len	Permits	100 million	
37-3-0295	Site 1.	G	DA	56	320755	6412309	Open site	Destroyed	Artefact :-		Open Camp Site	
-	Contact	8	lecorders	Noel	oen Curran.N	is Alison Niith	tingalo -			Permits	821	
37-3-0335	80:336	^	an	56	321670	6412250	Dina crea	Destroyed	Arielact :		Open Camp Sue	
	Contact	8	leconters	Mr.M	laithew Barb	er	Dana cita	11.41.4	-	Permits	1576.1762	
\$7-3-0393	MUDWER (1996) LWIN	12 A	0.0	20.	310450	6414330	open site:	vana.	Artenact :-		open camp site.	
17 3.0340	Contact	B	tecorders	Ms.JI	H Kung	6.44.4.4UT	- Palace alles	Teastdoneri	American	Permits	Otras Course Site	1520
37-3-9.840	wit model (read) 111		MID .	30	319200	0419400	Openane	Dontribybu	Autonuct :-		Open campone	.4203
17.3.0349	Michaen (1996) 10-	E A	GD	Ms/H	310377	6414420	Orana site	Valid	Autofart	Permits	Larlated Find	9569
31 2 03 11	Funtact		hoondane	Me II	Il Duin	difficult.	open pre-		the report of	Barmille	057	2303
	Lourace	5	ecorners	M5.0	o sound					rermus	05/	

NSW	Environment & Heritage	AHIMS Web Services (AWS) Extensive search - Site list report	1							Your Ref/PO No Client	umber : GCOP 2018 Service ID : 3807
SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatu	res	SiteTypes	Reports
37-3-0350	Mt Owen (1996) 9:	AGD	56	319600	6414420	Open site	Valid	Arteluct :-	-	Open Camp Sile	3569
	Contact	Recorder	s Ms.H	Il Ruig					Permits	857	
37+3-0351	Mt Owen (1996) 12;	AGD	56	319160	6414460	Open site	Destroyed	Artefact : -		Open Camp Site	3569
	Contact	Recorder	s Mali	II Ruig					Permits	1570	
17-3-0152	Mt Owon (1996) 13:	AGD	56	319200	6414520	Open site	Dostroyed	Arrefacta-		Open Camp Site	3569
	Contact	Becorder	s Mali	ii kug					Permits	1570	
37-3-0353	Mt Owen (1996) 15;	AGD	56	319430	6414650	Dpen size	Destroyed	Artefact :		Open Camp Sile	3569
	Contact	Recorder	s Ms.Ji	ft Rulg					Permits	1570	
37-3-0359	Mt Owen (1996).3:	AGD	56-	819760	6414880	Open size	Walid.	Artelact :-		Open Camp Site	3569
	Contact	Recorder	s Mall	H HOUN					Permits		
37-3-0360	Mt Owen (1996), 2;	AGD	56	318990	6414230	Open site	Valid	Artofact :-		Isolated Find	3569
	Contact	Recorder	s Ms.Ji	II Ruig					Permits		
37-3-0361	Mt Dwen (1996), 22,	GDA	56	320115	6414749	Open size	Desrenyeil	Www.Juct :-		Open Camp Sur	3569
	Contact	Recorder	s Mali	li Ruig;				_	Permits	857	
37-3-0363	Mt Owen (1996) 26;	GDA	56	319925	6414909	Open site	Destroyed	Arteflact : -		isolated Find	3569
_	Contact	Recorder	s Ms.li	ll Ruig		_		_	Permits	857	
37-3-0194	HVCC 1:	AGD	56	320355	6413489	Open Gine	Destroyed	Artislart :		Open Camp Site	2043.2206
	Centact	Reconter	s Pam	Dean-Jones				-	Permits	361	
37-3-0195	HVCC_2;	AGD	56	320555	6413769	Open site	Destroyed	Artefact :-		Isolated Find	2043,2206
	Contact	Recorder	s Pam	Dean-Jones					Permits	363	
37-3-0196	HYCC 3:	AGD	56	320605	0473306	Open size	Destroyed	Artefact :-		Open Camp Site	2043,2206
	Contact	Recorder	s Pam	Dean-Jones		a construction of the second			Permits	363	
37+3-0197	HVCC 4;	AGD	56	320535	6413869	Open site	Destroyed	Artefact:-		Open Camp Site	2043,2206
	Contact	Recorder	s Pam	Dean-Jones				_	Permits	363	
87-3-019H	HVCC S	AGD	56	320725	6414139	. Open site	Dontroyed	Assoluces -		Open Camp Site	2043.2206
	Contact	Becorder	s Pam	Dean-Jonos					Permits	363	
37-3-0199	HVCC 6:	AGD	56	320945	6414429	Open size	Destroyed	Artefact :-		Isolated Find	2043,2206
_	Contact	Recorder	s Pam	Dean-Jones					Permits	363	
37-3-0200	HVCC 8:	AGO	36-	321305-	6414469	Open size	Destroyed	Arreloct :-		Isolated Find	2043,2306
and strength of	Contact	Recorder	s Fam	Data Tonas	-	-		-	Fermits	303	
37-3-0201	HVCC 9;	AGD	56	321455	6414459	Open site	Destroyed	Artelact :-		Open Camp Site	2043.2205
	Contact	Recorder	s Pam	Dean-Jones					Permits	363	
37-3-0202	0VCC 10/	AGD	56	321415	6414400	Opani site	Desiroyed	Annelact -		Open Camp Sile	2043,2206
	Contact	Recorder	E Pam	Dean-Joney					Permits	363	

Report generated by AHIMS Web Service on 05/11/2018 for Thomas Dooley for the following area at Datum :GDA, Zone : 56, Eastings : 318450 - 321800, Northings : 6410750 - 6415100 with a Buffer of 0 meters. Additional Info : Background Info, Number of Aboriginal sites and Aboriginal objects found is 102. This information is not guaranteed to be free from error omission. Office of Environment and Heritage (NSW) and its employees disclaim liability for any act done or amission mude up the information and revesqueroes of web web with or omission.

P-1 of 7.

NSW	& Heritage	Extensive search - Site list report								Client	Service ID : 380
atelD 7-3-0202	SiteName HVCC 11,	Datum GDA	Zene 56	Easting 321135	Northing 6414569	Context Open site	Site Status Destroyed	SiteFeatur Artefact :-	res	SiteTypes Open Camp Site	Reports 2043.2206
	Contact	Recorders	Parr	Dean-Jones					Permits	363	
87-3-0204	UVCC 12/	GDA	56	321185	6414567	Opun size	Destroyed	Arrelact :-		Isolated Find	2043,2206
	Contact	Becorders	Pan	Dean-Joney					Permits	363	
37-3-0205	HVCC 13:	GDA	56	321325	6414609	Open site -	Destroyed	Artefact : -		Open Camp Site	2043,2206
	Contact	Recorders	Pan	Dean-Jones					Permits	363	
37-3-0206	HVCC 15	GDA	56	321585	6414234	Opera Gine	Destroyed	Arielact :		Open Camp Sue	2043.2200
	Contact	Recorders	Pan	Dean-Junes					Permits	361	
17-3-0208	HVCC 17;	AGD	36	321245	6414589	Open site	Destroyed.	Artelact :-		Open-Camp Site	2043,2206
-	Contact	Recorders	Pan	Dean-Jones					Permits	363	
\$7-3-0209	HACC THE	AGD	56	321345	6414679	Open-site	Destroyed	Artwheet :-		Open Camp Site	2043.2206
	Contact	Recorders	Pan	Dean-Jones		-			Permits	363	
37-3-0211	HVCC 20;	AGD	56	321600	6414690	Open site	Valid	Artefact :-		Open Camp Sile	2043,2206
	Contact	Recorders	Patr	Dean-Jones					Permits	363	
17-3-0212	HVCC.21.	AGD	56	321520	6414650	Opensite	Villid	ARRINGES -		Open Camp Site	2043.2206
	Contact	Becorders	Pan	Dean-jones		-			Permits	363	
37-3-0213	HVCC 22	AGD	56	321550	6414600	Open site	Valid	Artislact : -		Open Camp Site	2043,2206
_	Contact	Recorders	Parr	Dean-Jones	-	-			Permits	363	
17-3-0214	HVCC 23;	AGD	36-	721290	6414900	Opensite	Walid.	Artelact		Open Camp Site	2043,2206
	Contact	Recorders	Pan	Dem-lone:		-			Permits	363	
37-3-0215	HVCC 24	AGD	56	321000	6414500	Open (ite	Valid	Artelact :-		Open Camp Site	2043.2206
	Contact	Recorders	Parr	Dean-Jones	R of Rends				Permits	363	
37-3-0216	UVCC 251	AGD	56	321000	64145110	Open sine	Wahid	Arrelatt:-		Isulated Find	-2043,2206
	Contact	Recorders	Pan	Dean-Joney		-	11.0.0		Permits	363	
\$7-3-0217	HVCC 26:	AGD	56	321100	6414540	Open site -	Valid	Artefact :-		Open Camp Site	2043,2206
	Contact	Recorders	Pan	Dean-lones					Permits	363	
57-3-0210	HVCC 27)	Aun	56	321010	6414350	-Dimmerra	Walni	Arielact :		Open Camp Sue	2043.2206
	Contact	Recorders	Pan	Dean-Jones					Permits	363	
\$7-3-0220	HVGC 29;	AGD	20	321000	6414700	Opan site	Valid.	Artelact :-		Open Camp Site	2043,2206
	Contact	Recorders	Par	Dean-Jones	111.0010	Charles States	Arran a	And all	Permits	363	and dame
17-3-0221	(IYCC 30)	(up	20	320470	0414870	Open site	Vand	Artelact :-		Open Campone	2043.2200
	Contact	Recorders	Pan	Dean-Jones	643-943-0	0			Permits	868	2049 9204
1-3-0228	HVLC 3/1	GDA	20	319402	0413419	open size	Destroyed	Arrelact :-		Open camp sile	2043,2206
	Contact	Recorders	Pan	Dean-Jones					Permits	363	

NSW	Office of Environment & Heritage	AHIMS Web Services (AWS) Extensive search - Site list report								Your Ref/PO No Client	umber : GCOP 2018 Service ID : 38073
SitelD	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatur	es	SiteTypes	Reports
37-3-0229	HVCC 3IH	GDA	56	319955	6413399	Open site	Destroyed	Artelact :-		Open Camp Sile	2043.2206
	Contact	Recorders	Pam	Dean-Jones					Permits	363	
37-3-0230	HVCC 39;	GDA	56	319955	6413349	Open site	Destroyed	Artefact :-		Isolated Find	2043,2206
	Contact	Recorders	Pam	Dean-Joney					Permits	363	
87-3-0231	HVCC-40:	GDA	56	319955	0411309	Open site	Dortroyed	Arrefacta-		Open Camp Site	2043.2206
	Contact	Becorders	Pam	Hean-joines					Permits	363	
37-3 0232	HVCC 41)	GDA	56	320025	6413099	Open size	Destroyed	Artefact :		Open Camp Sile	2043,2206
	Contact	Recorders	Pam	Dean-Junes					Permits	363	
37.5.0235	HVCC 42:	GDA	56-	880025-	6413009	Open size	Destroyed	Arteloct :-		Isolated Find	2043,2206
	Contact	Recorders	Pam	Dean-Ionas					Permits	363	
37-3-0234	HVCC 43	GDA	56	320115	6413779	Open site	Destroyed	Artebic(:-		Open Camp Site	2043.2206
	Contact	Recorders	Pam	Dean-Jones-					Permits	363	
37-3-0235	UVCC 44)	GDA .	56	320115	6413780	Open size	Designyed	Waselact :-		Isolared Find	2043,2206,103
	Contact	Recorders	Pam	Dean-fones					Permits	363	
37-3-0236	HVCC 45;	GDA -	56	320115	6413819	Open site	Destroyed	Artelact : -		Open Camp Site	2043.2206.102 139
	Centact	Recorders	Pam	Dean-Jones					Permits	363	
37-3-0237	HVCC 45)	GDA	56	320265	6414109	Open Size	Damroyed	Amelact :-		Open Camp Stor	2013,2206
	Contact	Recorders	Parr	Disus-Jones					Permits	363	
37-3-0238	HVCC 47;	GDA	56	320105	6414019	Open site	Destroyed	Artelact :-		bolated Find	2043,2206
	Contact	Recorders	Pam	Dean-Jones	-				Permits	363	
37 3-0239	UVCC 400	GDA	56	320825	6414399	Opurr size	Destroyed	Armhet:-		Open Camp Stir	2043,2206
	Cuntact	Recorders	Pare	Dean-Jones					Permits	363	
37-3-0240	HVCC 49;	GDA	56	320955	6414939	Open site:	Destroyed	Arrefact) -		Isolated Find	2043,2206
	Contact	Recorders	Pam	Dean-lones					Permits	363	
37-3-0424	RE34	AGD	56	319294	6413351	Open sile	Destroyed	Artslart :-			
	Contact	Recorders	Meg	an Mehlieren	n				Permits		
37-3-0425	RE35	GDA	56	319328	6413209	Open site	Destroyed	Artefact : -			
	Contact	Recorders	Meg	an Mebberso	n				Permits		
57-1-1214	MOCD IF-23	GDA	56	313604	0414557	Open site	Vand.	Artelact : -			
	Contact	Recorders	Mr.F	Sen Churcher					Permits		
37-3-1215	MOCO IF-24	GDA	56	319791	6414618	Open site	Valid	Artefact :-			
	Contact	Recorders	Me.F	Sen Churcher					Permits		
17.3.1216	M000 (F-25	GDA	56	319700	6414604	Openalte	Valid	Arrefact : -			

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	a nerrage	Extensive search - Site list re	port						Clie	nt Service ID : 38073
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Suffer of 0 This informatics or omise	I meters. Additional in ation is not guaranteed to b ision.	Ifo: Background info. Number of Aboriginal site in free from error omission. Office of Environment and He	s and Aborigi ritage (NSW) and	nal objects found I its employees discla	is 102 im liability for	any act done or on	ission made on the infr	rmation and consequences of	such	

NSW	Environment & Heritage Extensive search - Si	te list report								Your Ref/PO	Number : GCOP 2018_ ent Service ID : 38073
SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatur	ws	SiteTypes	Reports
37-3-0521	MO-IF1	AGD	56	319018	6410130	Open site	Valid	Artefact :			
	Contact	Recorders	ERM	Australia Pt	y Ltd- Sydney	GHD			Permits		
37-3-0494	MO-IF2	AGD	56	310955	6410076	Opun site	Walled	Arrelant:-			
7.3.0500	Contact	Recorders	EUM	- Thoreton	CARESTE	The section .	Domound	the section is a	Permits		
	Ashtz .	Aup	30	320094	0400773	Oben atte -	Destroyed	Attenset :	Description		
7-3-0509	ASH13	AGD	56	320104	6406518	Dinara 61re	Destroyed	Arislart :-	Permits	10/1	
	Contact	Recordure	Met	anna a Maral		- Particular			Permite	THE	
17-3-0520	A51124	AGD	56	320680	6406986	Open site	Destroyed	Artefact :-	Contract		
	Contact	Recorders	Ms.V	anessa Hard	v				Permits	1691	
17-3-0526	Ashton EWA 10	GDA	56	320252	6407135	Open-site	Valid.	Artelact :-	(Jaconna)		
	Contact	Recorders	Ban	Witter.OxAr	Rewronment	al and Heritage N	donauement Miss Ste	phanie Ruude	Permits		
87-3-0527	Ashton EWA 17	AGD	56	319974	6406963	Open site	Valid	Artefact :-	100		98163
	Contact	Recorders	Dan	Witter					Permits		
17-3-0528	Auhton Ridge Top site	AGD	56	320920	6406428	Opensite	Portroyed	Arrenteta -			98162
	Contact	Recorders	Dan	WILTOF				-	Permits	1691	11
37-3-0530	Ashton EWA 25	AGD	56	319418	6406709	Open site	Destroyed	Art (Pigme	nt or		98163
	Conjust	Pacondare	Dan	Alittan				Engraved)	Hermits	1601	
17-1-11551	Ashton EWA 9	AGD	56	320294	6406305	Open site	Instroyed	Artelact :-	Termins	1011	98163
	Contact	Recorders	Dan	Vittor					Permits	1691	
37-3-0532	Ashton Slope site	AGD	56	320278	6406766	Open site	Destroyed	Artsfact :-	Citotine	1400	98163
	Contact	Recorders	Dan	Witter					Permits	1691	
17-3-0492	ASH1 also known as (Ashton Bridge Site)	AGD	56	310516	1406521	Opensite	Descoved	Arrefact :-		-	
	Contact	Recorders	Ms.V	aniessa Hard	y				Permits	1691	
3-3-0004	(refer to 37-3-0498) ASH2	AGD	56	320916	6406359	Open site	Deleted	Artelact :-			
	Contact	Recorders	Ms.V	anessa Hard	y.				Permits		
37-3-0498	ASH 2	AGD	56	320916	8406359	Dpara filte	Destroyed	Amelact :-			
	Contact	Recorders	Ms.V	inmaa Hard	y.				Permits	1891	
7-3-0500	ASH4 Waterhole Site same as 37-3-0006	GDA	56	318580	6406552	Opensite	Valid	Artefact1-			102139,10261
	Contact	Recorders	Lon I	wall Mi Var	eses Bawly				Permits		
7-3-0505	ASH9 also known as (Ashtun Tributary Xite)	AGD	56	320650	6406755	Opur size	Destangest	Arielatt:-			
	Centact	Recorders	Mev	auessa Hari	v				Permits	1691	
37-3-0507	ASH11	AGD	56	320146	6406945	Open site	Destroyed	Arrefact :-			

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Page 1 of 5

SiteID	SiteName	Datum Zone Easting Northing Context SiteStatus SiteFeatures SiteTypes	Reports
	Contact	Recorders Mc.Vanessa Hardy Permits 1691	
37-3-0026	Glennins Creek Sile B / Bettys Creek - B	AGD 56 320530 6407352 Open site Destroyed Arm/act - Open Camp :	Sile 164
7.7.0077	Contact	Recorders Halen Brayslaw, Barry French, John Madlews Permits	14
1-3-0027	Gennes Creek Site C / Bettys Creek - C	Act 50 321042 000700 Openate Destroyed Anteract - Open camp :	109
7-2-0502	Contact Batton Crank 1	Recorders Helion Brayshaw, Barry French, John Mathows Permits	198019 100905
	Postart	Describer United and a state of the second sta	
7-3-0593	Bettys Creek 3	GDA 56 321088 6409060 Open site Destroyed Arietact:-	99019,100895
1.0.90.00	Contact	Becorders Linica Wilson Dector Darcin Lordan Petrolyter Internet 2267	S manufactor
7-3-0594	Retty Creek 4	GDA 56 320837 640931 Open lite Destroyed Articlact :-	99019,100895
	Contact	Recorders Mastralial Ptv Limited. Permits 2267	
7-3-0646	BC44b	GDA 56 321427 6410732 Open vite Destroyed Artefact : 1	
	Contact T Russell	Recorders Unwelt (Australia) Pty Limited Permits	
7-3-0659	0065	GDA 56 321796 6410542 Open site Destroyed Arrefact: 2	
	Contact TRussoll	Becorders Unweit (Australia) Pty Limited Permits	
7-3 0660	RC66	GDA 56 321615 6410709 Open size Destroyed Artefact : 2	
	Contact T Russell	Recorders Unwelt (Australia) Pty Limited Permits	
7-3-0595	Bettys Creek 5	GDA 36 321070 6409844 Open site Destroyed Anelact 1-	99019/100895
	Contact	Recorders Unwork (Australia) Pty Linuad Permits 2267	
7-3-0596	Bettys-Creek 6	GDA 56 321128 6409296 Open lite Destroyed Artelact :-	99019,100095
	Contact	Recorders Ifmweit (Australia) Pty Limited Permits 2267	
7-3-0597	Bettys Creek 7	AGD 56 321102 6408896 Open size Desirence Armfact:-	99019,100995
	Contact	Becorders Unwelt (Australia) Pty Limuted Permits 2267	
7-3-0598	Bettys Creek 0	GDA 56 321172 6408634 Open site Destroyed Artefact :-	99019,100895
a ci thatte	Contact	Recorders Unweht (Australia) Pty Limited Permits 2267	The T.T. ADI LANCE
7>3>0599	Bettys Greek 9	GDA 56 321100 6400400 Dpen size Destroyed Artefact :-	.99019,100095
	Contact	Recorders Unwelt (Australia) Phy Landed Permits 2267	
7-3-0600	Bettys Greek 10	GDA 56 321048 6408229 Open site Destroyed Artefact 1	99019,100895
	Contact	Recorders OzArk Environmental and Heritage Management, OzArk Environmental and Herita, Permits 2267	Double du munt
× 1-0-001	Wolflys Cowek 11	GDA 50 X20005 0402391 Upenate Destroyes: Articlast >-	A4013/100002
2.2.0402	Contact	Recorders Unweil (Australia) Py Limited. Permits 2267	anoto tooso?
7-3-0002	Beuty Greek Ie	una se seres unarene operate periore undert.	44014/100045
2.3.0601	Barran Creak 13	CDA 56 201662 6402255 Than also Dearmand Arrefset -	99019 100095
	Indiversities and	NEW 20 STORE CALLER CONTACT	1017,100013

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NSW	Environment & Heritage	AHIMS Web Services (AV Extensive search - Site list repo	NS) rt								Your Ref/PO Clie	Number : GCOP 2018 nt Service ID : 38073
SiteID	SiteName	Dat	um	Zone	Easting	Northing	Context	Site Status	SiteFeatur	nes.	SiteTypes	Reports
	Contact	Rec	orders	_ Mory	welt (Austral	a) Pty Limited.	5		1	Permits	2267	
37-3-0604	Bettys Greek 14	GD/	1.00	56	320759	6407271	Open site	Destroyed	Artefart :-			99019,100895
_	Contact	Bec	orders	Umv	welt (Austral	ia) Pty Limited				Permits	2267	
37-3-0605	Bottys Greek 25	GD/	n., .	56	320638	6407440	Open site	Dontroyed	Artefact			99019,100095
	Contact	Bec	orders	i im	welt (Austral	ia) Pty Limited				Permits	2267	
37-3-0606	Bettys Creek 16	GD/		56	320877	6408654	Open size	Destroyed	Artefact : -			99019,100895
_	Contact	Rec	orders	Umv	welt (Austral	ia) Pty Limited				Permits	2267	
17-3-0607	Bettyn Grock 17	GD/	V	36-	320833	6409048	Open Site	Destroyed	Artelact :-			99019/100895
	Contact	Rec	orders	. Um	welt (Austral	toj Pty Limited.				Permits	2267	
37-3-0608	Bettys Greek 18	GD/	£	56	320455	6407668	Open litte	Destroyed	Artefact :-			99019,100095
	Contact	Rec	orders	Umv	welt (Austral	a) Pty Limited				Permits	2267	
37-3-0609	Bettys Greek 14	AGE		56	319774	6407650	Open size	Designyed	Arnelatt;-			99019,100895
	Cuntact	Bec	orders	Um	welt (Austral	ta) Pty Limited				Permits	2267	
37-3-0610	Bottys Greek 20	AGE		56	319625	6407469	Open site -	Dertroyed	Artefact :-			99019,100895
	Contact	Rec	orders	lanie	ce Wilson					Permits	2267	
37-3-4011	Bettys Greek 21	GDA	V	56	320865	6410243	Dimm size	Destroyed	Arislant : 1			.99019
	Contact	Rec	onlers	024	It Environm	unial and Horit	age Managemen	A OsArk Environment	and Heritag	Permits		
37-3-0612	Bettys Creek 22	AGE)	56	321033	6410107	Open site	Valid	Artefact :-			99019
	Contact	Rec	orders							Permits		
37-3-0622	Swamp Greek 5	GD/		56	110912	6407719	Open atte	Destroyed	Artelact : I Archaeolog Deposit (P	l. Potential (Jeal AD) /-		99019,100895
	Contact	Rec	onlers	Ums	well (Austral	ia) Pty Limitized	£		1000	Permits	7267	
17-3-0623	Swamp Creek 6	GD/	ł.,	56	319739	6409247	Open site	Destroyed	Artefact :-			99019,100895
	Contact	Rec	orders	Um	welt (Austral	ia) Pty Limited				Permits	2267	
17/30/0624	Swamp Creek 7	AGI	I	56	319492	6400385	Upen site	Destroyed	Artelact :-			99019,100095
	Contact	Rec	orders	Um	welt (Austral	a) Pty Limited				Permits	2267	
37-3-0625	Swamp Greek B	AGE	X	56	319634	6409058	Open site	Destroyed	Artelact : 1			99019,100895
	Contact	Rec	orders	Um	welt (Austral	ia) Pty Limited				Permits	2267	
37-3-0626	Swamp Creek 12	AGI	1	56	319273	6408935	Open site	Doutcoyed	Arrelact:-			99019,100095
	Contact	Rec	orders	Um	wolt (Austral	a) Pty Limited				Permits	2267	
87-3-0627	Swamp Creek 13	GD/	1. C.	56	319417	6409904	Open site	Destroyed	Artefact :-			99019,100095
	Contact	Rec	orders	Umv	welt (Austral	a) Pty Limited				Permits	2267	
37-3-0660	Swamp Crock PAD	AGE	1	56	320150	6410475	Open site	Valid	Artefact:-			
	Contact T.lino	all Rec	orders	10m	welt thirty slaw	a) Pty Limned				Permits		

Report generated by AllMS Web Service on 05/11/2018 for Thomas Dooley for the following area at Datum (GDA, Zone: 56, Eastings: 318450 – 321800, Northings: 6406400 - 6410750 with a Buffer of 0 meters. Additional Info: Background info. Number of Aboriginal sites and Aboriginal objects found is 175 This Information is not guaranteed to the free from error omission, Office, of Exerimatent and Heringe (ISW) and its employees disclaim liability for any act these on emission mode on the information and emissioners of auch-

NSW Office of Environment & Heritage **AHIMS Web Services (AWS)** Your Ref/PO Number : GCOP 2018_3 Extensive search - Site list report Client Service ID : 380737 SiteID SiteName Datum Zone Easting Northing 56 321445 6409885 Northing Context SiteFeatures SiteTypes Reports Site Status 37-3-1185 MOCO IF-16 GDA Open site Valid Artefact : 1 OzArk Environ tal and Heritage Manager 1.02Ark Envi al and Heritay Permits Recorders 37-3-1186 MOCO (F-17 56 321066 6407957 Open size GDA Valid Arrelact:1 Recorders OzArk Environmental and Heritage Managem Mr.Ben Churcher Permits Contact 37-3-1193 MOCO 05-5 56 321276 6410179 Open site GDA Partially Destroyed Artefact : 1 Recorders OzArk Environmental and Heritage Management, OzArk Environmental and Heritag Permits Contact 37-3-1194 MOCO 05-6 GDA 56 320718 p409739 Dpmm site Valid Amelant:1 Recorders OzArk Environmental and Heritage Managem GDA 56 321013 6408399 Open itto Contact nt.OrArk Enviro maland Heritaj Permits 37-3-1195 MOCO 05-7 Destroyed Artefact - 1 Recorders OzArk Environmental and Horitage Managem GDA 56 321748 6408000 Open size ent, OzArk Enviro mental and Horita, Permits Contact 37-3-1196 MOCO OS-8 Partially Arislact : 1 Destroyed at,OzArk Environm
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 entist and Heritay Permits Contact 37-3-1197 M0C0 05-9 Valid Contact 37-301496 SCK-9 Recorders OzArk Environmental and Heritage Managament.OzArk Environmental and Herita; Permits GDA 56 311871 6410241 Open-size Valid Artwlart : Contact Recorders OzArk Environmental and Veritage Managem ent MissStephanie Rusten Permits 37-3-1497 5CK-11 GDA 56 319089 6410231 Open site Valid Artefact :-Contact 37-3-1490 Swamp Creek IF-4 Recorders **OzArk Environmental and Heritage Manager** ent, Miss. Stephanie Rusden Fermits Valid. Artelact >-GDA 56 310805 6407340 Open alte Recorders OxArk Environmental and Heritage Management, OxArk Environmental and Horitar Permits Contact 37-3-1491 Swamp Creek IF-1 GDA 56 318640 6407727 Open site Valid Artefact : OzArk Environmental and Heritage Management, Miss Stephanie Rusden Permits 47-3-1492 Swamp Groek IF-2 Recorders 56 110807 6407327 Open ite Valid Artefact GDA
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 Artefact : Contact 37-3-1493 Swamp Creek IF-3 OzArk Environ ntal and Heritage Manager nt, OzArk Envir ental and Heritaj Permits Contact Recorders 37 J 1899 Swamp Crnek-OS1 36 31/0819 6407299 Open site GDA Valid Artelact: Recorders OrArk Environmental and Heritage Management Mr.Ben Churcher Contact 37-3-1508 Glendell North OS28 Permits GDA 56 318611 6408397 Open site Valid Artefact :-OzArk Environmental and Heritage Manageme 56 318588 A408562 Open size nt.Miss.Stephanie Rusden Valui Artefact : -Contact 37-3-1509 Glendell North OS27 Recorders Permits GDA
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 Centact 37-3-1513 Glendell North IF23 Valid Artefact : Permits Report generated by AHIMS Web Service on 05/11/2018 for Thomas Dooley for the following area at Datum :GDA, Zone : 56, Eastings : 318450 – 321800, Northings : 6406400 - 6410750 with a Buffer of 0 meters. Additional Info : Background Info, Namber of Aboriginal Sites and Aboriginal objects found is 75 This Information is negazarated to the first from error emission. White Witermannet and Witering (ENX) and the complayees disclain lability for any act down or emission made so the tubermantion and remsquences of such acts or contration Page 4 of 5

NSW	& Heritage	Extensive search -	Site list report								Client Se	rvice ID : 38073
elD	SiteName		Datum	Zenc	Easting	Northing	Context	Site Status	SiteFeatur	es	SiteTypes	Reports
_	Contact		Recorders	0z/	Ark Environm	ental and Heri	tage Månagement.M	tiss.Stephanie Rustle	n	Permits	1	
3-1517	Glendell North IF19		GDA	56	318543	641002A	Open size	Nabid	Avenfunt:-			
	Contact		Recorders	Oz/	Ark Environm	ental and Heri	tage Management A	Alss Stephanie Ruste	n.	Permits	and the second second	
3.0294	Site 2-		GDA	\$6	321168	6410327	Open site	Valid	Artefact :-		Open Camp Site	
	Contact		Recorders	No	oloen Curran.	OzArk Environ	mental and Heritag	e Management,Ms.Al	ison Nightti	Permits		
3-0006	Camberwell Hawman's	Laseli	GDA	56	31115900	6406552	Djarn Gliv	·Valid >	Arielaci : -		Open Camp Sile	98164,100761 102139,10261 7
	Contact		Recorders	Ler	Dyall					Permits	2990,3436	
3-0025	Glennies Creck Site A /	Bruyshaw Site A / Bettys Creek -	A AGD	56	320877	6405060	Open lite	Destroyed.	Artefact :-		Open Camp Site	164,99019,100 895
-	Contact	100 6 A 10 1	Recorders	Itel	en Brayshaw	Barry French.	ohn Mathews			Permits	1323.1324.1325.2267	
3-0506	ASH10 also lonnwy av /	shtum [fail site_	AGD	56	320384	6407026	Open size	Dustroyen	Number:-			
	Cuntact		Recorders	Ms	Vaurasa Kara	ly				Permits	1691	
3-0510	ASH14 Also known aw	unton Firebreak Site	AGD	56	320642	6306440	Open site	Destroyed	Artefact :-			
	Contact		Recorders	Ms.	Vanessa Haro	iy.				Permits	1691	
3:0680	G11, Glendell		AGD	56	319100	6410010	Dpmn size	Valhi	Anglartes			
	Contact T Room	a -	Recorders	Hes	Silons					Permits.		
3-1211	M0C0 IF-18		GDA	56	321173	6407744	Open site	Destroyed	Arrefact:-			
		CT001-07-02-00-00-00-00-00-00-00-00-00-00-00-00-	Barland at the full	ing an	ea at Datum	GDA Zone : 5	6. Eastings : 3184	50 - 321800, Northi	nes - 64064	00-64107	50 with a	

APPENDIX 3: SALVAGE REPORT





Environmental and Heritage Management P/L

Silcrete scraper from Glendell North OS24 (Artefact 12).

ABORIGINAL CULTURAL HERITAGE SALVAGE REPORT

GLENDELL MINE

RAVENSWORTH, NSW

DECEMBER 2018

Report Prepared by

OzArk Environmental & Heritage Management Pty Ltd

for Mt Owen Pty Limited

145 Wingewarra St (PO Box 2069) Dubbo NSW 2830

OzArk EHM

Phone: (02) 6882 0118 Fax: (02) 6882 0630 enquiry@ozarkehm.com.au www.ozarkehm.com.au OzArk Environmental & Heritage Management

EXECUTIVE SUMMARY

Mt Owen Pty Ltd (Mt Owen) has commissioned OzArk Environmental & Heritage Management (OzArk) to undertake a collection of surface artefacts at three sites located within the Glendell Mine Approved Disturbance Area (DA 80/952).

The salvage program was undertaken by Ben Churcher, OzArk Principal Archaeologist, with the assistance of Aboriginal community member Maree Waugh on 12 November 2018.

As all three sites are located within the approved disturbance area for the Glendell Mine, salvage of the sites was undertaken according to Section 6.2.1.1 of the *Mt Owen Complex Aboriginal Cultural Heritage Management Plan* (ACHMP) (V4, XMO SD PLN 0060).

The three sites salvaged under the conditions of the ACHMP and documented here are:

- Glendell North Open Site 24 (GN OS24: 37-3-1510)
- Glendell North Open Site 24 (GN OS27: 37-3-1509)
- Glendell North Isolated Find 25 (GN IF25: 37-3-1511).

All sites are now listed with the Aboriginal Heritage Information Management System (AHIMS) as destroyed with no further management requirements. All salvaged artefacts are stored in a secure location at the Glendell Mine Administration Offices. When it is constructed during 2019, the artefacts, along with other artefacts from the Mt Owen Complex, will be stored at the Wollombi Brook Education and Keeping Place.

Aboriginal Cultural Heritage Salvage Report: Glendell Mine

OzArk Environmenta	& Heritage Management
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OzArk Environmental & Heritage Management

INTRODUCTION

Introduction

1

Mt Owen Pty Ltd (Mt Owen) has commissioned OzArk Environmental & Heritage Management (OzArk) to undertake a collection of surface artefacts at three sites located within the Glendell Mine Approved Disturbance Area (DA 80/952).

These sites were recorded in April/May 2018 during field assessment for the Glendell North Continued Operations Project (GCOP; report forthcoming). While the area where the sites are located is outside of the Additional Disturbance Area for the GCOP, as this area is already approved for disturbance under the Glendell Mine approval (DA 80/952), the GCOP survey team assessed a buffer surrounding the GCOP Additional Disturbance Area to ensure that any Aboriginal sites located just beyond GCOP impacts would be known. It was within this buffer area that the three sites discussed in this report were recorded.

As all three sites are located within the approved disturbance area for the Glendell Mine, salvage of the sites was undertaken according to Section 6.2.1.1 of the *Mt Owen Complex Aboriginal Cultural Heritage Management Plan* (ACHMP) (V4, XMO SD PLN 0060).

The three sites salvaged under the conditions of the ACHMP and documented here are:

- Glendell North Open Site 24 (GN OS24: 37-3-1510)
- Glendell North Open Site 24 (GN OS27: 37-3-1509)
- Glendell North Isolated Find 25 (GN IF25: 37-3-1511).

The location of the three sites are shown on Figure 1.

The salvage program was undertaken by Ben Churcher, OzArk Principal Archaeologist, with the assistance of Aboriginal community member Maree Waugh on 12 November 2018. Melanie Dillon (Mt Owen Glendell Operations Environment and Community Officer) accompanied the salvage team.

Aboriginal Cultural Heritage Salvage Report: Glendell Mine



2 SALVAGE SURFACE COLLECTION RESULTS

The salvage program discussed here details the collection of surface artefacts at three sites only: GN OS24, GN OS27 and GN IF25. All sites are located in highly modified contexts; specifically a raised farm track, a dam wall and a top soil dump respectively. As such, all recorded artefacts are in secondary contexts and all sites have a low scientific significance. Despite the fact that all recorded artefacts are in a secondary context, it is assumed that they are representative of the artefacts formerly located in the flat floodplain of Swamp Creek.

Glendell North OS24 (37-3-1510)

Site Type:	Open artefact scatter

GPS Coordinates: GDA Zone 56 E 318346 N 6409339

Location of Site: 500 metres (m) east of Hebden Rd and 60 m southeast of Swamp Creek, Ravensworth. Located along a farm track that has been raised above the surrounding low-lying, probably swampy, landform; presumably using soil bulldozed from surrounding areas (Figure 2). The site is located on the floodplain of Swamp Creek along this artificial bund (Plate 1).

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Aboriginal Cultural Heritage Salvage Report: Glendell Mine

OzArk Environmental & Heritage Management

<u>Results of Salvage</u>: Glendell North OS24 was recorded as a low-density artefact scatter comprising seven mudstone flakes. The 150 by 10 m extent of the site was defined by the area of exposure along the bund. Potential for the presence of further subsurface archaeological deposits at Glendell North OS24 was assessed as negligible as the site was recorded in a highly modified context.

The salvage recovered fourteen artefacts, including mudstone flakes and a silcrete endscraper. Artefacts were recorded outside of the original site extent but all were confined to the raised bund (Plate 1). All artefacts are in secondary context within a highly modified landform, however, it is assumed that the artefacts would have originated from the surrounding floodplain landform to Swamp Creek. As all artefacts are in a secondary context they have a low scientific value. The Aboriginal Site Impact Recording Form (ASIRF) for this site is included in Appendix 1.





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Table 1: Glendell North OS24. Artefact attributes.

Artefact #	Artefact type	Material	Integrity	Reduction	Size	Comments
A1	Flake	Mudstone	Distal fragment	Tertiary	21x27x7mm	
A2	Flake	Mudstone	Complete	Tertiary	23x24x4mm	
A3	Flake	Mudstone	Proximal fragment	Tertiary	24x19x4mm	
A4	Flake	Mudstone	Distal fragment	Tertiary	11x17x3mm	
A5	Flake	Mudstone	Complete	Secondary	56x44x16mm	
A6	Flake	Mudstone	Distal fragment	Secondary	14x15x3mm	
A7	Flake	Mudstone	Complete	Secondary	33x27x9mm	
A8	Flake	Mudstone	Distal fragment	Tertiary	18x21x4mm	
A9	Flake	Mudstone	Complete	Tertiary	35x24x11mm	
A10	Flake	Mudstone	Complete	Secondary	28x31x10mm	
A11	Flake	Mudstone	Proximal Fragment	Tertiary	21x21x6mm	
A12	End Scraper	Silcrete	Complete	Tertiary	49mm	Irregular retouch to distal and marginal edge, steep and invasive.
A13	Flake	Mudstone	Proximal fragment	Secondary	40x21x12mm	
A14	Flake	Mudstone	Complete	Secondary	63x43x21mm	Retouch to one margin.

Glendell North OS27 (37-3-1509)

Site Type: Open artefact scatter

GPS Coordinates: GDA Zone 56 E 318588 N 6408562

Location of Site: 1.5 km north of Lemington Rd and 200 m east of Swamp Creek, Ravensworth. The site is located along the north-western edge of a dam on the dam wall in a modified location (Figure 3). The dam is located on a gentle-moderate gradient midslope (Plate 2).

Description of Site: Glendell North OS27 is a low-density artefact scatter comprising a mudstone flake and a silcrete flake. The 10 by 20 m extent of the site was defined by the area of exposure over the dam wall. Potential for the presence of subsurface archaeological deposits at Glendell North OS27 was assessed as nil as the site location is highly modified.

Salvage recovered the two artefacts originally recorded within the extent previously defined (**Plate 2**). These artefacts are in a secondary context and have a low scientific value. The ASIRF for this site is included in **Appendix 1**.

Aboriginal Cultural Heritage Salvage Report: Glendell Mine

Table 2: Glendell North OS27. Artefact attributes.

Artefact #	Artefact type	Material	Integrity	Reduction	Size
A1	Flake	Mudstone	Medial fragment	Tertiary	18x22x5mm
A2	Flake	Silcrete	Proximal fragment	Tertiary	25x33x5mm

Glendell North IF25 (37-3-1511)

Site Type: Isolated find

GPS Coordinates: GDA Zone 56 E 318341 N 6409244

Location of Site: 1.2 km northeast of the New England Hwy and 150 m southeast of Swamp Creek, Ravensworth (Figure 4). The site is located on the upper floodplain of Swamp Creek in an area of stockpiled soil (Plate 3).

Description of Site: Glendell North IF25 was originally recorded as a single mudstone flake. The extent of the site was defined by a 5 m buffer around the artefact. Potential for the presence of further subsurface archaeological deposits at Glendell North IF25 was assessed as nil due to the highly modified nature of the site's location.

Aboriginal Cultural Heritage Salvage Report: Glendell Mine

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Salvage recovered the artefact originally recorded, as well as an additional mudstone flake within the previously defined site extent (**Table 3**; **Plate 3**). These artefacts were recorded in secondary context in an area of extensive earthworks. The ASIRF for this site is included in **Appendix 1**.

Figure 3: Aerial showing location of Glendell North IF25 and the recovered artefacts.



Table 3: Glendell North IF25. Artefact attributes.

Artefact #	Artefact type	Material	Integrity	Reduction	Size
A1	Flake	Mudstone	Complete	Tertiary	29x13x9mm
A2	Flake	Mudstone	Complete	Tertiary	33x27x15mm

2.1 DISCUSSION

All artefacts previously recorded, along with several newly identified, were successfully salvaged from the three sites discussed here in accordance with the terms of Section 6.2.1.1 of the ACHMP.

As each of the sites were located in areas of heavy previous disturbance, the recovered artefacts are considered to be in secondary contexts with limited analytical potential. While all artefacts probably originated in the general area, the post-depositional movement of the artefacts

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precludes them being able to meaningfully add to our knowledge of Aboriginal use or occupation of the area. As such, all sites have a low scientific value.

All sites are now listed with the Aboriginal Heritage Information Management System (AHIMS) as destroyed with no further management requirements. All salvaged artefacts are stored in a secure location at the Glendell Mine Administration Offices. When it is constructed during 2019, the artefacts, along with other artefacts from the Mt Owen Complex, will be stored at the Wollombi Brook Education and Keeping Place.

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Site name:	Information:			-
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The person responsibl	e for the completion and submit	sion of this form)	First same	
Mr. Chur	cher		First name	
Organisation:	OzArk EHM			
Address:	145 Wingewarra St Dubl	00 NSW 2830		
Phone: 04160	09910 E-mail:	ben@ozarkehm.com.a		_
ocation map				
learly demarcate the d isplay map coordinate	nginal AHIMS site boundary; st 5.	ow the boundaries of impacted i	reas and the areas where the site remains in situ	
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ost-investigation significance		
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additional comments		



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ite contents information	open/closed site: Open	Site condition: Disturbed
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Title	sponsiole for the completion and s	uomission of this form)		First name	
Mr.	Churcher		Ben	Thothane	
Organisat	ion: OzArk EHM				
Address:	145 Wingewarra St	Dubbo NSW 2830			
Phone:	0416009910 F-m	ail: ben@ozarkehm.cr	om.au		
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Management recommendations	
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The site is now destroyed and has nil significance.	0 1 2 3 4 5c Description: Mudatore flake from GN I#25. Description:
Additional comments	

APPENDIX 4: SUPPLEMENTARY SITE LOCATION AND ARTEFACT PHOTOS




























APPENDIX 5: TEST EXCAVATION METHODOLOGY

The following test excavation methodology is the finalised document correct as of August 2018. Any project descriptions, impact areas etc. are as they were in August 2018; although these may have changed since that time.



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1 INTRODUCTION

1.1 PREAMBLE

OzArk Environmental & Heritage Management (OzArk) would like to acknowledge the Traditional Owners of the area—the Wonnarua peoples—and pay respect to their cultural heritage, beliefs and continuing relationship with the land.

We pay respect to the Elders, both past and present, for they hold the memories, traditions, culture and hopes of Aboriginal people in the area.

This document sets out the proposed methodology for the test excavation program associated with the Glendell Continued Operations Project (the Project). Test excavation is an archaeological tool designed to help identify archaeological deposits of conservation value and to understand the nature and extent of the subsurface component of sites. The permissible actions undertaken during the test excavation program are governed by Section 3.1 of the *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* (Code of Practice). This clearly establishes that a test excavation program should sample a given area, rather than to completely excavate it, and that the program should be designed to answer specific archaeological questions rather that other, broader questions (see Requirement 17 Section 1.3).

The test excavation methodology for the Project was written by Ben Churcher (Principal Archaeologist, OzArk).

1.2 BACKGROUND TO THE TEST EXCAVATION PROGRAM

The Glendell Mine is an open cut coal mine located at the Mount Owen Complex (MOC), within the Hunter Coalfields in the upper Hunter Valley of New South Wales (NSW). The Project Area is located approximately 20 kilometres (km) northwest of Singleton and 24 km southeast of Muswellbrook.

The Project seeks to extend the life of Glendell Mine to 2044, with an increase in extraction rate over the life of the Project up to 10 million tonnes per annum (Mtpa) from the current approved 4.5 Mtpa. The Project will extend the life of the existing operation providing for ongoing employment opportunities for the existing Glendell workforce (Figure 1-1).

Key aspects of the Project include the continuation of the Glendell Pit to the north, the realignment of Hebden Road, the diversion of Yorks Creek and relocation of Ravensworth Homestead.

The Project will impact on areas that have previously been impacted by mining and are approved for mining as well as up to an additional approximately 870 hectares (ha) of land that has not previously been impacted by mining (the Potential Additional Disturbance Area).

Glendell Continued Operations Project: Test Excavation Program Methodology

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Umwelt Australia Pty Ltd (Umwelt) has been engaged by Mt Owen Pty Ltd on behalf of Glendell Tenements Pty Ltd (the proponent) to prepare an Environmental Impact Statement (EIS) for the Project which involves the development of an Aboriginal Archaeology Impact Assessment (AAIA).

As part of the AAIA, OzArk have been engaged to undertake the archaeological assessment of the areas that will be potentially impacted by the Project. The surface archaeological assessment has already been completed over the Potential Additional Disturbance Area during April and May 2018.

As a result of the surface archaeological assessment, 12 locations have been identified that require subsurface test excavation in order to determine the integrity and/or extent of sites recorded during the field assessment.

This document sets out the proposed methodology for the test excavation and follows the Code of Practice under Part 6 National Parks and Wildlife Act 1974 (NPW Act).

Additionally, test excavations related to historic heritage at the Ravensworth Homestead may also be required. There is potential for Aboriginal artefacts to be encountered in historic test excavations. The methodology for the historic test excavations will have policies relating to the potential of encountering Aboriginal artefacts and this methodology will be circulated separately to the Registered Aboriginal Parties (RAPs) for the Project once prepared.



1.3 CODE REQUIREMENTS FOR THE TEST EXCAVATION PROGRAM

The Code of Practice lists a number of requirements pertaining to test excavation. These requirements are enumerated below and further information pertaining to these requirements follow in subsequent sections of this document.

Requirement 14 (Test excavation which is not excluded from the definition of harm):

Sub-surface investigation will not be excluded from harm where they are carried out in the following areas:

- o in or within 50m of an area where burial sites are known or are likely to exist
- o in or within 50m of a declared Aboriginal place
- o in or within 50m of a rock shelter, shell midden or earth mound
- in areas known or suspected to be Aboriginal missions or previous Aboriginal reserves or institutes
- in areas known or suspected to be conflict or contact sites.
 - The test excavation locations are not located within the vicinity of the items listed under Requirement 14 of the Code.
 - It is noted, however, that the entirety of the test excavation program is taking place in an area where there is the potential for conflict or contact sites due to the program's location within the former Ravensworth Estate and its proximity to the Ravensworth Homestead where early contact (and potentially conflict) between Aboriginal people and settlers may have occurred. While there are no known specific conflict or contact sites within the immediate vicinity of the test excavation areas, should such sites come to light during the test excavation works, all archaeological testing under the Code of Practice will immediately cease at that location.
 - Further, the Secretary's Environmental Assessment Requirements (SEARs) for the Project (SSD 9349; issued 7 June 2018), indicate that test excavation is a required aspect of the Aboriginal cultural heritage assessment:
 - Office of Environment and Heritage (OEH) input into SEARs, Attachment A Point 6 (in part): "The Environmental Impact Assessment (EIS) must identify and describe the Aboriginal cultural heritage values that exist across the whole area that will be affected by the development and document these in the Aboriginal Cultural Heritage Assessment Report (ACHAR). This may include the need for surface survey and test excavation."
- Requirement 15a (Consultation): As the proposed archaeological test excavation
 program is part of the Project, consultation has been ongoing with the RAPs and has been
 completed to the stage described in subclause 80C (6) of the National Parks and Wildlife
 Regulation 2009 (NPW Regulation).

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- Requirement 15b (Test excavation sampling strategy): This document sets out the proposed sampling strategy for the test excavation program.
- Requirement 15c (Notification):
 - the location of the proposed test excavation and the subject area.
 - \succ This document sets out the proposed location of the test excavation program.
 - the name and contact details of the legal entity with overall responsibility for the project.
 - Mt Owen Pty Limited, 642 Hebden Road, RAVENSWORTH NSW 2330
 - the name and contact details of the person who will be carrying out the test excavations where this is different to the legal entity with overall responsibility for the project.
 - OzArk Environmental & Heritage Management, 145 Wingewarra St, DUBBO NSW 2830
 - the proposed date of commencement, and estimated date of completion, of the test excavations.
 - Anticipated Commencement: 03/09/2018
 - Anticipated Completion: 21/09/2018

Weather permitting, the projected period for the excavation is up to 15 days.

- the location of the temporary storage location for any Aboriginal objects uncovered during the test excavations.
 - Aboriginal objects recovered during the excavations will be temporarily housed in a locked container at 21 Agnes Ave, CRESTWOOD, NSW, 2620 (OzArk branch office) for analysis. Following analysis the artefacts will be stored in accordance with the MOC Aboriginal Cultural Heritage Management Plan (MOC ACHMP) until such time as a Care Agreement is reached between an individual or organisation and the Office of Environment and Heritage (OEH). If no analysis is required (i.e. all analysis is completed in the field), the artefacts will be stored in accordance with the MOC ACHMP. Other objects, such as faunal or charcoal samples, may be sent to third party specialists for analysis.
- Requirement 16a (Test Excavation): The test excavation program will adhere to Requirement 16a of the Code as set out in this document (see Section 4.3).
- Requirement 16b (Objects recovered during test excavations): Aboriginal objects recovered during the excavations will be analysed at 21 Agnes Ave, CRESTWOOD, NSW, 2620 (OzArk branch office). When not being analysed, the objects will be temporarily stored in a locked container at 21 Agnes Ave, CRESTWOOD, NSW, 2620.
 Following analysis the objects will be stored according to the MOC ACHIMP. If no analysis is required (i.e. all analysis is completed in the field), the artefacts will be immediately

Glendell Continued Operations Project: Test Excavation Program Methodology

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stored according to the MOC ACHMP until such time as a Care Agreement is reached between an individual or organisation and OEH.

- Requirement 17 (When to stop test excavations): the test excavation program will adhere
 to the requirements set out in the Code: Any test excavation carried out under this
 requirement will cease when suspected human remains area encountered; or when
 enough information has been recovered to adequately characterise the objects present
 with regard to their nature and significance.
 - OzArk shall ensure that this Requirement is adhered to during the test excavation program. This will include ceasing work as soon as human skeletal material is noted and immediately notifying the police. If the skeletal material is determined to be Aboriginal, OEH will be immediately notified.

1.4 ABORIGINAL COMMUNITY CONSULTATION

A draft of this test excavation methodology was issued to all RAPs on 19 July 2018 for a 28 day review period closing on 17 August 2018.

From 31 July to 2 August 2018, during the review period for this document, a series of on-site meetings were held with RAPs to initiate discussions regarding the cultural values of the Potential Additional Disturbance Area. As part of these meetings, Ben Churcher, OzArk Principal Archaeologist, presented a summary of the results of the archaeological survey and introduced the methodology and location of the test excavation program. In addition, these meetings involved RAPs being shown various areas within the Potential Additional Disturbance Area where test excavation was planned to take place.

As a result of these meetings, only one specific comment from Luke Hickey was received regarding the test excavation methodology. This comment revolved around the spacing of the test excavation squares which were proposed to be spaced at 10 metre (m) intervals, while Luke felt this spacing was too wide and proposed a 5 m spacing. During discussion on this issue, it was agreed that small potential archaeological deposits (PADs) would be sampled by excavation squares at 5 m intervals; while larger PADs would be sampled at 10 m intervals so that a broad representation of the landform could be sampled.

As a result of Luke's concerns, Point 3 in Section 4.4 has been added to this document.

At the end of the 28 day review period, three further responses were received from RAPs. These responses are set out below. There was no requirement to amend the test excavation methodology as a result of these responses.

Ryan Johnson (Murra Bidgee Mullangari).

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I have read the project information and draft test pitting methodology and endorse the recommendations made.

OzArk Environmental & Hentage Management

Jesse Carroll – Johnson (Muragadi Heritage Indigenous Corporation)

Glendell Continued Operations Project: Test Excavation Program Methodology

I have read the recommendations for the Glendell project and endorse the recommendations made by Ozark, if you require further details please contact.

Kevin Duncan

Yaama Bridie, Thank you for the results of the Draft Test Pitting Methodology for the Glendell Project. I as an Aboriginal Traditional Custodian of these areas strongly disapprove of Mining in our Traditional Lands as Mining has done much damage to our natural Environment and Cultural Space. For thousands of years these lands have been important places for our people. In the result of Mining across the Valley into Jerry's Plains the Land itself will never recover and thousands of years of Cultural History wiped forever. My words I know will probably not be recognised in context to my Human Right as an Indigenous person under United Nations Charter of Indigenous Peoples Rights which Australia is Signatory. So even in my protest to protect and preserve Culture that is older than the Pyramids themselves they will ultimately will be destroyed. This is my True expression of who I am as an Aboriginal Person and of my feelings for my Ancestral Home Lands. Sincerely Kevin Duncan Gomeroi, Wonnorua Awaba, Peoples

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2 THE POTENTIAL ADDITIONAL DISTURBANCE AREA

Figure 2-1 shows the Project Area and the extent of the Potential Additional Disturbance Area.

The majority of the Potential Additional Disturbance Area has been already cleared and includes flat landforms and associated lower and mid slope landforms associated with Bowmans, Yorks and Swamp Creeks (Figure 2-2). Historically the area has been intensively farmed leading to widespread vegetation loss and soil erosion (Figure 2-3).

The region surrounding the Project Area is an area that holds high cultural value for Wonnarua people and the wider landscape surrounding the Project Area has deep meaning to Wonnarua people.

Many of the Aboriginal community are also deeply concerned about the existence of 'massacre sites' within the former Ravensworth Estate which includes the Potential Additional Disturbance Årea. There is very little supporting historic evidence regarding the actual location of any such sites, despite this having been expressed strongly as 'stories' and cultural knowledge held by a knowledge holder for the area. All available evidence, however, indicates that the area is outside, and a number of kilometres from, the Project Area (ACHM 2013: 66–69).

The wider cultural landscape surrounding the Project Area is of high cultural and historical significance to Wonnarua people. The historical associations with early settlement, conflict, dispossession and survival are important, and the area is seen as a significant surviving cultural landscape to numerous members of the Wonnarua people. Overall, the cultural significance of the wider region is considered to be high.

The landscape within the Potential Additional Disturbance Area is highly disturbed and fragmented, resulting in the fact that much of the natural landscape no longer exists as the history of agriculture and coal mining has irreversibly altered the landscape. With the remnant cultural landscape within the Potential Additional Disturbance Area having undergone considerable modification since European settlement, the Potential Additional Disturbance Area potentially has a lower cultural significance than the surrounding region. However, landscape features, such as creek lines, have often been cited as being of cultural importance and the Potential Additional Disturbance Area contains portions of Bowmans, Yorks and Swamp Creeks. These waterways would contribute and enhance the residual cultural landscape of the Potential Additional Disturbance Area.

OzArk Environmental & Heritage Management Figure 2-1. Aerial showing the Project Area and the Potential Additional Disturbance Area. 0 0.5 1 1.5 2 km Ö Project Area Potential Additional Disturbance Area Glendell Continued Operations Project: Test Excavation Program Methodology





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3 ARCHAEOLOGICAL CONTEXT

3.1 PREVIOUS ARCHAEOLOGICAL STUDIES

The Project Area has been subject to previous Aboriginal archaeological survey and assessment in the recent past resulting in the recording of multiple Aboriginal sites.

Based on current information from the OEH managed Aboriginal Heritage Information Management System (AHIMS) database, there have been a number of sites recorded either within the Potential Additional Disturbance Area, or in close proximity.

During the course of the survey all valid and partially valid sites were revisited and the majority recorded currently visible artefacts. At those sites where there were no visible surface artefacts, possible explanations include:

- The sites have a low artefact density and it is therefore easier to understand that a low number of artefacts could be obscured whereas larger, more-dense artefact sites would retain a surface manifestation
- The high degree of water movement in some areas that has probably removed artefacts from their find location. This reinforces how dynamic any landscape is and how difficult it is to re-locate low density sites after a passage of time.

There have been numerous archaeological investigations in the local area and a number within the Potential Additional Disturbance Area itself. The results of these investigations provide an archaeological context for the assessment and were used in the preparation of a predictive model of Aboriginal site location for the pedestrian survey. These studies were summarised in the Survey Methodology. For the purpose of the test excavation program, only the studies involving subsurface test excavation or salvage are summarised here.



3.1.1 Ravensworth East Archaeological Investigation (ERM 2002)

In 2002 ERM conducted archaeological excavations and salvage grader scrapes over areas of the Ravensworth East Mine under Permit SZ323. These investigates were located in the central portion of the Project Area, in areas along the former course of Swamp Creek (ERM 2002). The area where this work took place is now highly modified and outside of the Potential Additional Disturbance Area. Figure 3-1 lists the six sites salvaged within the Project Area under the 2002 ERM program. The location of these sites is shown on Figure 3-1.

Table 3-1. Sites salvaged within the Project Area under Permit SZ323.

AHIMS #	Site name
37-3-0399	Ravensworth 10
37-3-0398	Ravensworth 09
37-3-0400	Ravensworth 11
37-3-0401	Ravensworth 12
37-3-0402	Ravensworth 13
37-3-0403	Ravensworth 14

The combined geomorphological investigations undertaken by ERM highlighted the Swamp Creek valley as the key area likely to yield archaeological evidence of Aboriginal occupation within the ERM study area. However, these studies also showed that although buried land surfaces were apparent within the valley, evidence of Pleistocene Aboriginal occupation was unlikely to be recovered. Archaeological sampling of soil from these land surfaces failed to yield any archaeological material, confirming this view. In light of this, no further pursuit of Pleistocene archaeological deposits was undertaken within the scope of the excavation program.

The initial archaeological component of ERM's investigation, which included grader scrapes spread over three different landscapes across the valley, at varying distances from water sources, yielded little archaeological evidence. Of the three grader scrapes, three artefacts were recovered over a total area of 560 square metres (m²).

A low rise adjacent to the swampy meadow channel west of Swamp Creek in the vicinity of surface sites Ravensworth 12 to 14, revealed substantial archaeological material with several artefact concentrations located approximately 40 metres (m) to 60 m away from the channel. Test pit excavation yielded an artefact spread up-slope of the channel from approximately 10 m from the current channel edge, extending across the rise in all directions. A total of 87 artefacts were recovered from the 11 test pits. Over a combined excavated area of 11 m², this represents an artefact density of 7.9 artefacts/m². The largest artefact concentration (44 pieces or 50.57% of the total assemblage) was excavated from Test Pit 4 located on the peak of the rise. Without the Test Pit 4 artefact concentration, artefact density would have been substantially lower, at 4.3 artefacts/m², as the majority of test pits contained five artefacts or less. 82.75% of the assemblage was mudstone and 17.25% was silcrete.

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Open excavation of the site complex Ravensworth 12–14 recovered a concentrated artefact scatter across the peak of the rise within the very shallow A-Horizon soil. Open excavation on this rise was proposed by Margrit Koettig (then at the NSW Department of Environment and Climate Change) to define the apparent spread of artefacts from TP4, and to further establish the nature of this subsurface deposit, specifically to investigate whether it contained hearths and identifiable activity areas. The open area excavation of 86 m² (including TP4) was conducted in July–August 2001 by ERM. 1,168 artefacts were excavated in the open excavation and the investigations revealed a continuation of artefacts over the low rise, rather than what was originally recorded as three individual surface sites. Within this scatter, several distinct areas of artefact concentration were recorded, all with quantities of associated charcoal and burnt earth. The assemblage comprised backed artefacts and associated manufacturing debitage, mostly of mudstone.

Seven raw materials were represented in the open excavation. Mudstone was the dominant raw material observed, accounting for almost 80% of the total artefact numbers. This mirrored the initial trend set in testing phase. Silcrete was the next most common material and comprised nearly 20% of the assemblage. The remainder of the artefacts (less than 2%) was produced from six other raw material types.

Five artefact types were identified in the assemblage. The majority of artefacts were whole flakes accounting for more than 50% of the assemblage with broken flakes (almost 30%) and flaked pieces (approximately 15%) making up much of the remaining assemblage numbers. All modified artefacts, consisting of cores and retouched flakes, made up just under 2% of the assemblage.

3.1.2 Glendell Project Area (Umwelt 2013)

Salvage of the Glendell project area was undertaken under National Parks and Wildlife Services (NPWS) section 90 Consent #2267 and formed Part 4 of the salvage program for the Bettys Creek valley. This archaeological salvage within the Glendell project area was conducted by Umwelt and the Aboriginal community between November 2005 and February 2006. Table 3-2 lists those sites within the Project Area that were salvaged under Consent #2267. The location of these sites is shown on Figure 3-1.

Table 3-2. Sites within the Project Area salvaged under Consent #2267.

AHIMS	site name	Salvage methodology
37-3-0599	Bettys Creek 9	Surface Collection with Subsurface Investigation (manual excavation)
37-3-0601	Bettys Creek 11	Surface Collection with Subsurface Investigation (grader scrapes)
37-3-0602	Bettys Creek 12	Surface Collection with Subsurface Investigation (grader scrapes)
37-3-0604	Bettys Creek 14	Surface Collection with Subsurface Investigation (grader scrapes)
37-3-0605	Bettys Creek 15	Surface Collection with Subsurface Investigation (grader scrapes)
37-3-0606	Bettys Creek 16	Surface Collection with Subsurface Investigation (grader scrapes)
37-3-0607	Bettys Creek 17	Surface Collection with Subsurface Investigation (grader scrapes)

AHIMS	site name	Salvage methodology
7-3-0608	Bettys Creek 18	Surface Collection with Subsurface Investigation (grader scrapes)
7-3-0609	Bettys Creek 19	Surface Collection
7-3-0610	Bettys Creek 20	Surface Collection
7-3-0618	Swamp Creek 1	Surface Collection
7-3-0619	Swamp Creek 2	Surface Collection
7-3-0620	Swamp Creek 3	Surface Collection with Subsurface Investigation (grader scrapes)
7-3-0621	Swamp Creek 4	Surface Collection with Subsurface Investigation (grader scrapes)
7-3-0622	Swamp Creek 5	Surface Collection
7-3-0623	Swamp Creek 6	Surface Collection
7-3-0624	Swamp Creek 7	Surface Collection
7-3-0026	Glennies Creek Site B / Bettys Creek - B	Surface Collection with Subsurface Investigation (grader scrapes)
7-3-0625	Swamp Creek 8	Surface Collection
17-3-0027	Glennies Creek Site C / Bettys Creek - C	Surface Collection with Subsurface Investigation (grader scrapes)
7-3-0626	Swamp Creek 12	Surface Collection
7-3-0592	Bettys Creek 1	Surface Collection with Subsurface Investigation (grader scrapes)
7-3-0627	Swamp Creek 13	Surface Collection with Subsurface Investigation (grader scrapes)
7-3-0593	Bettys Creek 3	Surface Collection with Subsurface Investigation (grader scrapes)
7-3-0773	Swamp Ck 10	Surface Collection with Subsurface Investigation (grader scrapes)
7-3-0594	Bettys Creek 4	Surface Collection with Subsurface Investigation (grader scrapes)
7-3-0595	Bettys Creek 5	Surface Collection with Subsurface Investigation (grader scrapes)
7-3-0596	Bettys Creek 6	Surface Collection with Subsurface Investigation (grader scrapes)
7-3-0597	Bettys Creek 7	Surface Collection with Subsurface Investigation (grader scrapes)
7-3-0598	Bettys Creek 8	Surface Collection with Subsurface Investigation (grader scrapes)

A total of 2,713 artefacts were recovered from the Glendell project area salvage including 824 (30.6%) from the surface collection, 274 (10.1%) from Excavation 1 (Bettys Creek 10), 19 (0.7%) from Excavation 2 (Bettys Creek 9), 1,414 (52.1%) from Excavation 3 (Bettys Creek 2) and 177 (6.5%) from the grader scrapes. A total of 2,604 (96%) of the artefacts were recovered from the Bettys Creek catchment, 52 (1.9%) from the Bowmans Creek catchment and 57 (2.1%) from the Swamp Creek catchment.

Observations made from the surface collection assemblage were as follows:

- . The highest number of artefacts were collected from Bettys Creek 14 (26.7% of the surface collection assemblage), followed by Bettys Creek 10 (19,5% of the assemblage)
- . 60.6% of the artefacts were collected from lower slopes and floodplains associated with creek lines (56.7% from Bettys Creek; 3.3% from Swamp Creek and 0.7% from Bowmans Creek)
- · Sites on low but elevated spurs in tributary confluences comprised 22.2% of the assemblage; ridge crests (7.5%); sites on lower slopes on tributary channels more than 150 m from the main creek channel (7.5%); mid slope sites (1.3%) and upper slopes (0.6%)

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1	The dominant artefact type was broken flakes (45%); followed by flakes (26.7%); flaked pieces (10.9%); retouched flakes (10%), cores (3.7%), heat shatter (3.4%) and grindstones (0.4%)
•	A total of 31 cores were recovered from the surface collection. Of these, 21 were recovered from the Bettys Creek sites (17 from areas with tributary confluences with Bettys Creek)
u),	Mudstone was dominant within the assemblage making up 58,5% of the artefacts, followed by silcrete (31.9%) with the remaining raw materials making up 9.6% of the total assemblage.
Excavatio	on was targeted at Bettys Creek 2, Bettys Creek 9 and Bettys Creek 10 indicated the
following.	
•	Bettys Creek 10 and Bettys Creek 2 retained a level of spatial integrity reflected by knapping events and raw material distribution patterns
	Bettys Creek 9 contained artefacts in a secondary context
1.0	All three locations contained backed flakes
-	A ground oven identified at Bettys Creek 2 had an absolute date of 2188+/-39 BP (years before present)
•	It was possible to obtain one radiocarbon date of 3077±40 BP (calibrated-Wk-20912) from Square K Spit 3 of Excavation 3 within the Mount Owen Extension Area. The date was relative in nature as it belonged to a large piece of burnt wood that was associated with artefacts both above and below it. Thus the artefacts above it must be dated to later than 3077±40 BP and those below it to earlier
	Broken flakes (45.7%) dominated the artefact assemblage, followed by flakes (38.7%)
•	Bettys Creek 10 and Bettys Creek 2 were dominated by mudstone while Bettys Creek 9 was dominated by silcrete. Overall, mudstone was dominate (55.7%) over silcrete (32.3%)
	A small knapping event was evident at Bettys Creek 10, with greater amounts of knapping noted at Bettys Creek 2
1.21	Care to flake ratios for Pottus Crook 10 wars 1/29 7 and for Pottus Crook 2 wars 1/27 4

 Core to flake ratios for Bettys Creek 10 were 1:28.7 and for Bettys Creek 2 were 1:27.4 suggesting knapping on site.

As a result of the Umwelt investigations outlined above, today's archaeological landscape, particularly along Bettys Creek, but also along Swamp Creek and Bowmans Creek in the vicinity of the Project Area, has been extensively studied.

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3.1.3 Aboriginal Archaeological Values Assessment: Mount Owen Continued Operations (OzArk 2013)

The assessment area for the Mount Owen Continued Operations (MOCO) Project disturbance area covered approximately 500 ha with portions of the assessment area encompassing part of the southern portion of the Potential Additional Disturbance Area.

Australian Cultural Heritage Management Pty Limited (ACHM) were engaged by MOC to undertake Aboriginal community consultation for the MOCO Project and to author the Aboriginal Cultural Heritage Assessment Report (ACHAR) to which OzArk 2014 contributed (ACHM 2013). The ACHM report appeared as Appendix 13a (Parts 1 and 2) of the MOCO Project *Environmental Impact Statement* (EIS) (Umwelt 2015). ACHM 2013 contains the cultural, aesthetic and historic values of the area, while OzArk 2014 contains an examination of the scientific values of the area.

The archaeological survey for the MOCO Project took place over two weeks from 26 November 2012 to 7 December 2012. The archaeological test excavation program for the MOCO Project took place over one week from 11 March 2013 to 15 March 2013. In 2014, the proposed disturbance area for the MOCO Project was expanded slightly necessitating a further one day of survey that took place on 29 April 2014. The results of these investigations are detailed in OzArk 2014 and contained in Appendix 13b of the MOCO Project EIS (Umwelt 2015).

Results

Large portions of the MOCO Project (223 ha) had been subject to previous Aboriginal Heritage Impact Permits (AHIPs) with extensive areas having already undergone archaeological assessment and salvage. Within the MOCO disturbance area, 18 sites had already been salvaged by manual excavation and more expansive additional areas have been subject to grader scrapes to salvage subsurface artefacts. Over the years, both from within the MOCO disturbance area and from adjacent landforms, over 11,000 artefacts had already been recovered as a result of these programs.

As a result of the scientific values assessment for the MOCO Project, 39 Aboriginal sites were recorded; consisting of:

11 artefact scatters (37-3-1189 to 37-3-1199)

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- 25 isolated finds (37-3-1170 to 37-3-1188 and 37-3-1212 to 37-3-1216)
- Three extensions to previously recorded sites (Extension to site 37-3-0649, Extension to site 37-3-0611 and Extension to site 37-3-0600).

In addition, the MOCO disturbance area contained three previously recorded sites, 37-3-0611, 37-3-0985 (low density artefact scatters) and 37-3-0527 (isolated artefact). Thus, 42 sites were known to exist within or close to the MOCO disturbance area.

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At two locations within the MOCO disturbance area, test excavations were carried out under the OEH Code of Practice. At one location (37-3-1191), no artefacts were recorded during the test excavations, while at the second location (37-3-1192), 114 artefacts were recorded, with over 80% coming from one discrete concentration. As a result, it was determined that 37-3-1191 is a displaced site with no associated archaeological deposits, while 37-3-1192 is a low density artefact scatter along the banks of the 'eastern drainage' line with one known concentration of artefacts.

Two sites recorded during the survey, 37-3-1194 and 37-3-1198, remain partially extant in the Potential Additional Disturbance Area.

Conclusion

Those archaeological sites in the disturbance area investigated revealed relatively sparse artefact concentrations in shallow and disturbed contexts. Archaeologically, all of the places located and/or identified conform to the Australian Small Tool Tradition¹, and most likely date to no more than the last 2,000 to 3,000 years.

The majority of the disturbance area had been subjected to varying degrees of land clearing and mining since first settlement, destroying the primary context of much of the physical cultural material present, and irretrievably altering the landscape itself.

Given the nature and extent of the archaeological sites identified, there was little additional knowledge which could be added to the archaeological record from any further investigation of this material. There is little probability for the presence of undisturbed and deeply stratified archaeological sites within the disturbance area.

In general, the archaeological sites in the MOCO disturbance area offered:

- Limited research potential in regard to regional and/or localised subsistence and resource procurement activities
- Limited research potential to address questions on stone tool technologies in the region
- · Limited potential for radiometric dating methods to be applied to the sites
- Limited research potential to address questions about the timing of the first occupation of this region of the Hunter Valley
- Limited research potential to address questions about the timing of the Aboriginal settlement history of the Hunter Valley
- Limited potential to reveal further unique spatiotemporal patterning which would add to the archaeological record.

¹ The Australian Small Tool Tradilion (also sometimes referred to as 'Bondaian') is a term applied to the Holocene period Abonginal tool kit; distinguishing it from the earlier Australian Core Tool and Scraper Tradition generally dated to the Pleistocene period.

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3.1.4 Archaeological Salvage. Liddell Coal Operations Development Modification 5 (OzArk 2015)

OzArk was engaged by Liddell Coal Operations (LCO) to undertake the salvage of 15 Aboriginal archaeological sites for Development Modification 5 of DA 305-11-01 and was approved under AHIP #C0000623. The salvage of the sites was undertaken on 28 January 2015 and 24 to 25 February 2015.

Artefacts were retrieved from seven of the 15 sites. A total of 46 artefacts were salvaged across all sites. The majority of the 46 artefacts recovered from the salvage were flakes (73.9%). Other artefact types included cores, flaked pieces, debitage, blades and a core fragment. Almost all artefacts were made from mudstone (56.5%) and silcrete (39.1%). Quartz and basalt artefacts were also present. Most artefacts were at a tertiary (65.2%) stage of reduction, with the rest secondary (34.8%). There were no artefacts at the primary stage of reduction.

The artefacts that were salvaged closely correspond to the regional context. The low proportion of formal tools (just one in 46) and the high percentage of flakes and debitage (76%) in the salvaged assemblage are typical of the region, but this is probably true in most sites across Australia. Mudstone has been recorded to be the most common raw material in the region, which was the case for the salvaged artefacts, and the other materials salvaged are also common.

Details of the two sites in this program that are near the Potential Additional Disturbance Area are listed in Table 3-3 and shown on Figure 3-1.

Table 3-3. Details of sites within the Project Area salvaged under AHIP C0000623.

AHIMS #	Site name	Site name Artefacts Notes			
37-3-0419	Rav 24 East	12	This site was salvaged by surface collection and grader-scrape salvage. The ground surface visibility (GSV) of 15% is based on pre-grader-scrape visibility. The grader-scrapes added an additional 20% GSV.		
37-3-1152	LID 36	1	Rakes were used to remove wood chips from the ground and improve GSV.		

3.1.5 Mount Owen Continued Operations Project Salvage Program (OzArk 2017)

In early 2017 the MOCO salvage program took place under the authority of the 2016 MOC ACHMP (XMO SD PLN 0060). This program was completed in the approved disturbance areas associated with the MOCO Project (SSD-5850).

This program included the collection of surface artefacts at 26 sites resulting in 163 artefacts being recorded. Included in the tally of 26 sites, were two sites where limited archaeological excavation took place resulting in a further 187 artefacts being recorded. An additional area on the east bank of Bowmans Creek proposed for impact by the new Hebden Road Bridge was also subject to archaeological investigation by manual excavation but the area proved to be highly disturbed and no artefacts were recorded.

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In addition, there were three sites that were unable to be salvaged, one as it was on land not owned by Mount Owen (37-3-0527) and two due to the fact that the area of the sites had previously been unintentionally impacted by mining activities (37-3-1171 and 37-3-1189)². These unintentional impacts were self-reported to the OEH who issued an official caution to MOC on 17 March 2016. Sites salvaged within the Project Area under SSD-5850 are listed in Table 3-4 and shown on Figure 3-1.

Table 3-4. Sites salvaged within the Project Area under SSD-5850.

Site ID	Site Name	Site Type	Number of Artefacts Salvaged	Salvage methodology
37-3-0527	Ashton EWA 17	Artefact scatter	N/A	Not salvaged (access)
37-3-0611	Bettys Creek 21	Artefact scatter	2	Surface collection and excavation
37-3-1170	MOCO IF-1	Isolated find	0	Surface collection
37-3-1171	MOCO IF-2	Isolated find	N/A	Not salvaged (previously destroyed)
37-3-1174	MOCO IF-5	Isolated find	1	Surface collection
37-3-1176	MOCO IF-7	Isolated find	0	Surface collection
37-3-1177	MOCO IF-8	Isolated find	0	Surface collection
37-3-1178	MOCO IF-9	Isolated find	1	Surface collection
37-3-1179	MOCO IF-10	Isolated find	0	Surface collection
37-3-1180	MOCO IF-11	Isolated find	2	Surface collection
37-3-1181	MOCO IF-12	Isolated find	1	Surface collection
37-3-1182	MOCO IF-13.	Isolated find	2	Surface collection
37-3-1183	MOCO IF-14	Isolated find	3	Surface collection
37-3-1184	MOCO IF-15	Isolated find	2	Surface collection
37-3-1189	MOCO OS-1	Artefact scatter	N/A	Not salvaged (previously destroyed)
37-3-1190	MOCO OS-2	MOCO OS-2 Artefact scatter 2 Surfa		Surface collection
37-3-1191	MOCO OS-3	Artefact scatter	24	Surface collection
37-3-1192	MOCO OS-4	Artefact scatter	257	Surface collection and excavation
37-3-1193	MOCO OS-5	Artefact scatter	2	Surface collection
37-3-1194	MOCO OS-6	Artefact scatter	5	Surface collection
37-3-1195	MOCO OS-7	Artefact scatter	O	Surface collection
37-3-1196	MOCO QS-8	Artefact scatter	3	Surface collection
37-3-1197	MOCO OS-9	Artefact scatter	36	Surface collection
37-3-1198	MOCO OS-10	Artefact scatter	10	Surface collection
37-3-1199	MOCO OS-11	Artefact scatter	7	Surface collection
37-3-1211	MOCO IF-18	Isolated find	0	Surface collection
37-3-1212	MOCO IF-21	Isolated find	2	Surface collection
37-3-1213	MOCO IF-22	Isolated find	2	Surface collection

² In addition, MOCO OS-3 was unintentionally partially impacted by mining activities and the remainder of this site was salvaged during the salvage program.

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Artefacts	ita iD Sita Nama	Site Tune	Number of	Saluada mathodologi
Salvaged	Site Name	Site Type	Artefacts Salvaged	Salvage methodolog

Of all the sites investigated in the 2017 salvage program, 37-3-1192 (MOCO OS-4 located on an unnamed watercourse termed the 'eastern drainage') recorded the highest artefact density with 71 surface artefacts (43.5% of all surface artefacts recorded during the salvage program) and 186 artefacts recorded in the test excavation component of the program (constituting almost all of the artefacts recorded in the test excavation component of the program). 37-3-1192 was located in area heavily affected by erosion and the investigation showed that while one concentration of artefacts remained *in situ*, the majority of the site had been displaced by the erosion.

Other sites that recorded more than 10 artefacts during the salvage program were 37-3-1191, 37-3-1197 and 37-3-1198. 37-3-1194 and 37-3-1198 remain partially extant within the Potential Additional Disturbance Area. All other sites recorded very low artefact numbers supporting the conclusion reached in OzArk 2014 that the remaining archaeological values at MOC consist of low density, often displaced, artefact scatters.

The recording of these sites affords with the general picture emerging that sites located away from permanent water are likely to have a low artefact density and low site complexity.

PROPOSED METHODS

4.1 PURPOSE OF THE TEST EXCAVATION PROGRAM

The purpose of the test excavation program is to understand more completely the nature of the sub-surface material within the Potential Additional Disturbance Area. Data obtained from the test excavation program will inform the mitigation and management options in the forthcoming AAIA.

The aims are therefore to:

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- Establish the extent and nature the of sub-surface archaeological deposits at a site or landform with archaeological potential
- Use the data gained from the test excavation program to better evaluate the archaeological significance and potential of the Potential Additional Disturbance Area
- Develop, in consultation with the RAPs, an informed management strategy for the site to assist in mitigating the proposed impacts.

As a result, locations initially considered for the test excavation program are limited to:

- · Areas identified during the pedestrian survey as having archaeological potential
- · Landforms which are relatively intact (i.e. not within disturbed contexts)
- Previously recorded sites which were potential archaeological deposits (PADs) or had PADs associated with them.

Excavations undertaken as per the Code do not require an AHIP under the NPW Act.

4.2 BACKGROUND TO THE TEST EXCAVATION PROGRAM

The test excavation program follows an extensive program of surface survey that focused on the Potential Additional Disturbance Area rather than the Project Area as a whole. The Aboriginal heritage surface survey was undertaken by two teams on 9 to 20 April 2018, and by one team on 30 April to 1 May 2018 with each team consisting of two archaeologists and up to four RAPs. The assessment consisted of full pedestrian assessment of the Potential Additional Disturbance Area.

The results of the Aboriginal heritage assessment will be contained in the forthcoming AAIA that will provide full details of all sites recorded. As an overview, the pedestrian survey recorded 59 additional sites consisting of:

- 33 artefact scatters
- · 24 isolated finds
- One PAD

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One scarred tree.

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15 of these sites are outside of the Potential Additional Disturbance Area, however, some are closely adjacent to the boundary of the Potential Additional Disturbance Area and will require further management.

In addition, there are 43 previously recorded sites within or partially within the Potential Additional Disturbance Area. Of these, one site can no longer be reasonably located in the landscape. As such there are 42 known Aboriginal sites that have been previously recorded in the Potential Additional Disturbance Area.

Figure 4-1 illustrates the locations of all sites within proximity to the Potential Additional Disturbance Area and Figure 4-2 shows the site types recorded during the survey.

When previously and recently recorded sites are considered, there are 86 sites within the Potential Additional Disturbance Area. Three additional sites are technically outside of the Potential Additional Disturbance Area but are so closely adjacent that they should be treated as if they are inside of the Potential Additional Disturbance Area. However, one of these sites can no longer be reasonably located in the landscape and so there are an additional two known sites that may be harmed by the Project, As such, should the Project be approved in its current form, 88 known sites will be harmed.

The survey identified 12 areas where test excavation would provide a clearer picture of the subsurface archaeological potential. These areas, and the reasons why they have been selected are outlined in Table 4-1. The location of these 12 areas are shown on Figure 4-3.

There a number of previously recorded sites in the Potential Additional Disturbance Area where







Area			Landform			Reason for test excavation
Area 1		A broad elevate Creek.	d spur running p	arallel to Bowm	ans	A number of artefact scatters are located within the landform.
Area 2		A large level are Creek on its eas	a that is elevate tern bank.	d above Yorks		Area also occupied by Ravensworth Homestead, often an indicator of a prime occupational location.
Areas 3 & 4		Landforms on w its confluence w	estern bank of Y	orks Creek clos	e to	Appeared to have high archaeological potential during the survey.
Areas 5 & 6		Elevated landfor Creek close to it	ms on the easters confluence with	ern bank of York th Bowmans Cre	s nek.	Appeared to have high archaeological potential during the survey.
Area 7		Terrace overloo Creek.	king the floodpla	in for Bowmans		A number of surface artefacts were visible during the survey.
Area 8		Elevated landfor appears to be a	m between Swa h old channel fo	mp Creek and v r Swamp Creek.	what	Allows landforms in this portion of Swamp Creek to be tested.
Areas 9 & 10		Two locations of	n either side of S	Swamp Creek.		Chosen at random in order to test the nature of deposits along this portion of Swamp Creek.
Areas 11 & 12 Centred on previ recorders sugge		eviously recorded sites where original gested PAD may be present.			Allows the banks on either side of Yorks Creek to tested, Includes AHIMS #37-3-0754 and #37-3-0761.	
Table 4-	2: P	reviously rec	orded sites	with PADs n	iot in	cluded in the test excavation program.
Site ID	-	Site name	GDA East	GDA North	-	Reason for not including in test excavation
37-3-0753	Ye	ork Creek 10	317865	6412266	Dist	urbed location. No potential noted during survey.
37-3-0752	3-0752 York Creek 9		317385	6411312	Disturbed location. No potential seen during survey.	
51-5-0140	TOIR CIEER S		511505	equart.	being tested to south (Area 3).	
37-3-0617	Bo	wmans Creek 5	318015 6409874 Disturbe		Dist	urbed location. No potential seen during survey.
37-3-0612	Be	ttys Creek 22	321138	6410296	Within what was once a swamp/pond? Low archae potential.	
37-3-0469	59 Bowmans/Swamp Creek Trenoh 1		318072	6409137	Highly disturbed and partially destroyed.	
37-3-0766	Bo	wmans Ck 10	316833	6412566	Low	archaeological values. Potential not visible al time o ey.
37-3-0764	Bo	wmans Ck 8	317205	6412329	Dist	urbance from buried pipeline. Will test nearby mans Ck 7 (Area 1).
37-3-0762	Bo	wmans Ck 6	317645	6410765	Dist	urbed by cultivation. Other testing sites nearby.
37-3-0760	Yo	ork Creek 17	317555	6411497	Dist	urbed location. No potential noted during survey.
37-3-0759	Yo	ork Creek 16	317827	6411497	Dist	urbed location. No potential seen during survey.

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4.3 RATIONALE BEHIND THE TEST EXCAVATION METHODOLOGY

4.3.1 Predicative model

The 2018 OzArk assessment of the Project Area has reached the following preliminary conclusions at this stage of the archaeological investigations:

- Stone artefact sites (isolated finds and artefact scatters) are the most commonly recorded site types in the area and that other site types, such as culturally modified trees, are very rare or non-existent
- Artefacts tend to associated only with the A-Horizon soil layers indicating a date in the Holocene period (i.e. 12,000 BP to the present)
- The predominant raw materials used for stone artefact manufacture are locally sourced mudstone and silcrete
- Excavations generally reveal a low artefact density but some spatial patterning has been
 observed: principally concentrations of artefacts interpreted as 'knapping areas'. Other
 archaeological features such as hearths are rare
- Sites tend to be associated with waterways and a discernible pattern has been observed whereby larger sites are associated with larger waterways offering permanent water supplies
- While all waterways have been equally studied, Yorks and Bettys Creeks appear to have attracted past Aboriginal occupation more often than Swamp Creek. Bowmans Creek would have been a major focus of past occupation but much of the evidence of this occupation has been removed by major channel migrations or intensive historical land use disturbances such as cultivation.

4.3.2 Research questions

While any test excavation program is limited in the level of research objectives it can achieve due to the restricted nature of the excavations, the test excavations for the Project will attempt to shed light on:

- Do the results support previous findings that occupation appears denser along Yorks Creek when compared to Swamp Creek?
- Do elevated landforms associated with Bowmans Creek preserve subsurface archaeological deposits?
- Are additional archaeological features, such as hearths, present in the Potential Additional Disturbance Area?
- How do the findings in terms of raw material use compare to other investigations in the vicinity of the Potential Additional Disturbance Area?

4.4 SAMPLING STRATEGY

The excavation program will be undertaken by archaeologists and representatives of RAPs and will include the following aspects:

- Twelve areas will be investigated by the test excavation program. Ten of these areas relate to newly identified PADs noted by OzArk during the pedestrian survey, and two are situated at previously recorded sites (AHIMS #37-3-0754 and #37-3-0761).
- The location for the proposed test excavation program is shown on Figure 4-3 and detailed locations of transects on Figure 4-4 to Figure 4-9.
- 3 Excavation squares will generally be spaced with a 10 m interval so that a broad representation of the landform will be obtained. However, should the PAD under investigation be small in size, the excavation squares will be excavated at a 5 m interval.
- 4. Prior to any excavation, the site will be recorded via digital photography.
- 5. A minimum of six 0.5 m x 0.5 m excavation squares in a straight 50 m transect will be excavated, although the methodology allows for additional squares to be excavated should the results indicate that this is warranted. The excavation squares will be positioned so as a valid sample of the impact area is obtained so that the archaeological values of the area can be characterised. Depending on the size of the investigation area, there may be only one transect or more. For specific methodology relating to each area, see Table 4-3.
- 6. Initial excavation squares will be excavated in 5 cm spits to determine whether archaeological stratigraphy is present. If not, spit size will be increased to 10 cm. If archaeological stratigraphy is present, this will be used rather than spits.
- The excavated material from all pits will be sieved on site using dry sieving through nested sieves of 6–8 millimetre (mm) and 2.5–3.5 mm mesh (which is considered to satisfy the 5 mm aperture wire-mesh sieve requirement).
- 8. Each excavator (by hand) will be responsible for sieving the deposit from their excavation square, retrieving the artefacts and, in conjunction with the supervising archaeologist, correctly recording their provenance. There could be some room for assistance with the sieving but a self-contained approach is preferable. Deposits will be sieved on to tarpaulins and the spoil used to backfill the excavation square.
- A standard excavation recording form will be used for each excavation square. Details will include; date, site recorder, spit number and depth, description of finds, description of soil, sketch plan of excavation (if relevant to show structure), end of spit levels, soil pH (when necessary or appropriate) and a bucket tally.

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- 10. It is envisioned that the excavation crew will consist of an Excavation Director, two assistant archaeologists, and at least six cultural heritage field workers. The excavator of each excavation square, in conjunction with the supervising archaeologist, will be responsible for ensuring all forms are correctly completed. It will be the archaeologists' responsibility to perform all photographic tasks, undertake any planning and section drawing if required and to ensure that a correct location of each excavation square is maintained.
- Given that the work will be reasonably physical, all persons participating on the test excavation program should be aware of this and be 'fit for work'.
- 12. If intact archaeological deposits or archaeological features are encountered, then additional archaeological excavation squares may be excavated to ensure documentation of any features and/or retrieval of artefacts and other relevant archaeological material. A feature would include a high density of artefacts within a square (such as in excess of 60 artefacts greater than 15 mm in size per m²), or a square containing rare or unusual artefacts (such as artefacts constructed from a stone type rarely represented in the area or less-common tool forms such as ground edge axes, hammerstones, etc.), or other signs of human occupation i.e. ground ovens/hearths or charcoal concentrations. Any expansion must adhere to Requirement 16 (5). Any expansion would only occur with the consent of the Excavation Director who will determine if an expansion is required to gain the appropriate scientific information.
- 13 Rather than expanding around an individual square as set out in Point 12, it is more likely that any expansion will involve setting out an additional transect at 90 degrees to a transect that has demonstrated significant and intact archaeological deposits. The perpendicular transect will be used to assist in determining the spatial spread of the subsurface deposits.
- 14. If appropriate (i.e. intact archaeological stratigraphy is recorded) section drawings will be completed for the appropriate excavation square(s). If no archaeological stratigraphy is recorded then digital photographs shall be taken of a representative section of each excavation square and a suitably representative drawing made of the excavation square section to show the soil profile.
- 15. Analysis of all excavated lithics will be made in order to determine the site's characteristics and to enable the site to be compared with other sites in the region. Analysis will also assist in determining what type of activities the Aboriginal people carried out at the site and their relationship with local resources (fauna, flora, water and stone). All artefacts will be analysed and selectively photographed. If charcoal from a secure stratigraphic context is obtained, it may be sent to a laboratory for Carbon 14 dating (subject to proponent's agreement).

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- 16. Select faunal remains, if recovered, will be analysed by a fauna specialist. Remnant shell and bone fragments may assist in determining what foods Aboriginal people may have eaten at the specific site and may elucidate possible foraging strategies. In conjunction with *in situ* stone tools, bone/shell fragments may also provide evidence of specific usage of stone tools for food processing.
- 17. Artefacts will remain in the care of OzArk until such time as the analysis is complete. Every effort will be made to analyse artefacts on-site to ensure that the artefacts do not have to leave the Project Area. However, in the case of large artefact numbers or artefacts requiring further research, it may be necessary to take artefacts off-site. If taken off-site, the artefacts would be the responsibility of OzArk and every effort would be made to return all artefacts to the MOC as quickly as is possible. At the completion of analysis (whether on-site or off-site) artefacts will be returned to the MOC where they will be kept as per the MOC ACHMP until Point 19 below is enacted.
- 18. The results of the test excavation program will inform the forthcoming AAIA. Excavation results will be used to advise further courses of action in relation to the management and mitigation options for the Project Area.
- Once all salvage activities for the Project Area are complete (should the Project be approved), artefacts will be amalgamated and managed as per the MOC ACHMP.

Table 4-3: Sampling methodology for text excavation program.

Area	Test excavation methodology				
Area 1	5 x 50 m transects, with each 50 m transect separated by 50 m. Transects will be positioned running along the spur, parallel to Bowmans Creek. Area 1 includes an area of PAD recorded during the survey. Decisions on the suitability of expansion will depend on the results of the first five transects.				
Area 2	4 x 50 m transects will be initially excavated to examine areas closet to Yorks Creek and a tributary to Yorks Creek located to the south of the PAD area. Decisions on whether to expand excavation will depend on results of the initial four transects.				
Area 3	2 x 50 m transects will be excavated so entire PAD area is investigated.				
Area 4	5 x 50 m transects will be excavated to investigate areas closest to Yorks Creek and Bowmans Creek, as well as landforms near the confluence of the two creeks.				
Areas 5 & 6	These PADs are too small for an entire transect. Instead two sets of two conjoined 0.5 m x 0.5 m pits will initially investigate these areas (see Figure 4-10).				
Area 7	2 x 50 m transects will be excavated running along the length of the terrace.				
Area 8, 9, 10, 11 & 12	1 x 50 m transect excavated initially at each location.				

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- 6 Where the 0.5 m x 0.5 m excavation unit is greater than 0.5% of the area then point 5 (ii) (above) does not apply.
- Not applicable. As the potential archaeological deposits are spatially large, less than 0.5% of the known potential archaeological deposits dimensions will be investigated.
- 7 The first excavation unit must be excavated and documented in 5 cm spits at each area —either PAD or site—being investigated. Based on the evidence of the first excavation unit, 10 cm spits or sediment profile/stratigraphic excavation (whichever is smaller) may then be implemented.
- Complies. See in Section 4.4 Point 6.
- 8 All material excavated from the test excavation units must be sieved using a 5 mm aperture wire-mesh sieve.
- · Complies. See in Section 4.4 Point 7.
- 9 Test excavation units must be excavated to at least the base of the identified Aboriginal object-bearing units, and must continue to confirm the soils below are culturally sterile.
- This requirement will be fulfilled in the field and all excavation squares will be excavated to the B-Horizon basal clays. To ensure that, as suspected, these basal clays are culturally sterile, several deeper probes at each excavation area will be excavated into these clays to ensure that they are, in fact, culturally sterile. The decision as to where these deeper probes are placed will rest with the Excavation Director.
- 11 Photographic and scale-drawn records of the stratigraphy/soil profile, features and informative Aboriginal objects must be made for each single excavation point.
- · Complies. See in Section 4.4 Points 9, 10, 14, 15 and 16.
- 12 Test excavations units must be backfilled as soon as practicable.
- Complies. See in Section 4.4 Point 8.

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- 13 Following test excavation, an Aboriginal Site Impact Recording form must be completed and submitted to the AHIMS Registrar as soon as practicable, for each AHIMS site that has been the subject of test excavation in accordance with the requirements of the Code.
- It will be the responsibility of OzArk to ensure that this requirement is met.

5 REFERENCES	
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OEH 2011	Office of Environment and Heritage. 2011. Guide to Investigating, Assessi and Reporting on Aboriginal Cultural Heritage in New South Wale Department of Environment, Climate Change and Water, Sydney.
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OzArk 2015	OzArk Environmental & Heritage Management Pty Limited. 2015. Archaeological Salvage. Liddell Coal Operations Development Modification 5. Report for Liddell Coal Operations.
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Umwelt 2013	Umwelt (Australia) Pty Limited. 2013. Part 4 – Bettys Creek Salva Program, Glendell Mine Surface and Subsurface Salvage under Section Aboriginal Heritage Impact Permil #2267. Report for Xstrata Mount Ower

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APPENDIX 6: TEST EXCAVATAGE CATALOGUE

Area	Transect	Square	Spit	Artefact type	Raw material	Integrity	Reduction	Size	Rotation	Platform type	Platform size	Termination type	Notes
1	1	1	2 (5-10cm)	F	MS	С	т	4	Р	S	3	SH	
1	1	1	2 (5-10cm)	F	MS	MF	т	2	ND	-	-	-	
1	1	3	3 (10-15cm)	F	MS	с	т	4	Р	s	4	F	
1	1	5	1 (0-5cm)	F	S	с	S	4	Р	S	4	F	
1	1	6	2 (5-10cm)	F	MS	с	т	2	R	S	2	SH	
1	1	6	3 (10-15cm)	F	MS	с	Р	3	ND	с	3	F	
1	1	6	3 (10-15cm)	F	MS	DF	т	2	Р	-	-	SH	
1	1	6	3 (10-15cm)	F	S	с	s	1	ND	S	2	F	
1	1	6	3 (10-15cm)	F	MS	с	s	3	R	с	3	F	
1	1	6	3 (10-15cm)	F	MS	с	s	4	R	s	3	F	
1	1	6	3 (10-15cm)	S	PW		Т	2	-	-	-	-	
1	1	6	4 (15-20cm)	FP	MS	с	S	4	R	с	5	F	
1	2	3	3 (10-15cm)	F	MS	DF	Т	2	ND	-	-	F	
1	3	1	3 (20-30cm)	F	MS	LB	S	4	ND	S	2	F	
1	3	3	2 (5-10cm)	F	MS	DF	Т	2	ND	-	-	F	
1	3	3	3 (15-25cm)	F	S	с	Т	2	R	S	2	F	
1	4	1	2 (10-20cm)	F	MS	с	S	2	ND	S	2	F	
1	4	1	2 (10-20cm)	F	MS	с	Т	2	R	S	2	F	
1	4	1	2 (10-20cm)	F	MS	с	S	2	ND	S	2	F	
1	4	1	2 (10-20cm)	F	MS	с	т	2	R	S	2	F	
1	4	2	2 (10-20cm)	F	MS	с	т	3	R	S	2	F	
1	4	2	2 (10-20cm)	В	S	с	s	3	Р	S	2	F	
1	4	2	2 (10-20cm)	F	MS	с	т	3	R	S	2	F	
1	4	2	2 (10-20cm)	В	S	С	s	3	Р	s	2	F	
1	4	3	3 (20-30cm)	F	MS	с	s	2	Р	с	2	F	Broken into two pieces
1	4	3	3 (20-30cm)	F	MS	с	s	2	Р	с	2	F	Broken into two pieces
1	4	4	1 (0-10cm)	s	MS		т	2					
1	4	4	2 (10-20cm)	F	MS	с	т	2	R	s	2	F	
1	4	4	2 (10-20cm)	F	MS	С	Т	2	R	S	2	F	

Area	Transect	Square	Spit	Artefact type	Raw material	Integrity	Reduction	Size	Rotation	Platform type	Platform size	Termination type	Notes
1	4	4	2 (10-20cm)	F	MS	LB	т	3	Р	S	3	F	
1	4	4	2 (10-20cm)	FP	MS		Р	4	ND	S	4	F	
1	4	5	2 (10-20cm)	F	Q	С	Т	3	R	S	3	F	
1	4	6	1 (0-10cm)	F	S	DF	т	4	R	-	-	F	
1	4	6	2 (10-20cm)	F	MS	С	S	2	Р	с	2	F	
1	4	6	2 (10-20cm)	F	MS	PF	Т	2	Ρ	с	3	-	
1	4	6	2 (10-20cm)	F	S	DF	Т	2	R	-	-	F	
1	4	6	2 (10-20cm)	BB	S	PF	т	2	Р	S	2	-	
1	4	6	2 (10-20cm)	S	S		т	2					
1	4	6	2 (10-20cm)	F	S	с	т	4	Р	S	5	F	
1	4	6	3 (20-30cm)	F	MS	С	S	3	R	S	4	F	
1	5	1	1 (0-10cm)	F	S	PF	Т	2	Ρ	F	3		
1	5	1	1 (0-10cm)	F	S	с	Т	3	Ρ	S	3	SH	
1	5	1	1 (0-10cm)	F	S	С	т	3	R	F	2	F	
1	5	1	1 (0-10cm)	F	MS	DF	т	3	R			SH	
1	5	1	1 (0-10cm)	F	MS	С	т	2	Р	S	3	F	
1	5	1	1 (0-10cm)	F	MS	DF	т	2	ND			F	
1	5	1	1 (0-10cm)	F	с	С	Т	2	Р	S	2	SH	
1	5	1	1 (0-10cm)	F	S	DF	Т	2	Р			F	
1	5	1	1 (0-10cm)	F	S	PF	Т	2	Р	F	3		
1	5	1	1 (0-10cm)	F	S	С	Т	3	Р	S	3	SH	
1	5	1	1 (0-10cm)	F	S	С	Т	3	R	F	2	F	
1	5	1	1 (0-10cm)	F	MS	DF	т	3	R			SH	
1	5	1	1 (0-10cm)	F	MS	С	т	2	Р	S	3	F	
1	5	1	1 (0-10cm)	F	MS	DF	т	2	ND			F	
1	5	1	1 (0-10cm)	F	с	С	Т	2	Р	S	2	SH	
1	5	1	1 (0-10cm)	F	S	DF	Т	2	Р			F	
1	5	1	2 (10-20cm)	F	MS	С	S	3	Р	S	2	F	
1	5	2	2 (10-20cm)	F	MS	С	т	2	Р	S	2	SH	

Area	Transect	Square	Spit	Artefact type	Raw material	Integrity	Reduction	Size	Rotation	Platform type	Platform size	Termination type	Notes
1	5	2	2 (10-20cm)	F	MS	С	Т	2	ND	S	2	F	
1	5	2	2 (10-20cm)	S	MS		Т	3					
1	5	3	1 (0-10cm)	F	S	С	Р	2	Р	S	2	SH	
1	5	3	1 (0-10cm)	F	MS	с	Т	1	Ρ	Р	1	SH	
1	5	3	1 (0-10cm)	В	S	DF	Т	2	Р			F	
1	5	3	1 (0-10cm)	F	S	с	т	4	R	S	3	F	
1	5	3	1 (0-10cm)	F	MS	С	т	1	Ρ	S	2	F	
1	5	3	1 (0-10cm)	F	S	с	Т	2	Р	S	2	F	
1	5	3	1 (0-10cm)	F	MS	с	т	1	Р	S	2	F	
1	5	3	1 (0-10cm)	S	S		Т	1					
1	5	3	1 (0-10cm)	F	S	MF	Т	2	ND				
1	5	3	1 (0-10cm)	F	MS	С	Т	3	Р	S	3	F	
1	5	3	1 (0-10cm)	SS	с		т	4	R	F	5	F	
1	5	4	2 (10-20cm)	F	MS	С	Т	2	Р	S	3	F	
1	5	4	2 (10-20cm)	F	MS	С	Т	2	Р	S	2	F	
1	5	4	2 (10-20cm)	F	MS	с	т	2	R	S	3	F	
1	5	4	2 (10-20cm)	F	MS	С	Т	2	Р	S	2	F	
1	5	5	1 (0-10cm)	F	S	с	Т	2	R	S	2	F	
1	5	5	1 (0-10cm)	F	S	PF	т	2	Р	s	2		
1	5	5	1 (0-10cm)	F	S	DF	Т	2	Р			F	
1	5	5	1 (0-10cm)	F	S	с	т	4	R	S	2	Р	
1	5	5	2 (10-20cm)	F	QZ	с	т	3	Р	S	3	F	
1	5	5	2 (10-20cm)	F	S	с	т	3	Р	S	3	F	
1	5	5	2 (10-20cm)	F	S	PF	т	3	Р	s	4		
1	5	5	2 (10-20cm)	F	MS	с	S	3	R	S	5	F	
1	5	5	2 (10-20cm)	F	Q	С	Т	1	Р	S	2	F	
1	5	5	2 (10-20cm)	F	MS	с	S	2	R	с	2	F	
1	5	5	2 (10-20cm)	F	S	PF	Т	2	Р	S	2		
1	5	5	2 (10-20cm)	F	S	DF	т	2	Р			F	

Area	Transect	Square	Spit	Artefact type	Raw material	Integrity	Reduction	Size	Rotation	Platform type	Platform size	Termination type	Notes
1	5	5	2 (10-20cm)	F	S	DF	т	2	Р			F	
1	5	5	2 (10-20cm)	F	S	PF	т	1	Р	S	2		
1	5	5	2 (10-20cm)	F	0	С	т	2	R	S	3	F	Chalcedony
1	5	5	2 (10-20cm)	BB	MS	С	т	2	Р	F	2	F	
1	5	5	2 (10-20cm)	BB	S	с	т	3	Р	F	3	F	
1	5	6	1 (0-10cm)	F	MS	с	S	3	ND	S	4	F	
3	1	3	1 (0-10cm)	F	S	DF	Т	2	Р			F	
3	1	5	1 (0-10cm)	F	S	LB	т	3	R	S	4	F	
3	2	3	1 (0-10cm)	В	0	С	т	3	Р	S	3	F	Porcellanite
3	2	3	1 (0-10cm)	F	0	с	т	3	R	S	2	F	Porcellanite
3	2	3	1 (0-10cm)	F	0	DF	т	3	Р			F	Porcellanite
3	2	3	1 (0-10cm)	F	0	PF	Т	2	Р	S	3		Porcellanite
3	2	4	2 (10-20cm)	F	MS	MF	Т	1	ND				
3	2	4	2 (10-20cm)	F	MS	DF	т	2	R			F	
3	2	5	2 (10-20cm)	F	S	с	Т	2	Р	S	2	F	
3	2	5	2 (10-20cm)	F	S	DF	т	2	R			F	
4	1	1	2 (10-20cm)	F	S	С	т	2	Р	S	2	F	
4	1	4	1 (0-10cm)	F	S	С	т	1	Р	S	2	F	
4	1	6	3 (20-30cm)	с	MS	С	S	5	R				
4	1	6	3 (20-30cm)	АН	V	С	Р	6					
4	2	3	2 (10-20cm)	F	S	С	т	4	R	S	4	F	
4	2	3	2 (10-20cm)	F	MS	PF	т	4	Р	F	4		
4	2	3	2 (10-20cm)	F	MS	MF	т	3	Р				
4	2	3	2 (10-20cm)	В	MS	PF	т	2	Р	CR	3		
4	2	3	2 (10-20cm)	F	MS	MF	т	2	Р				
4	2	3	2 (10-20cm)	S	S		т	2					
4	3	4	2 (10-20cm)	с	S	с	s	4	R				
4	3	5	2 (10-20cm)	F	MS	DF	s	3	ND			F	
4	3	5	3 (20-30cm)	S	MS		т	1					

Area	Transect	Square	Spit	Artefact type	Raw material	Integrity	Reduction	Size	Rotation	Platform type	Platform size	Termination type	Notes
4	3	6	2 (10-20cm)	BB	S	С	т	4	Р				
4	3	6	5 (40-50cm)	F	S	С	т	3	Р	S	2	F	
4	4	2	3 (20-30cm)	F	MS	С	S	3	R	F	5	F	
4	4	4	1 (0-10cm)	S	S		т	1					
4	4	4	1 (0-10cm)	В	S	PF	т	2	Р	S	3		
4	4	4	2 (10-20cm)	F	S	PF	Т	3	Р	S	Р		
4	4	4	2 (10-20cm)	В	S	MF	Т	2	Р			F	
4	4	4	2 (10-20cm)	F	S	DF	т	2	Р				
4	4	4	2 (10-20cm)	F	S	с	Т	2	Р	S	3	F	
4	4	4	2 (10-20cm)	S	MS		т	2					
4	4	4	2 (10-20cm)	F	S	PF	т	2	R			F	
4	4	4	2 (10-20cm)	S	MS		Т	1					
4	4	4	2 (10-20cm)	F	MS	DF	Р	2	ND			F	
4	4	4	3 (20-30cm)	S	S		т	1					
4	4	5	2 (10-20cm)	В	S	PF	т	2	Р	S	2		
4	4	5	2 (10-20cm)	В	S	DF	т	2	Р			F	
4	4	5	3 (20-30cm)	F	S	С	т	1	Р	s	3	F	
4	4	6	2 (10-20cm)	F	S	DF	т	3	Р			F	
4	4	6	4 (30-40cm)	S	MS		Т	1					
4	4	8	2 (10-20cm)	М	S	с	Т	2	Р				
4	4	8	2 (10-20cm)	F	S	С	s	3	Р	s	2	F	
4	4	8	3 (10-20cm)	S	Q		т	2					
4	5	1	1 (0-10cm)	F	S	DF	т	3	Р			F	
4	5	1	2 (10-20cm)	В	S	DF	т	3	Р			F	
4	5	1	2 (10-20cm)	F	S	с	т	1	ND	F	4	F	
4	5	1	2 (10-20cm)	В	S	MF	т	2	Р				
4	5	1	2 (10-20cm)	F	S	с	т	3	Р	CR	3	F	
4	5	1	2 (10-20cm)	F	S	PF	т	2	Р	s	3		
4	5	1	2 (10-20cm)	F	S	PF	т	2	R	CR	4		

Area	Transect	Square	Spit	Artefact type	Raw material	Integrity	Reduction	Size	Rotation	Platform type	Platform size	Termination type	Notes
4	5	1	2 (10-20cm)	F	S	с	т	2	Р	S	2	F	
4	5	1	2 (10-20cm)	S	S		т	2					
4	5	1	2 (10-20cm)	В	S	DF	т	2	Р			F	
4	5	1	2 (10-20cm)	F	S	PF	Т	1	ND	S	3		
4	5	1	2 (10-20cm)	F	S	с	т	1	ND	S	1	F	
4	5	1	2 (10-20cm)	В	S	DF	т	2	Р			F	
4	5	1	2 (10-20cm)	F	S	PF	т	1	ND	F	2		
4	5	9	1 (0-10cm)	S	S		S	3					
4	5	9	3 (20-30cm)	F	S	PF	т	2	Р	S	2		
4	5	9	3 (20-30cm)	F	MS	DF	S	2	Р			F	
4	5	9	3 (20-30cm)	F	MS	С	S	2	Р	с	2	F	
4	5	9	4 (30-40cm)	F	S	DF	т	2	Р			F	
6	1	1	3 (10-15cm)	В	S	MF	т	2	Р				
6	1	2	4 (15-20cm)	F	MS	DF	т	1	ND			F	
6	1	3	1 (0-5cm)	F	MS	DF	т	2	Р			F	
6	1	4	2 (5-10cm)	F	S	PF	т	1	ND	S	2		
7	2	1	3 (20-30cm)	F	S	MF	т	3	Р				
7	2	2	3 (20-30cm)	F	S	PF	т	2	Р	F	2		
7	2	3	1 (0-10cm)	FP	MS		т	3	R	S	4	F	
7	2	3	2 (10-20cm)	F	S	С	S	4	R	S	3	F	
7	2	3	2 (10-20cm)	F	S	с	т	2	R	Р	1	F	
7	2	4	2 (10-20cm)	F	MS	С	т	3	Р	S	3	F	
7	2	4	2 (10-20cm)	F	Q	DF	т	2	ND			F	
8	1	6	1 (0-10cm)	FP	MS		S	4	R	S	5	F	
9	1	5	2 (10-20cm)	F	MS	с	S	2	Р	S	2	F	
10	1	2	2 (10-20cm)	S	S		т	2					
10	1	5	2 (10-20cm)	F	MS	С	т	4	Р	S	5	F	
10	1	5	2 (10-20cm)	F	MS	С	т	4	Р	S	3	SH	
11	1	4	1 (0-10cm)	F	S	DF	т	2	R			F	

Area	Transect	Square	Spit	Artefact type	Raw material	Integrity	Reduction	Size	Rotation	Platform type	Platform size	Termination type	Notes
12	1	2	1 (0-10cm)	F	MS	с	Т	2	Р	S	2	F	
12	1	2	1 (0-10cm)	F	S	DF	т	1	NA			F	
12	1	2	2 (10-20cm)	F	MS	DF	т	1	R			F	
12	1	2	2 (10-20cm)	F	S	MF	т	2	Р				
12	1	2	2 (10-20cm)	F	S	с	S	3	R	S	4	F	
12	1	5	1 (0-10cm)	F	С	С	S	3	Р	С	4	F	

11.6 Contact History at Ravensworth Estate by Dr Mark Dunn



Ravensworth

Contact History

Dr Mark Dunn Historian August 2019

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European Arrival in the Hunter Valley

Europeans first began to enter into the Hunter Valley from as early as the late 1790s as first escaping convicts from Sydney and then search parties came through what is now Newcastle harbour on their way north. Reports on the coal deposits seen in the cliffs around the harbour entrance and the stands of timber along the river that ran into it soon meant commercial traders from Sydney were also making trips to gather coal and timber. In 1801 a small convict camp was established to mine the coal, and although this was abandoned in 1802, by 1804 a permanent penal station had been established.

From 1804 onwards convict timber getters working out of the Newcastle penal station began to explore the reaches of the Hunter River looking for stands of timber to log. Between 1803 and 1821, the penal station and its outlying camps around Maitland were the only permanent settlements of Europeans in the Hunter, with the remainder off limits to European settlement. Despite this restriction, Europeans and Aboriginal people had early contact around Newcastle and at points inland around Maitland and Morpeth. By 1810 convict timber camps were established along the river around what was known as Wallis Plains, close to present day Maitland. From here convicts ventured further inland in their search for timber.¹ Contact with Aboriginal people was reported around these camps and by those convicts working in the bush. In July 1819 when Governor Macquarie toured the penal station and its camps he noted that the cedar gang based at what is now Maitland had a "military guard of a Corporal and three privates to protect them from the natives".²

Exploration of the Middle Hunter Valley 1819-1822

In November 1819, a party of eight men from Windsor on the Hawkesbury, being six Europeans led by John Howe and two Aboriginal guides, emerged from the Bulga Ranges on the southern edges of the Hunter Valley onto alluvial plains close to present day Jerry's Plains. John Howe, a constable from Windsor, had set out to follow the paths of two previous parties who had attempted to get through the mountains to what they were hoping was an alternative route over the Blue Mountains to Bathurst. His party had left Windsor in late October and arrived at the Hunter River on 5 November. In reports to Governor Macquarie, Howe noted the potential for grazing in this new valley, noting that the country was thinly timbered, with twenty trees per fifty acres in some areas. Although apparently keen to explore further, the party came into contact with a number of Aboriginal men, some of whom appeared to be tailing the group and observing them as they moved along the river. Howe's two guides were alarmed at the group's appearance, to the point where they refused to continue. After one more night at their camp, the party turned back into the mountains and returned to Windsor.³

On 6 March 1820, Howe set off for a second expedition, this time with a party of sixteen including two Aboriginal guides, at least one, named Myles, who had accompanied him on the first journey. The second man's name was Mullaboy.⁴ The expedition reached the Hunter River on 15 March. This time they proceeded along the banks until they came across convict timber getters at Wallis Plains,

confirming that they were, and had previously been, in the Hunter Valley. In a letter to Governor Macquarie, Howe reiterated the grazing potential of the land he had passed through, commenting that it was 'as fine a country as imagination can form'. Returning to Windsor, Howe blazed the trees along the path to mark the track he had taken. He was promised a grant of 700 acres at Patricks Plains (now Singleton) for his discoveries, with other members of his party also taking up land around the Singleton area. The land promised to Howe marked the beginnings of European expansion into the middle valley, while his marked path made for an easy escape route for runaway convicts from the timber camps around Wallis Plains, ending the isolation that had been one of the penal stations main advantages and hastening its removal to Port Macquarie in 1823.

By August 1822 Howe was on his land at Patricks Plains, with other settlers from Windsor also using his track to access the Valley. Some of these earliest forays were unofficial, with small farmers from Windsor trying to get onto land before large areas were alienated through grants. As numbers of settlers increased, the newly arrived governor Sir Thomas Brisbane instructed Surveyor General John Oxley to begin surveying land around Newcastle and along the Hunter River for partition into land grants. Oxley in turn instructed Assistant Surveyor Henry Dangar to undertake the survey, which he started on 14 March 1822.

Dangar's Survey and the European occupation 1822-1826

For five years Dangar worked on the survey (refer Figure 1). In July 1824 he reached the area around what is now Ravensworth, in the County of Durham. He named Fal Brook (now Glennies Creek) and Foy Brook (now Bowmans Creek) and dividing the land around Ravensworth into squares ready for settlement in what was named the Parish of Liddel (sic).⁵ A number of settlers had already been granted land in the Parish of Ravensworth prior to the survey. A 2597 acre grant had been made to the Church and School Estate, while Ebenezer Bunker had received 600 acres in March 1821, William Powditch had been granted 2000 acres in July 1824, with a further 500 acres purchased in May 1825, Captain John Brabyn had received his 800 acres in June 1824 and James Bowman had taken up 2560 acres at the same time. Bowman was granted a further 4600 acres and purchased an extra 5000 in May 1825. The only land then surveyed in the Parish of Liddell adjacent to the Parish of Ravensworth was land set aside as the Church and School Estate of 2560 acres.⁶ (See Figure 1) In 1828, Dangar produced a large scale map of the surveyed areas of the Hunter Valley, from Newcastle on the coast inland to lower slopes of the Liverpool Ranges, which was accompanied by an Index and Directory. In his directory, Dangar described both the Parish of Ravensworth and of Liddel. Ravensworth was noted as being "lightly timbered, well watered, and though (except the vallies [sic]) a thin iron stone gravelly soil, yield a healthy and good sheep pasture" with Liddell also "an excellent tract of open, sound and deep loam" and "a most desirable tract for winter or spring sheep or cattle grazing". The neighbouring parish of Vane was also good country with desirable pasture extending along Fal Brook.⁷


Figure 1: Detail of Dangar's 1828 map showing the County of Durham and the Parishes he surveyed from 1822-1827. The Parish of Ravensworth and Liddel are shown. The numbers correspond to the portions surveyed by Dangar. In the Parish of Ravensworth these are [1] Church and School Estate [2] Ebenezer Bunker [3+4] William Powditch [5] John Brabyn [6-8] James Bowman (Source: NLA)

James Bowman had arrived in New South Wales in 1819 having been appointed Colonial Surgeon to replace D'Arcy Wentworth. Already a trained naval surgeon, Bowman was put in charge of the Sydney Infirmary (hospital). In 1823, Bowman married Mary Isabella Macarthur, the daughter of John and Elizabeth Macarthur. Macarthur gave Mary a dowry of 2,000 sheep and 200 cattle and Bowman soon after applied for a land grant. With the stock in hand, Bowman applied for and received a total of 12,160 acres in three portions, bounded by Foy Brook and Yorks Creek, which ran into the Hunter River. Bowman named his grant Ravensworth. Bowman was visiting the Hunter from August 1824 and occupied the estate late in 1824. He likely sent his convicts and overseer first to clear land and start the construction of the original house and associated outbuildings. By mid-1825 the Ravensworth estate was described by Peter Cunningham, another settler in the district (his estate was Dalswinton near present day Denman), as being partly fenced, under cultivation with extensive buildings for packing and sorting wool, with Bowman's flocks being numerous and amongst the finest cross-breeds in the colony.⁸ In a letter to the Colonial Secretary in November 1826 Bowman described his estate as having "Sheep sheds, wool house, stores, cottage, kitchen, huts for ten men etc, which cost me Two Hundred & Sixty Pounds", with three miles of fence and 34 convicts.9

The location of Bowman's first cottage and its collection of outbuildings at Ravensworth was on the high ground between the two creeks, with views back across the estate, approximately 850m to the west of the current homestead. The land was made up of a series of gentle hills and alluvial flats,

with Foy Brook (Bowmans Creek), Yorks Creek and other small creeks and rivulets across the farm. Bowman was not alone in this part of the valley, although his homestead had no neighbours in sight, with the surrounding hills blocking direct views. To the east, (approximately 11km in a straight line) Robert Lethbridge, a Lieutenant in the Royal Navy, had taken up his 1000 acre estate named Bridgman on Fal Brook (Glennies Creek) by May 1825. As Lethbridge spent much of his time in Parramatta where he was a member of the local bench of magistrates, the estate was managed by Richard Alcorn, who himself had a small parcel of 60 acres close by also on Fal Brook. Alcorn's farm adjoined the 60 acres of Duncan Kennedy, promised by Governor Macquarie in 1821 but later passed to John Cuneen (who appears on the Crown Plan for the area) in 1836, with the 100 acres of James Chilcott next to that. All three properties had frontage to Fal Brook. Alcorn and Chilcott both had small huts on their properties, as did Lethbridge. (Refer Figures 2 and 3)

The main land use for this part of the Hunter was grazing: sheep, cattle or a mixture of both. In the Census of 1828 it was noted that Bowman had 500 acres cleared, 40 under cultivation, 2 horses, 362 cows and 3715 sheep, Alcorn had 12 of his 60 acres cleared, with 9 acres under cultivation, 1 horse and a herd of 90 cattle and Chilcott (with a total of 200 acres on different grants) had 40 cleared, 30 cultivated, 10 horses, 100 cattle and 400 sheep.¹⁰

With convict servants and shepherds, one of the first tasks was to enclose the land or at least portions of it, for use as pens and to stop stock wandering into neighbouring properties. The building of fences and the restriction of access across the land impacted directly on local Aboriginal populations, particularly as the farms and estates grew both in size and in number. The numbers of Europeans, and more particularly their stock animals, had grown exponentially in the Hunter since the granting of the first estates in 1821-22. Analysis of stock numbers in musters and census data shows the enormous increase between 1821 and 1828. Table 1 outlines the increases.

Year	Land granted in acres	Sheep	Cattle
1821	638	376	236
1825	67,798	8,919	4,495
1828	1,537,488	119,391	46,805

 Table 1: Increases in the area of land granted, sheep and cattle in the Hunter Valley 1821-1828¹¹

Attacks on Settlers: Greig, Pike and Forbes

Tensions between Aboriginal people and settlers had been apparent since the first grants were made in 1821-22, with attacks on isolated huts and raids into ripening maize crops recorded around Newcastle, Wallis Plains (Maitland) and Patricks Plains (Singleton) between 1822 and 1824. Although some assaults were alleged, most of the incidents were concerned with the taking of maize crops with direct contact and violence a rarity.¹² However, in late 1825 circumstances changed with the fatal attack on an isolated hut near present day Denman. In November 1825 it was reported that Robert Greig, cousin of the settler James Greig who had a farm on the banks of the Hunter River, had been attacked and killed in his hut and a stockman on the same property was missing,

presumed dead.¹³ As the details came to light, it became apparent that the attack was provoked by Greig, who had, according to his cousin James, taken an Aboriginal man at the property and beaten him, which had "irritated the tribe he belonged to, and caused Robert Greig's untimely end".¹⁴ Further allegations that Greig had attempted to drive the Aboriginal people off the land were told to the missionary Reverend Lancelot Threlkeld and reinforced the likelihood that the attack was targeted and in response to bad treatment.¹⁵

Soon after Greig was killed, two other unnamed stockmen were speared and another, the convict of Captain John Pike, saved only by the arrival of two other Europeans. Pike's estate, Pickering, was on the Hunter River close to its junction with the Goulburn River to the west of Ravensworth and close to Greig. The killing of Greig was the first recorded in the area and prompted the then Commandant in Newcastle, Captain Allman to order a detachment of soldiers to proceed to the area in June 1826. Ten men, accompanied by bush constables headed inland to apprehend the identified Aboriginal assailants. None were captured in this action. While the soldiers were in the area, Edinglassie the estate of George Forbes just north of Pike's on the river was also attacked and a shepherd speared. The shepherd recovered from the attack. In response, *The Australian* newspaper recommended that "such decisive measures to be adopted that will convince those sable depratadors that they cannot attack the peaceable Settlers with impunity".¹⁶

Attacks on Settlers: Bowman, Chilcott and Ogilvie

On 18 June 1826 two convicts assigned to Bowman were killed by Aboriginal attack, one killed in the bush and another in a hut on the estate, the whereabouts of which was not reported.¹⁷ Soon after, the hut of James Chilcott on Fal Brook (Glennies Creek) was raided. Chilcott wrestled with one of the attackers, a man known as Cato, over a musket, and managed to drive the rest away with the assistance of other farm workers.¹⁸ In the same period two of Bowman's men, working in the bush on the fences around Ravensworth were attacked, with both men severely wounded, one receiving seven spear wounds and being taken to the hospital in Newcastle.¹⁹ The wounded man was interviewed by Reverend Threlkeld in the hospital over the incident, saying he had been speared in the back while working, then chased and set upon with cudgels.²⁰







Figure 3: Crown Plan 66-663 showing the position of Chilcott's and Alcorn's farms on a bend in Fal Brook (Glennies Creek) (Source: LPI)

With the violence now appearing to escalate, the soldiers who had been despatched in June were joined by a detachment of the newly formed Mounted Police under the command of Lieutenant Nathaniel Lowe. The Mounted Police were soldiers, not civilian police and remained on regimental pay, although the cost of the horses was borne by the colony. They had been established by Governor Brisbane to act against bushrangers as well as Aboriginal attackers, with half the detachment sent to Bathurst in November 1825 and the other half to Wallis Plains for action in the Hunter Valley.²¹ Bushranging in the Hunter Valley had emerged as an issue since a gang of runaway convicts known as Jacob's Mob had rampaged around present day Lochinvar and the hills to the north in the first half of 1825. In August, Lieutenant Lowe's detachment, travelling with local settlers John Lanarch from Patricks Plains and James Glennie, a neighbour of Bowman's, had come across and captured a number of Aboriginal men they suspected of having been involved in the attack at Chilcott's: first a single man, and then a group of at least seven men and one boy, including Cato. The captured group were tethered together and led by one of the mounted troopers to Chilcott's farm, where a number of them, including Cato, were identified as having been involved in the raids on Chilcott as well as the attack on Bowman's men, and then onto to Lethbridge's, although here none were identified.²² With the identification made, the three youngest were released and the rest restrained to be returned to Wallis Plains. Of the Aboriginal men taken, five including Cato and the first unnamed man were killed in the bush, attempting to escape from custody according to Lowe and his men. One was shot close to James Glennies hut on Fal Brook, with Glennie reporting hearing a shot soon after he left the party near his house. That is all the men reported captured, except the boys, were killed.²³

Despite an inquiry established by Governor Darling and his attorney general Saxe Bannister, it was not known exactly where all the killings had taken place as each man interviewed gave a slightly different version of events. In January 1827, Threlkeld wrote to Bannister with further details of the events as told to him by an unnamed witness in the presence of another settler John Cobb. The witness said that one of the Aboriginal men suspected of involvement in the wounding of Bowman's men was captured and bought to Bowman's hut. Here he was secured with a rope around his neck, and then under armed guard he was taken one mile from the hut into the forest, made to climb a tree and tie the rope to an extended branch, whereupon he was shot. Wounded by the Europeans he was let fall and left hanging.²⁴ Based on the date (1826) the hut referred to was the original Bowman homestead, on the ridge line above the creeks to the west of the later, and current, Ravensworth house complex of which was built c1832.

As the details of the various actions emerged Lowe was put on trial not for the killings in the bush of the six men captured, but for the wilful murder of another Aboriginal man, Jackey-Jackey who had been returned under arrest to Wallis Plains in July and then allegedly executed on 1 August 1826. Jackey-Jackey, otherwise known as Commandant or as Jerry, was taken as a prisoner by the mounted police during July as one of those involved in the killing of Bowman's shepherds in June 1826. This was the first time a military officer had been brought before the courts for actions against Aboriginal people. Despite eye witness accounts of the shooting at Wallis Plains, Lowe was found not guilty in May 1827 and no further action was taken in relation to the other men captured and shot.²⁵

Lowe's incursion appeared to have quelled the violence and Darling ordered the mounted police withdrawn to Wallis Plains, although a small detachment remained stationed at James Glennies property on Fal Brook.²⁶

In the last week of August at Merton, the property of William Ogilvie, a war party of upwards of 200 warriors suddenly appeared while William was away. The house was occupied by his wife Mary and children. The men had appeared in response to one of their own having been arrested by the mounted police at Merton. The police had enticed the men to Merton under the pretence of looking for guides to capture bushrangers. When they had approached they had been seized. One of the men was named Jerry. Although Mary convinced the mounted police that the men were not involved in any local violence, it was the second time this had happened in as many weeks, with two other men already taken to Newcastle. When the warriors approached, it was the released man Jerry who led them. Angry at his own treatment and suspicious as to why he had been released but the earlier two had not, Jerry had returned. But, confident in their friendship between them, Mary and her son William spoke to Jerry and the others in their own language reassuring them they had tried to help and were friends. Jerry in turn spoke to the assembled warriors and, telling Mary to tell the soldiers not to interfere with them, the party moved off with no further incident.²⁷

Attacks on Settlers: Richard Alcorn

On August 28 1826, another group of approximately 15 Aboriginal men gathered at the hut of Richard Alcorn, overseer for Captain Robert Lethbridge on the Bridgman estate at Fal Brook (See Figure 3). The small hut stood just over 800 metres along the creek line of Fal Brook from Chilcott's property, and it was typical of the back country workers' huts of the period, with two rooms, one large outer room with a fireplace and a smaller inner room with a bed. There was a single entry door and three windows, two in the large and one in the small room. The doorway had no door and the windows no glass or shutters (See Figure 4).²⁸

Around midday, John Woodbury, a servant to Thomas Cullen at Pitt Town, who was minding Cullen's cattle on agistment at Fal Brook, arrived at Alcorn's hut to find the Aboriginal men already there. Alcorn's wife Charlotte, her baby daughter Sarah Jane and young son Richard were inside. Woodbury sent the boy off to fetch two men working nearby, while Charlotte offered the assembled group some kangaroo to eat, which they took and roasted on a fire set for the purpose. Young Richard, who had been followed by one of the Aboriginal men, soon returned with the two men. Asking for bread and maize, a few of the gathered warriors came into the hut, but Woodbury reported they showed no signs of violence in word or action at this point. At around 4pm, Richard Alcorn arrived at the hut and on recognising three men believed to have been involved in the raid on Chilcott's hut, decided with Woodbury that it was not safe having so many armed Aboriginal men around the huts and told them they had to go. Woodbury testified that at this point, the three men called out and those at the fire rose and advanced on the hut. The Europeans dashed for the inner room for their muskets, while Charlotte, the baby and Richard junior got under the bed for protection.

With no door and no shutters the hut was particularly vulnerable to attack and soon enough spears were coming in through the openings. Before Woodbury could discharge his musket he was struck with a spear in his hand, forcing him to drop the weapon while he dragged out the spear. Henry Cottle, one of the workers, was struck in the left side and fell dead. As Woodbury regathered his musket the second man, Morty Kernan was also hit with a spear while firing from the inner doorway. Spears continued to fly in through the doorway and the windows, as Woodbury and Alcorn fired back out. As the shot for the muskets was in the outer room, both men were firing only with powder, hoping to fool their attackers into thinking they had lethal weapons. With spears exhausted the Aboriginal raiders began throwing large stones, one of which struck the wounded Kernan in the head and killed him.

In desperation, Alcorn had tied a bayonet to a long pole and used this improvised pike to thrust out at the Aborigines now in the outer room, while Woodbury took a large wooden box to block the window. The box was soon smashed in with clubs and stones and Alcorn was knocked senseless. At this the attack began to break up, as a shepherd, alerted by the shooting, was observed by the attackers going to fetch the mounted troops who were stationed at Glennie's property nearby. The adjoining workers' huts were raided for bedding and blankets and the warriors retreated into the bush. Not realising that the troops had been alerted, Woodbury tried to raise the alarm by firing his musket twice more and then once again sent young Richard Alcorn to Chilcott's farm. The mounted troops pursued the group but did not find them.²⁹

G D Door (Door into inner Moutan of De Window pouter F- Dater Rood G - Sumer Room H - Foreplace Figure 4: The layout plan of Alcorn's hut as presented to the inquiry into Aboriginal violence in the Hunter Valley. The plan shows the various doors and windows where the action took place in August 1825. (Source: SLNSW Government Despatches Vol. 8 A 1197)

Robert Scott, the nearest magistrate, arrived the following day and saw broken spears lying all around the area, stones in the hut and the smashed box used in the defence. According to Scott, the warriors were not those involved in other incidents. Nevertheless, Woodbury identified four of them by name, including three from the attack on Chilcott's: Ball, Murray and Togy, another man named Brandy, and a boy captured and released on Glennie's farm nearby. The others he did not know well, although he felt he should.³⁰ The response to this attack was swift. Two days after the attack, Robert Scott gathered a party of men, including five mounted police, four settlers and four Aboriginal trackers from his estate at Glendon near Singleton to pursue the attackers. Three days later, on 2 September, Scott's party came across an Aboriginal camp approximately 20 miles (32 kilometres) from Alcorn's hut. Two versions as to what happened were subsequently reported. Scott, in his report, claimed that they came on the camp in the morning of the third day, whereupon a skirmish occurred, with one of the European's in his party was speared in the face, two Aborigines killed and an unknown number wounded. Scott reported that he had been told this by an Aboriginal woman captured during the action.³¹

The Australian newspaper however provided a more detailed account as reported to them: the pursuing group led by Scott came on the camp in the evening, guided in by the light of the camp fires. Two of the party, one European and one Aboriginal tracker, each with a musket, were sent forward to reconnoitre the site, but being seen they fired into the camp and then retreated behind trees to reload. The Aboriginal tracker was struck in the face with a spear, but was not killed, and the rest of the party rushed forward to join the fight. As each was armed with a musket, their firing resulted in the death of eighteen Aborigines and the capture of a man and a woman.³² Roger Millis, in his book *Waterloo Creek* suggested that the discrepancies in the descriptions points to two separate incidents, one occurring in the morning and another in the afternoon.³³ There is no evidence to suggest two raids, as Scott makes no further reference. More likely is that Scott had played down the event in his original report, whereas *The Australian*, through other informants had reported a fuller version. The report describes the chaos that ensued during the raid, with close quarter fighting against a group surprised at their camp.

The fear of more attacks amongst the settlers grew and in September a petition, signed by eleven landholders calling for the replacement of the mounted police with others or the reversal of the order to recall them in order that the district might be safe from future rumoured attack. James Bowman of Ravensworth was the first signatory, followed by near neighbour Peter McIntyre of Segenhoe, John Cobb who had been present when Threlkeld learnt of the hanging at Ravensworth, William Ogilvie whose own farm Merton had been the scene of a threatened attack by 200 warriors, as well as other landholders from lower down the Valley around present day Singleton, Lochinvar and Maitland.³⁴ Chilcott and Alcorn, the only ones at the time to have had direct contact with the violence were not signatories, nor was Glennie. While the Attorney General Saxe Bannister advised Governor Darling to deploy the military as a sign of the Government's overwhelming force, Darling dismissed the settlers concerns and the petition, commenting that the threat was minor, with few Aboriginal people in comparison to the settlers. He also advised that if the petitioners were so worried then they should consider spending more time at their properties rather than in Sydney, where he understood most were during the recent attacks. Further, their presence on the estates would enable them to counsel their servants and prevent the 'irregularities' that he suspected was the root cause of much of the trouble. He did however declare that if settlers united to take vigorous measures in their defence, they would prove more effective than a military force in protecting themselves, and that they would receive every necessary support for their exertions.³⁵

Ongoing Clashes 1826-1827

Following Scott's attack on the camp site, one more serious incident was recorded in the area. In his summary of events in the Valley, Robert Scott reported to the Governor on 3 October 1826 that a body of warriors attacked some fencer's working on Bowman's estate, the third time Bowman's had been targeted. Five fencers were alerted by the barking of their dogs to the approaching warriors and managed to get to their weapons before the attack, wounding an Aboriginal man but sustaining no injuries themselves. ³⁶

In late 1826 John Elliott, a blacksmith at Thomas Macqueen's Segenhoe estate (close to modern day Scone), avoided an ambush by Aboriginal men when warned by another, with whom he was friends about the plan. In November the child of John and Catherine Hunt at Patricks Plains was reportedly abducted by a man known to Europeans as Bit-O-Bread and to his own people as Byirybyrry. Hunt

was a district constable at Patricks Plains. In March 1827 a large group of warriors surrounded the hut of convict George Claris at Redbournberry (near Singleton), including Byirybyrry who was seeking vengeance for the wrongful accusation of kidnapping. The arrival of two more Europeans at Claris's hut averted any attack. The Aboriginal men declared they would assemble 1000 warriors to attack the valley if Byirybyrry came to harm.³⁷

Three days after this event, on 28 March 1827, the last series of what did turn out to be the end of the violence occurred. Samuel Owen, an overseer for James Bowman was returning to Ravensworth having been searching for strayed cattle. At Fal Brook (Glennies Creek), close to home, Owen was surrounded by a party of 15 Aboriginal men, one he recognised as Jackass (likely a man called Girrogan from Patricks Plains, identified by that name on the same blanket returns as Byirybyrry) who had caused 'so much mischief about Dr Bowman's'. The men asked Owen if he was 'the big constable' and when he said yes, they surrounded him in a circle, with Jackass and Owen in the centre–Jackass flourishing a waddie (club) and Owen parrying with his musket. The contest was stopped by the arrival of a woman, Cobborn Mary, the wife of Byirybyrry, who spoke to the men and convinced them to leave, likely saving Owen's life.³⁸ On the same day, Benjamin Singleton at Patricks Plains and James Glennie both reported cattle having been speared.

Although tensions remained high, Robert Scott advised that there was no point in pursuing or arresting any of the suspected Aboriginal men. Although convinced of their identity, Scott thought that with Aboriginal warriors showing increasing signs of hostility in the area, and travelling in large groups around the settlements, no arrests could be made without violence, bloodshed and possibly open warfare, requiring a considerable force to overcome.³⁹ In the end there was no need, as reports of violence in the Hunter Valley declined, with few made after mid-1827.

Not all interactions in the middle Hunter during this period were violent. Many of the estates and farms also employed Aboriginal people in work, paying them with food, tobacco and blankets. Although there is no evidence of Bowman employing Aboriginal workers, Robert Scott did on his estate at Glendon, as did William Ogilvie at Merton, including some in permanent work as shepherds. In 1826 Peter Cunningham employed 50 Aboriginal workers to cut and collect his maize crop, George Wyndham employed Aboriginal workers in 1830 and 1833 to cut maize, while William Bell at his Lemington estate on the Hunter River close to Ravensworth employed Aboriginal men to build bark races for his sheep during shearing in 1833.⁴⁰

Conclusion

The years 1825-1827 cycled through a series of tit-for-tat attacks and retributions between Aboriginal people and Europeans in the middle Hunter Valley. A combination of increasing pressures on traditional food sources by the influx of settler's livestock, the locking off of land through fencing and farming, provocation by convicts against Aboriginal people all combined to create an atmosphere of tension and the potential for violence. A close reading of the available evidence, through newspapers, depositions and enquiries appears to show not a series of random attacks, or rampaging bands of warriors, but rather targeted attacks against individuals and isolated workers. Bowman's large estate was the site of three attacks resulting in two Europeans killed and two wounded, with one Aboriginal man wounded. His worker Samuel Owen was also confronted close to the estate. But Ravensworth was not the only estate to be targeted. Violence spread across the Valley floor from Merton (Denman) in the west to Patricks Plains in the east, with a series of raids and attacks against mostly small, and isolated huts and outposts. The compounds that had been developed on the large estates, with the exception of Ogilvie's Merton, were rarely seriously threatened, with Aboriginal people probably aware of the danger in attacking these establishments, which were easily defended and often had sizable populations of convicts and workers around. Some however were used as temporary staging posts for the mounted police and district constables, such as James Glennie's property. It was from the property of James Glennie on Fal Brook (Glennies Creek), not Ravensworth, which Robert Scott set out with his party to pursue the attackers on Alcorn's hut in late 1826. The attack by this party that was reported by *The Australian* occurred 20 miles (32 kilometres) from Alcorn's Hut and resulted in the death of 18 Aborigines. Even though the exact location of this event is unknown, the plotting of a 20 mile (32 kilometre) radius from Alcorn's Hut situates this event well beyond Ravensworth Estate, which lies approximately 5 miles (8 kilometres) to the north-west.

By c1832, Bowman had completed construction of a new home on the Ravensworth estate for his manager James White. The new site was approximately 850 metres to the east of the original homestead site located on a slight rise (although lower than the hill of the original homestead) with flat land around it. The old homestead was rarely mentioned after this and disappears from maps and surveys of the estate, suggesting it was abandoned or removed once the new house and buildings were completed.

⁴ The second Aboriginal man is not named in Howe's first expedition; it may have been Mullaboy or someone else.

⁵ Wood, W A., *Dawn in the Valley: The Story of Settlement in the Hunter River Valley to 1833*, Sydney, 1972, p 42

⁷ Dangar, pp. 17-18.

¹ John Purcell to Colonial Secretary, 6 July 1810, Colonial Secretary's Correspondence, Special Bundles-Newcastle, SANSW, R6066 4/1804, p22.

² Macquarie, L., Journal of a tour to and from Newcastle 27 July 1818–9 August 18, SLNSW, ML Manuscripts A781, CY303 p.13.

³ John Howe to Governor Macquarie, 17 November 1819, Colonial Secretary's Correspondence, SANSW, Reel 6048 4/1743, p121.

⁶ Dangar, H, Index and Directory to Map of the Country bordering upon the River Hunter; the lands of the Australian-Agricultural Company; with the ground –plan and allotments of King's Town, New South Wales: containing a detail of the annual quit rent and amount of the redemption of the same; also, historical notes upon the tenure and principle of granting lands in the colony since 1810 with a view of the present state of agriculture in the colony... the whole forming, with regard to and affairs in that colony, a complete emigrants guide, 1828, British Library Historical Print Editions, British Library, London, p.17.

⁸ Cunningham, P., *Two Years in New South Wales*, Volume 1, Henry Colburn, London, 1827, p 80.

⁹ CSIL26/7403, in NRS 907, Col Sec, Correspondence re Land, James Bowman file, SANSW 2/7807 as quoted in 'Ravensworth Homestead Complex and Surroundings: Historical Archaeological Assessment and Archaeological Research Design' prepared for Glencore by Casey and Lowe Archaeology & Heritage, September 2018, p.20

¹⁰ Sainty, M. R., & K. A. Johnson, *Census of New South Wales: November 1828*, Library of Australian History, Sydney, 1980, A0167, B1862, C1029.

¹¹ Perry, T.M., *Australia's First Frontier: The Spread of settlement in New South Wales 1788-1829*, Melbourne University Press, Melbourne, 1963, p. 132.

¹² Dunn, M., Valley in a Valley: Colonial Struggles over land and resources in the Hunter Valley, NSW 1820-1850, PhD Thesis UNSW 2015, pp196-201. See also John Connor, *The Australian Frontier: 1788-1838*, UNSW Press Sydney, 2005, pp 62-64.

¹³ *The Australian*, 10 November 1825, p.3; James Greig letter to his brother, 11 November 1826, ML, Doc 2316.

¹⁴ James Greig letter to his brother, 11 November 1826, ML, Doc 2316.

¹⁵ Dunn, M., Valley in a Valley: Colonial Struggles over land and resources in the Hunter Valley, NSW 1820-1850, PhD Thesis UNSW 2015, p203.

¹⁶ *The Australian*, 17 June 1826, p.2.

¹⁷ *The Australian*, 24 June 1826, p.3.

¹⁸ Governor's Despatches, ML Volume 8, A1197, pp. 342-343.

¹⁹ Governor's Despatches, ML Volume 8, A1197, p. 343

²⁰ Threlkeld to Attorney General, 21 August, 1826, Supreme Court of NSW, 'Memoranda selected from 24 years of missionary engagements in the South Sea Islands and Australia by LE Threlkeld 1838', SRNSW, NRS 13705, COD 554, 5/1123, p. 46.

²¹ Wood, op cit, p.103.

²² Deposition of John Lanarch; Report of Robert Scott, ML Government Despatches Vol.8, A1197, pp. 324

²³ Dunn, op cit, pp. 207-210. See Governor's Despatches, ML Volume 8, A1197, pp. 288-329.

²⁴ Gunson, Neil (ed), *Australian Reminiscences and Papers of LE Threlkeld: Missionary to the Aborigines 1824-1859, Vol I and II*, Australian Institute of Aboriginal Studies, Canberra, 1974, p.95.

²⁵ The King against Nathaniel Lowe, Depositions, SANSW T24A, SC27/56.

²⁶ Report of Magistrates Mr Scott and Mr McLeod, 3 October 1826, Governor's Despatches, ML Volume 8, A1197, p. 344.

²⁷ Mary Bundock Memoir, Papers of the Bundock Family of Wynagarie, Richmond River, ML A6939, p. 7.

²⁸ Deposition of John Woodbury, ML Government Despatches Vol.8, A1197, p. 357.

²⁹ Deposition of John Woodbury; Report of Robert Scott, ML Government Despatches Vol.8, A1197, pp. 352–357; p. 344.

³⁰ Deposition of John Woodbury, ML Government Despatches Vol.8, A1197, p. 356.

³¹ Report of Magistrates Mr Scott and Mr McLeod, 3 October 1826, Governor's Despatches, ML Volume 8, A1197, p. 344. It should be noted that the AHMIS site card for the Ravensworth Massacre is based on the account put forward by Roger Millis in his *Waterloo Creek The Australia Day Massacre of 1838, George Gipps and the British conquest of NSW*, McPhee Gribble, Melbourne, p58. Millis has used the report of Scott and the Australian newspaper 23 September 1826, p3.

³² *The Australian*, 23 September 1826, p.3.

³³ Millis, R, *Waterloo Creek: The Australia Day Massacre of 1838, George Gipps and the British conquest of NSW*, McPhee Gribble, Melbourne, p.58.

³⁴ Petition to Governor Darling, 4 September 1826, ML, Governors Despatches, Volume 8, A1197, p. 219. The signatories to the petition were: Dr J Bowman (Ravensworth), Peter McIntyre (Segenhoe), AB Sparke (Ravensfield, Maitland), Leslie Duguid (Lochinvar), J Gaggin (Luskintyre), John Cobb (Minimbah), TW Winder (Windermere near Lochinvar), David Maziere (farm on site of Dalwood, Branxton), William Ogilivie (Merton), A Malcolm, John Brown (Bolwarra).

³⁵ Governor Darling–Response to petitioners, 5 September 1826, ML, GD Volume 8, A1197, p. 223.

³⁶ Report of Magistrates Mr Scott and Mr McLeod, 3 October 1826, Governor's Despatches, ML Volume 8, A1197, p. 345.

³⁷ George Claris, 25 March 1827, Supreme Court Miscellaneous Correspondence relating to Aborigines, SANSW, COD 294A, 5/1161, Items 378-867, p. 74.

³⁸ Samuel Owen, 28 March 1827, Supreme Court Miscellaneous Correspondence relating to Aborigines, SANSW COD 294A 5/1161, Items 378-867, p. 80.

³⁹ Robert Scott to Alexander McLeay, 17 May 1827, 28 March 1827, Supreme Court Miscellaneous Correspondence relating to Aborigines, SRNSW COD 294A 5/1161, Items 378-867, p. 90.

⁴⁰ Dunn, pp261-267.